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Description

This is a package for running H2O via its REST API from within R. To communicate with a H2O instance, the version of the R package must match the version of H2O. When connecting to a new H2O cluster, it is necessary to re-run the initializer.

Details

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<td>R (&gt;= 2.13.0), RCurl, jsonlite, statmod, tools, methods, utils</td>
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H2O is the scalable open source machine learning platform that offers parallelized implementations of many supervised and unsupervised machine learning algorithms such as Generalized Linear Models (GLM), Gradient Boosting Machines (including XGBoost), Random Forests, Deep Neural Networks (Deep Learning), Stacked Ensembles, Naive Bayes, Generalized Additive Models (GAM), Cox Proportional Hazards, K-Means, PCA, Word2Vec, as well as a fully automatic machine learning algorithm (H2O AutoML). As an example, to run GLM, call `h2o.glm` with the H2O parsed data and parameters (response variable, error distribution, etc.) as arguments.

This package enables the use of the H2O machine learning platform commands in R. To use H2O from R, you must start or connect to the "H2O cluster", the term we use to describe the backend H2O Java engine. To run H2O on your local machine, call `h2o.init` without any arguments, and H2O will be automatically launched at localhost:54321, where the IP is "127.0.0.1" and the port is 54321. If you have the H2O cluster running on a remote machine (e.g. AWS EC2), you must provide the IP and port of the remote machine as arguments to the `h2o.init` call.

Note that no actual data is stored in the R workspace; and no actual work is carried out by R. R only saves the named objects, which uniquely identify the data set, model, etc on the server. When the user makes a request, R queries the server via the REST API, which returns a JSON file with the relevant information that R then displays in the console.

Author(s)

Maintainer: Erin LeDell <erin@h2o.ai>

References

- H2O.ai Homepage
- H2O User Guide
- H2O on GitHub
### .addParm

**TODO:** No objects in this file are being used. Either remove file or use objects.

#### Description

Append a `<key,value>` pair to a list.

#### Usage

```
.addParm(parms, k, v)
```

#### Arguments

- **parms**: A list to add the `<k,v>` pair to.
- **k**: A key, typically the name of some algorithm parameter.
- **v**: A value, the value of the algorithm parameter.

#### Details

Contained here are a set of helper methods that perform type checking on the value passed in.

### .collapse

**Helper Collapse Function**

#### Description

Collapse a character vector into a `,`-sep array of the form: `[thing1,thing2,...]`

#### Usage

```
.collapse(v)
```

#### Arguments

- **v**: Character vector.
.h2o.doGET

Just like doRawGET but fills in the default h2oRestApiVersion if none is provided

Description

Just like doRawGET but fills in the default h2oRestApiVersion if none is provided

Usage

.h2o.doGET(h2oRestApiVersion, urlSuffix, parms, ...)

Arguments

h2oRestApiVersion
  (Optional) A version number to prefix to the urlSuffix. If no version is provided, a default version is chosen for you.
urlSuffix
  The partial URL suffix to add to the calculated base URL for the instance
parms
  (Optional) Parameters to include in the request
...
  (Optional) Additional parameters.

Value

A list object as described above

.h2o.doPOST

Just like doRawPOST but fills in the default h2oRestApiVersion if none is provided

Description

Just like doRawPOST but fills in the default h2oRestApiVersion if none is provided

Usage

.h2o.doPOST(h2oRestApiVersion, urlSuffix, parms, ...)

Arguments

h2oRestApiVersion
  (Optional) A version number to prefix to the urlSuffix. If no version is provided, a default version is chosen for you.
urlSuffix
  The partial URL suffix to add to the calculated base URL for the instance
parms
  (Optional) Parameters to include in the request
...
  (Optional) Additional parameters.

Value

A list object as described above
.h2o.doRawGET

Perform a low-level HTTP GET operation on an H2O instance

Description

Does not do any I/O level error checking. Caller must do its own validations. Does not modify the response payload in any way. Log the request and response if h2o.startLogging() has been called.

Usage

```
.h2o.doRawGET(
    conn = h2o.getConnection(),
    h2oRestApiVersion,
    urlSuffix,
    parms,
    ...
)
```

Arguments

- `conn` H2OConnection
- `h2oRestApiVersion` (Optional) A version number to prefix to the `urlSuffix`. If no version is provided, the version prefix is skipped.
- `urlSuffix` The partial URL suffix to add to the calculated base URL for the instance
- `parms` (Optional) Parameters to include in the request
- `...` (Optional) Additional parameters.

Details

The return value is a list as follows: $url – Final calculated URL. $postBody – The body of the POST request from client to server. $curlError – TRUE if a socket-level error occurred. FALSE otherwise. $curlErrorMessage – If curlError is TRUE a message about the error. $httpStatusCode – The HTTP status code. Usually 200 if the request succeeded. $httpStatusMessage – A string describing the $httpStatusCode. $payload – The raw response payload as a character vector.

Value

A list object as described above
Perform a low-level HTTP POST operation on an H2O instance

Description

Does not do any I/O level error checking. Caller must do its own validations. Does not modify the response payload in any way. Log the request and response if h2o.startLogging() has been called.

Usage

h2o.doRawPOST(
    conn = h2o.getConnection(),
    h2oRestApiVersion,
    urlSuffix,
    parms,
    fileUploadInfo,
...
)

Arguments

conn H2OConnection
h2oRestApiVersion (Optional) A version number to prefix to the urlSuffix. If no version is provided, the version prefix is skipped.
urlSuffix The partial URL suffix to add to the calculated base URL for the instance
parms (Optional) Parameters to include in the request
fileUploadInfo (Optional) Information to POST (NOTE: changes Content-type from XXX-www-url-encoded to multi-part). Use fileUpload(normalizePath("/path/to/file")).
...
(Optional) Additional parameters.

Details

The return value is a list as follows: $url – Final calculated URL. $postBody – The body of the POST request from client to server. $curlError – TRUE if a socket-level error occurred. FALSE otherwise. $curlErrorMessage – If curlError is TRUE a message about the error. $httpStatusCode – The HTTP status code. Usually 200 if the request succeeded. $httpStatusMessage – A string describing the httpStatusCode. $payload – The raw response payload as a character vector.

Value

A list object as described above
.h2o.doSafeGET  Perform a safe (i.e. error-checked) HTTP GET request to an H2O cluster.

Description

This function validates that no CURL error occurred and that the HTTP response code is successful. If a failure occurred, then stop() is called with an error message. Since all necessary error checking is done inside this call, the valid payload is directly returned if the function successfully finishes without calling stop().

Usage

.h2o.doSafeGET(h2oRestApiVersion, urlSuffix, parms, ...)

Arguments

h2oRestApiVersion  (Optional) A version number to prefix to the urlSuffix. If no version is provided, a default version is chosen for you.
urlSuffix  The partial URL suffix to add to the calculated base URL for the instance
parms  (Optional) Parameters to include in the request
...  (Optional) Additional parameters.

Value

The raw response payload as a character vector

.h2o.doSafePOST  Perform a safe (i.e. error-checked) HTTP POST request to an H2O cluster.

Description

This function validates that no CURL error occurred and that the HTTP response code is successful. If a failure occurred, then stop() is called with an error message. Since all necessary error checking is done inside this call, the valid payload is directly returned if the function successfully finishes without calling stop().

Usage

.h2o.doSafePOST(h2oRestApiVersion, urlSuffix, parms, fileUploadInfo, ...)

Arguments

h2oRestApiVersion  (Optional) A version number to prefix to the urlSuffix. If no version is provided, a default version is chosen for you.
urlSuffix  The partial URL suffix to add to the calculated base URL for the instance
parms  (Optional) Parameters to include in the request
fileUploadInfo  (Optional) Additional parameters.
Arguments

- **h2oRestApiVersion**
  (Optional) A version number to prefix to the `urlSuffix`. If no version is provided, a default version is chosen for you.

- **urlSuffix**
  The partial URL suffix to add to the calculated base URL for the instance

- **parms**
  (Optional) Parameters to include in the request

- **fileUploadInfo**
  (Optional) Information to POST (NOTE: changes Content-type from XXX-www-url-encoded to multi-part). Use fileUpload(normalizePath("/path/to/file")).

  ... (Optional) Additional parameters.

Value

The raw response payload as a character vector

---

**.h2o.is_progress**  
*Check if Progress Bar is Enabled*

**Description**

Check if Progress Bar is Enabled

**Usage**

```
.h2o.is_progress()
```

---

**.h2o.locate**  
*Locate a file given the pattern <bucket>/<path/to/file> e.g.  
h2o:::.h2o.locate("smalldata/iris/iris22.csv") returns the absolute path to iris22.csv*

**Description**

Locate a file given the pattern `<bucket>/<path/to/file>` e.g. `h2o:::.h2o.locate("smalldata/iris/iris22.csv")` returns the absolute path to `iris22.csv`

**Usage**

```
.h2o.locate(pathStub, root.parent = NULL)
```

**Arguments**

- **pathStub**  
  relative path

- **root.parent**  
  search root directory
.h2o.perfect_auc  
Internal function that calculates a precise AUC from given probabilities and actual responses.

Description

Note: The underlying implementation is not distributed and can only handle limited size of data. For internal use only.

Usage

.h2o.perfect_auc(probs, acts)

Arguments

probs An H2OFrame holding vector of probabilities.
acts An H2OFrame holding vector of actuals.

.h2o.primitives  
Map of operations known to H2O

Description

Map of operations known to H2O

Usage

.h2o.primitives

Format

An object of class character of length 39.

.h2o.__ALL_CAPABILITIES  
Capabilities endpoints

Description

Capabilities endpoints

Usage

.h2o.__ALL_CAPABILITIES

Format

An object of class character of length 1.
.h2o.__checkConnectionHealth

*Check H2O Server Health*

**Description**

Warn if there are sick nodes.

**Usage**

```r
.h2o.__checkConnectionHealth()
```

---

.h2o.__CREATE_FRAME

*H2OFrame Manipulation*

**Description**

H2OFrame Manipulation

**Usage**

```r
.h2o.__CREATE_FRAME
```

**Format**

An object of class `character` of length 1.

---

.h2o.__DECRYPTION_SETUP

*Decryption Endpoints*

**Description**

Decryption Endpoints

**Usage**

```r
.h2o.__DECRYPTION_SETUP
```

**Format**

An object of class `character` of length 1.
**Removal Endpoints**

**Description**
Removal Endpoints

**Usage**
\[ .h2o.__DKV \]

**Format**
An object of class character of length 1.

---

**Export Files Endpoint Generator**

**Description**
Export Files Endpoint Generator

**Usage**
\[ .h2o.__EXPORT_FILES(frame) \]

**Arguments**
- `frame` H2OFrame

---

**Inspect/Summary Endpoints**

**Description**
Inspect/Summary Endpoints

**Usage**
\[ .h2o.__FRAMES \]

**Format**
An object of class character of length 1.
### Import/Export Endpoints

**Description**
Import/Export Endpoints

**Usage**
.h2o.__IMPORT

**Format**
An object of class character of length 1.

### Administrative Endpoints

**Description**
Administrative Endpoints

**Usage**
.h2o.__JOBS

**Format**
An object of class character of length 1.

### Log and Echo Endpoint

**Description**
Log and Echo Endpoint

**Usage**
.h2o.__LOGANDECHO

**Format**
An object of class character of length 1.
### h2o.__MODELS  
**Model Endpoint**

**Description**
Model Endpoint

**Usage**
.h2o.__MODELS

**Format**
An object of class character of length 1.

### h2o.__MODEL_BUILDERS  
**Model Builder Endpoint Generator**

**Description**
Model Builder Endpoint Generator

**Usage**
.h2o.__MODEL_BUILDERS(algo)

**Arguments**
- **algo**  
  Cannonical identifier of H2O algorithm.

### h2o.__MODEL_METRICS  
**Model Metrics Endpoint**

**Description**
Model Metrics Endpoint

**Usage**
.h2o.__MODEL_METRICS(model, data)

**Arguments**
- **model**  
  H2OModel.
- **data**  
  H2OFrame.
### Parse Endpoints

**Description**
Parse Endpoints

**Usage**
```
.h2o.__PARSE_SETUP
```

**Format**
An object of class character of length 1.

### Rapids Endpoint

**Description**
Rapids Endpoint

**Usage**
```
.h2o.__RAPIDS
```

**Format**
An object of class character of length 1.

### H2O Package Constants

**Description**
The API endpoints for interacting with H2O via REST are named here.

**Usage**
```
.h2o.__REST_API_VERSION
```

**Format**
An object of class integer of length 1.

**Details**
Additionally, environment variables for the H2O package are named here. Endpoint Version
.h2o.__SEGMENT_MODELS_BUILDERS

Segment Models Builder Endpoint Generator

**Description**

Segment Models Builder Endpoint Generator

**Usage**

```
.h2o.__SEGMENT_MODELS_BUILDERS(algo)
```

**Arguments**

- `algo`  
  Cannonical identifier of H2O algorithm.

---

.h2o.__W2V_SYNONYMS

Word2Vec Endpoints

**Description**

Word2Vec Endpoints

**Usage**

```
.h2o.__W2V_SYNONYMS
```

**Format**

An object of class `character` of length 1.

---

.pkg.env

The H2O Package Environment

**Description**

The H2O Package Environment

**Usage**

```
.pkg.env
```

**Format**

An object of class `environment` of length 4.
**Description**

Collected here are the various methods used by the h2o-R package to communicate with the H2O backend. There are methods for checking cluster health, polling, and inspecting objects in the H2O store.

**Usage**

```r
verify_dataxy()
```

**Arguments**

- `data`: H2OFrame
- `x`: features
- `y`: response
- `autoencoder`: autoencoder flag

**Examples**

```r
## Not run:
if (Sys.info()['sysname'] == "Darwin" && Sys.info()['release'] == '13.4.0') {
  quit(save = "no")
} else {
  h2o.init(nthreads = 2)
}
## End(Not run)
```
apply  

Apply on H2O Datasets

Description

Method for apply on H2OFrame objects.

Usage

apply(X, MARGIN, FUN, ...)

Arguments

X
an H2OFrame object on which apply will operate.

MARGIN
the vector on which the function will be applied over, either 1 for rows or 2 for columns.

FUN
the function to be applied.

...optional arguments to FUN.

Value

Produces a new H2OFrame of the output of the applied function. The output is stored in H2O so that it can be used in subsequent H2O processes.

See Also

apply for the base generic

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
summary(apply(iris_hf, 2, sum))

## End(Not run)

as.character.H2OFrame  

Convert an H2OFrame to a String

Description

Convert an H2OFrame to a String

Usage

## S3 method for class 'H2OFrame'
as.character(x, ...)
as.data.frame.H2OFrame

Arguments

x  An H2OFrame object

... Further arguments to be passed from or to other methods.

Examples

```r
## Not run:
library(h2o)
h2o.init()
pretrained <- as.h2o(data.frame(
    C1 = c("a", "b"), C2 = c(0, 1), C3 = c(1, 0), C4 = c(0.2, 0.8),
    stringsAsFactors = FALSE))
pretrained_w2v <- h2o.word2vec(pre_trained = pretrained, vec_size = 3)
words <- as.character(as.h2o(c("b", "a", "c", NA, "a")))
vecs <- h2o.transform(pretrained_w2v, words = words)
## End(Not run)
```

Description

Downloads the H2O data and then scans it in to an R data frame.

Usage

```r
## S3 method for class 'H2OFrame'
as.data.frame(x, ...)
```

Arguments

x  An H2OFrame object.

... Further arguments to be passed down from other methods.

Details

Method as.data.frame.H2OFrame will use fread if data.table package is installed in required version.

See Also

use.package
as.data.frame.H2OSegmentModels

Converts a collection of Segment Models to a data.frame

Description

Converts a collection of Segment Models to a data.frame

Usage

## S3 method for class 'H2OSegmentModels'
as.data.frame(x, ...)

Arguments

x

Object of class H2OSegmentModels.

...

Further arguments to be passed down from other methods.

Value

Returns data.frame with result of segment model training.

Examples

### Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
as.data.frame(prostate)

### End(Not run)

### Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
models <- h2o.train_segments(algorithm = "gbm",
   segment_columns = "Species",
   x = c(1:3), y = 4,
   training_frame = iris_hf,
   ntree = 5,
   max_depth = 4)
as.data.frame(models)

### End(Not run)
as.factor

Convert H2O Data to Factors

Description
Convert a column into a factor column.

Usage
as.factor(x)

Arguments
x  
a column from an H2OFrame data set.

See Also
as.factor.

Examples
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadfile(path = prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
summary(prostate)
## End(Not run)

as.h2o

Create H2OFrame

Description
Import R object to the H2O cluster.

Usage
as.h2o(x, destination_frame = "", ...)

## Default S3 method:
as.h2o(x, destination_frame = "", ...)

## S3 method for class 'H2OFrame'
as.h2o(x, destination_frame = "", ...)

## S3 method for class 'data.frame'
as.h2o(x, destination_frame = "", use_datatable = TRUE, ...)

## S3 method for class 'Matrix'
as.h2o(x, destination_frame = "", use_datatable = TRUE, ...)
Arguments

`x`  
An R object.

`destination_frame`  
A string with the desired name for the H2OFrame

...  
arguments passed to method arguments.

`usedatatable`  
allow usage of data.table

Details

Method `as.h2o.data.frame` will use `fwrite` if data.table package is installed in required version.

To speedup execution time for large sparse matrices, use h2o datatable. Make sure you have installed and imported data.table and slam packages. Turn on h2o datatable by `options("h2o.use.data.table"=TRUE)`

References

https://www.h2o.ai/blog/fast-csv-writing-for-r/

See Also

`use.package`

Examples

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
euro_hf <- as.h2o(euro)
letters_hf <- as.h2o(letters)
state_hf <- as.h2o(state.x77)
iris_hf_2 <- as.h2o(iris_hf)
stopifnot(is.h2o(iris_hf), dim(iris_hf) == dim(iris),
is.h2o(euro_hf), dim(euro_hf) == c(length(euro), 1L),
is.h2o(letters_hf), dim(letters_hf) == c(length(letters), 1L),
is.h2o(state_hf), dim(state_hf) == dim(state.x77),
is.h2o(iris_hf_2), dim(iris_hf_2) == dim(iris_hf))
if (requireNamespace("Matrix", quietly=TRUE)) {
  data <- rep(0, 100)
data[(1:10) ^ 2] <- 1:10 * pi
m <- matrix(data, ncol = 20, byrow = TRUE)
m_hf <- as.h2o(m)
stopifnot(is.h2o(m_hf), dim(m_hf) == dim(m))
}
## End(Not run)
```
as.matrix.H2OFrame  

Convert an H2OFrame to a matrix

Description

Convert an H2OFrame to a matrix

Usage

## S3 method for class 'H2OFrame'
as.matrix(x, ...)

Arguments

x  An H2OFrame object

...  Further arguments to be passed down from other methods.

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
describe <- h2o.describe(iris_hf)
mins = as.matrix(apply(iris_hf, 2, min))
print(mins)

## End(Not run)

as.numeric  

Convert H2O Data to Numeric

Description

Converts an H2O column into a numeric value column.

Usage

as.numeric(x)

Arguments

x  a column from an H2OFrame data set.
Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate[, 2] <- as.numeric(prostate[, 2])
## End(Not run)
```

as.vector.H2OFrame Convert an H2OFrame to a vector

Description

Convert an H2OFrame to a vector

Usage

```r
## S3 method for class 'H2OFrame'
as.vector(x, mode)
```

Arguments

- `x`: An H2OFrame object
- `mode`: Mode to coerce vector to

Examples

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
cor_R <- cor(as.matrix(iris[, 1]))
cor_h2o <- cor(iris_hf[, 1])
iris_R.cor <- cor(iris[, 1:4])
iris_H2O_cor <- as.data.frame(cor(iris_hf[, 1:4]))
h2o_vec <- as.vector(unlist(iris_H2O_cor))
r_vec <- as.vector(unlist(iris_R.cor))
## End(Not run)
```

australia Australia Coastal Data

Description

Temperature, soil moisture, runoff, and other environmental measurements from the Australia coast. The data is available from [https://cs.colby.edu/courses/S11/cs251/labs/lab07/AustraliaSubset.csv](https://cs.colby.edu/courses/S11/cs251/labs/lab07/AustraliaSubset.csv).

Format

A data frame with 251 rows and 8 columns
colnames

Returns the column names of an H2OFrame

Description

Returns the column names of an H2OFrame

Usage

colnames(x, do.NULL = TRUE, prefix = "col")

Arguments

  x          An H2OFrame object.
  do.NULL   logical. If FALSE and names are NULL, names are created.
  prefix    for created names.

Examples

## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
colnames(iris_hf) # Returns "Sepal.Length" "Sepal.Width" "Petal.Length" "Petal.Width" "Species"

## End(Not run)

---

dim.H2OFrame

Returns the Dimensions of an H2OFrame

Description

Returns the number of rows and columns for an H2OFrame object.

Usage

## S3 method for class 'H2OFrame'
dim(x)

Arguments

  x          An H2OFrame object.

See Also

dim for the base R method.
Examples

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
dim(iris_hf)

## End(Not run)
```

### dimnames.H2OFrame

**Column names of an H2OFrame**

**Description**

Set column names of an H2O Frame

**Usage**

```r
## S3 method for class 'H2OFrame'
dimnames(x)
```

**Arguments**

- `x`: An H2OFrame

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

n <- 2000
# Generate variables V1, ... V10
X <- matrix(rnorm(10 * n), n, 10)
# y = +1 if sum_i x_{ij}^2 > chisq median on 10 df
y <- rep(-1, n)
y[apply(X*X, 1, sum) > qchisq(.5, 10)] <- 1
# Assign names to the columns of X:
dimnames(X)[[2]] <- c("V1", "V2", "V3", "V4", "V5", "V6", "V7", "V8", "V9", "V10")

## End(Not run)
```
**feature_frequencies.H2OModel**

*Retrieve the number of occurrences of each feature for given observations Available for GBM, Random Forest and Isolation Forest models.*

**Description**

Retrieve the number of occurrences of each feature for given observations Available for GBM, Random Forest and Isolation Forest models.

**Usage**

```r
feature_frequencies.H2OModel(object, newdata, ...)
```

```r
h2o.feature_frequencies(object, newdata, ...)
```

**Arguments**

- `object` a fitted H2OModel object for which prediction is desired
- `newdata` An H2OFrame object in which to look for variables with which to predict.
- `...` additional arguments to pass on.

**Value**

Returns an H2OFrame contain per-feature frequencies on the predict path for each input row.

**See Also**

`h2o.gbm` and `h2o.randomForest` for model generation in h2o.

---

**generate_col_ind**

*Check to see if the column names/indices entered is valid for the dataframe given. This is an internal function*

**Description**

Check to see if the column names/indices entered is valid for the dataframe given. This is an internal function

**Usage**

```r
generate_col_ind(data, by)
```

**Arguments**

- `data` The H2OFrame whose column names or indices are entered as a list
- `by` The column names/indices in a list.
get_seed.H2OModel  
Get the seed from H2OModel which was used during training. If a user does not set the seed parameter before training, the seed is autogenerated. It returns seed as the string if the value is bigger than the integer. For example, an autogenerated seed is always long so that the seed in R is a string.

Description
Get the seed from H2OModel which was used during training. If a user does not set the seed parameter before training, the seed is autogenerated. It returns seed as the string if the value is bigger than the integer. For example, an autogenerated seed is always long so that the seed in R is a string.

Usage
get_seed.H2OModel(object)
h2o.get_seed(object)

Arguments
object  a fitted H2OModel object.

Value
Returns seed to be used during training a model. Could be numeric or string.

Examples
```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
prostate_gbm <- h2o.gbm(3:9, "CAPSULE", prostate)
seed <- h2o.get_seed(prostate_gbm)
## End(Not run)
```

h2o.abs
Compute the absolute value of x

Description
Compute the absolute value of x

Usage
h2o.abs(x)
h2o.acos

Compute the arc cosine of x

Description

Compute the arc cosine of x.

Usage

x

An H2OFrame object.

See Also

Trig for the base R implementation, acos().

Examples

## Not run:

```r
library(h2o)
h2o.init()

smtrees_hf <- h2o.importFile(url)
model <- h2o.gbm(x = c("girth", "height"), y = "vol", ntree = 3, max_depth = 1,
                 distribution = "gaussian", min_rows = 2, learn_rate = .1,
                 training_frame = smtrees_hf)
pred <- as.data.frame(predict(model, newdata = smtrees_hf))
diff <- pred - smtrees_df[, 4]
diff.abs <- abs(diff)
print(diff.abs)
```

## End(Not run)
h2o.aggregated_frame  

Retrieve an aggregated frame from an Aggregator model

**Description**

Retrieve an aggregated frame from the Aggregator model and use it to create a new frame.

**Usage**

h2o.aggregated_frame(model)

**Arguments**

- **model**: an H2OClusteringModel corresponding from a h2o.aggregator call.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
df <- h2o.createFrame(rows = 100,
cols = 5,
categorical_fraction = 0.6,
integer_fraction = 0,
binary_fraction = 0,
real_range = 100,
integer_range = 100,
missing_fraction = 0)
target_num_exemplars = 1000
rel_tol_num_exemplars = 0.5
encoding = "Eigen"
agg <- h2o.aggregator(training_frame = df,
    target_num_exemplars = target_num_exemplars,
    rel_tol_num_exemplars = rel_tol_num_exemplars,
categorical_encoding = encoding)
# Use the aggregated frame to create a new dataframe
new_df <- h2o.aggregated_frame(agg)
## End(Not run)
```

h2o.aggregator  

Build an Aggregated Frame

**Description**

Builds an Aggregated Frame of an H2OFrame.
Usage

h2o.aggregator(
    training_frame,
    x,
    model_id = NULL,
    ignore_const_cols = TRUE,
    target_num_exemplars = 5000,
    rel_tol_num_exemplars = 0.5,
    transform = c("NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE"),
    categorical_encoding = c("AUTO", "Enum", "OneHotInternal", "OneHotExplicit",
                            "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited"),
    save_mapping_frame = FALSE,
    num_iteration_without_new_exemplar = 500,
    export_checkpoints_dir = NULL
)

Arguments

training_frame  Id of the training data frame.

x               A vector containing the character names of the predictors in the model.

model_id        Destination id for this model; auto-generated if not specified.

ignore_const_cols  Logical. Ignore constant columns. Defaults to TRUE.

target_num_exemplars  Targeted number of exemplars Defaults to 5000.

rel_tol_num_exemplars  Relative tolerance for number of exemplars (e.g, 0.5 is +/- 50 percents) Defaults to 0.5.

transform  Transformation of training data Must be one of: "NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE". Defaults to NORMALIZE.

categorical_encoding  Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited". Defaults to AUTO.

save_mapping_frame  Logical. Whether to export the mapping of the aggregated frame Defaults to FALSE.

num_iteration_without_new_exemplar  The number of iterations to run before aggregator exits if the number of exemplars collected didn’t change Defaults to 500.

export_checkpoints_dir  Automatically export generated models to this directory.

Examples

## Not run:
library(h2o)
h2o.init()
df <- h2o.createFrame(rows = 100,
                       cols = 5,
                       categorical_fraction = 0.6,
integer_fraction = 0,
binary_fraction = 0,
real_range = 100,
integer_range = 100,
missing_fraction = 0)
target_num_exemplars = 1000
rel_tol_num_exemplars = 0.5
encoding = "Eigen"
agg <- h2o.aggregator(training_frame = df,
target_num_exemplars = target_num_exemplars,
rel_tol_num_exemplars = rel_tol_num_exemplars,
categorical_encoding = encoding)

## End(Not run)

---

**h2o.aic**

*Retrieve the Akaike information criterion (AIC) value*

**Description**

Retrieves the AIC value. If "train", "valid", and "xval" parameters are FALSE (default), then the training AIC value is returned. If more than one parameter is set to TRUE, then a named vector of AICs are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.aic(object, train = FALSE, valid = FALSE, xval = FALSE)
```

**Arguments**

- **object**: An H2OModel or H2OModelMetrics.
- **train**: Retrieve the training AIC
- **valid**: Retrieve the validation AIC
- **xval**: Retrieve the cross-validation AIC

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
p_sid <- h2o.runif(prostate)
prostate_train <- prostate[p_sid > .2,]
prostate_glm <- h2o.glm(x = 3:7, y = 2, training_frame = prostate_train)
aic_basic <- h2o.aic(prostate_glm)
print(aic_basic)

## End(Not run)
```
Given a set of logical vectors, are all of the values true?

**Usage**

```r
h2o.all(x)
```

**Arguments**

- `x` An H2OFrame object.

**See Also**

`all` for the base R implementation.

---

Anomaly Detection via H2O Deep Learning Model

**Description**

Detect anomalies in an H2O dataset using an H2O deep learning model with auto-encoding.

**Usage**

```r
h2o.anomaly(object, data, per_feature = FALSE)
```

**Arguments**

- `object` An `H2OAutoEncoderModel` object that represents the model to be used for anomaly detection.
- `data` An H2OFrame object.
- `per_feature` Whether to return the per-feature squared reconstruction error

**Value**

Returns an H2OFrame object containing the reconstruction MSE or the per-feature squared error.

**See Also**

`h2o.deeplearning` for making an H2OAutoEncoderModel.
Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path = system.file("extdata", "prostate.csv", package = "h2o")
prostate = h2o.importFile(path = prostate_path)
prostate_dl = h2o.deeplearning(x = 3:9, training_frame = prostate, autoencoder = TRUE,
                               hidden = c(10, 10), epochs = 5)
prostate_anon = h2o.anomaly(prostate_dl, prostate)
head(prostate_anon)
prostate_anon_per_feature = h2o.anomaly(prostate_dl, prostate, per_feature = TRUE)
head(prostate_anon_per_feature)
## End(Not run)
```

### h2o.any

#### Description

Given a set of logical vectors, is at least one of the values true?

#### Usage

```r
h2o.any(x)
```

#### Arguments

- `x` An H2OFrame object.

#### See Also

`all` for the base R implementation.

#### Examples

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.any(iris[, 1] < 1000)
## End(Not run)
```
**h2o.anyFactor**  
*Check H2OFrame columns for factors*

**Description**  
Determines if any column of an H2OFrame object contains categorical data.

**Usage**  
```r  
h2o.anyFactor(x)  
```

**Arguments**  
- `x`: An H2OFrame object.

**Value**  
Returns a logical value indicating whether any of the columns in `x` are factors.

**Examples**  
```r  
## Not run:  
library(h2o)  
h2o.init()  
iris_hf <- as.h2o(iris)  
h2o.anyFactor(iris_hf)  
## End(Not run)  
```

---

**h2o.arrange**  
*Sorts an H2O frame by columns*

**Description**  
Sorts H2OFrame by the columns specified. H2OFrame can contain String columns but should not sort on any String columns. Otherwise, an error will be thrown. To sort column `c1` in descending order, do `desc(c1)`. Returns a new H2OFrame, like `dplyr::arrange`.

**Usage**  
```r  
h2o.arrange(x, ...)  
```

**Arguments**  
- `x`: The H2OFrame input to be sorted.
- `...`: The column names to sort by.
h2o.asfactor

Examples

## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.arrange(iris, "species","petal_len","petal_wid")

## End(Not run)

h2o.ascharacter

Convert H2O Data to Characters

Description

Convert H2O Data to Characters

Usage

h2o.ascharacter(x)

Arguments

x An H2OFrame object.

Examples

## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.ascharacter(iris["species"])

## End(Not run)

h2o.asfactor

Convert H2O Data to Factors

Description

Convert H2O Data to Factors

Usage

h2o.asfactor(x)
h2o.asnumeric

Arguments

x An H2OFrame object.

See Also

factor for the base R implementation, as.factor().

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
h2o.asfactor(cars["cylinders"])

## End(Not run)
h2o.assign  

*Rename an H2O object.*

**Description**

Makes a copy of the data frame and gives it the desired key.

**Usage**

```r
h2o.assign(data, key)
```

**Arguments**

- `data`  
  An H2OFrame object
- `key`  
  The key to be associated with the H2O parsed data object

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
dim(cars)

split <- h2o.splitFrame(data = cars, ratios = 0.8)
train <- h2o.assign(split[[1]], key = "train")
test <- h2o.assign(split[[2]], key = "test")
dim(train)
dim(test)

## End(Not run)
```

h2o.as_date  

*Convert between character representations and objects of Date class*

**Description**

Functions to convert between character representations and objects of class "Date" representing calendar dates.

**Usage**

```r
h2o.as_date(x, format, ...)
```

**Arguments**

- `x`  
  H2OFrame column of strings or factors to be converted
- `format`  
  A character string indicating date pattern
- `...`  
  Further arguments to be passed from or to other methods.
h2o.auc

Retrieve the AUC

Description

Retrieves the AUC value from an H2OBinomialMetrics. If "train", "valid", and "xval" parameters are FALSE (default), then the training AUC value is returned. If more than one parameter is set to TRUE, then a named vector of AUCs are returned, where the names are "train", "valid" or "xval".

Usage

h2o.auc(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object
An H2OBinomialMetrics object.
train
Retrieve the training AUC
valid
Retrieve the validation AUC
xval
Retrieve the cross-validation AUC

See Also

h2o.giniCoef for the Gini coefficient, h2o.mse for MSE, and h2o.metric for the various threshold metrics. See h2o.performance for creating H2OModelMetrics objects.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.auc(perf)
## End(Not run)
```

h2o.aucpr

Retrieve the AUCPR (Area Under Precision Recall Curve)

Description

Retrieves the AUCPR value from an H2OBinomialMetrics. If "train", "valid", and "xval" parameters are FALSE (default), then the training AUCPR value is returned. If more than one parameter is set to TRUE, then a named vector of AUCPRs are returned, where the names are "train", "valid" or "xval".
Usage

h2o.aucpr(object, train = FALSE, valid = FALSE, xval = FALSE)

h2o.pr_auc(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object: An H2OBinomialMetrics object.

train: Retrieve the training aucpr

valid: Retrieve the validation aucpr

xval: Retrieve the cross-validation aucpr

See Also

h2o.giniCoef for the Gini coefficient, h2o.mse for MSE, and h2o.metric for the various threshold metrics. See h2o.performance for creating H2OModelMetrics objects.

Examples

## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)

prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.aucpr(perf)

## End(Not run)
h2o.automl

blending_frame = NULL,
nfolds = 5,
fold_column = NULL,
weights_column = NULL,
balance_classes = FALSE,
class_sampling_factors = NULL,
max_after_balance_size = 5,
max_runtime_secs = NULL,
max_runtime_secs_per_model = NULL,
max_models = NULL,
stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error"),
stopping_tolerance = NULL,
stopping_rounds = 3,
seed = NULL,
project_name = NULL,
exclude_algos = NULL,
include_algos = NULL,
modeling_plan = NULL,
exploitation_ratio = 0,
monotone_constraints = NULL,
algo_parameters = NULL,
keep_cross_validation_predictions = FALSE,
keep_cross_validation_models = FALSE,
keep_cross_validation_fold_assignment = FALSE,
sort_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "mean_per_class_error"),
export_checkpoints_dir = NULL,
verbosity = "warn"
)

Arguments

x
A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.

y
The name or index of the response variable in the model. For classification, the y column must be a factor, otherwise regression will be performed. Indexes are 1-based in R.

training_frame
Training frame (H2OFrame or ID).

validation_frame
Validation frame (H2OFrame or ID); Optional. This argument is ignored unless the user sets nfolds = 0. If cross-validation is turned off, then a validation frame can be specified and used for early stopping of individual models and early stopping of the grid searches. By default and when nfolds > 1, cross-validation metrics will be used for early stopping and thus validation_frame will be ignored.

leaderboard_frame
Leaderboard frame (H2OFrame or ID); Optional. If provided, the Leaderboard will be scored using this data frame instead of using cross-validation metrics, which is the default.

blending_frame
Blending frame (H2OFrame or ID) used to train the the metalearning algorithm in Stacked Ensembles (instead of relying on cross-validated predicted values);
Optional. When provided, it also is recommended to disable cross validation by setting `nfolds=0` and to provide a leaderboard frame for scoring purposes.

nfolds
Number of folds for k-fold cross-validation. Defaults to 5. Use 0 to disable cross-validation; this will also disable Stacked Ensemble (thus decreasing the overall model performance).

fold_column
Column with cross-validation fold index assignment per observation; used to override the default, randomized, 5-fold cross-validation scheme for individual models in the AutoML run.

weights_column
Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed.

balance_classes
Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors
Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.

max_after_balance_size
Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_runtime_secs
This argument specifies the maximum time that the AutoML process will run for, prior to training the final Stacked Ensemble models. If neither `max_runtime_secs` nor `max_models` are specified by the user, then `max_runtime_secs` defaults to 3600 seconds (1 hour).

max_runtime_secs_per_model
Maximum runtime in seconds dedicated to each individual model training process. Use 0 to disable. Defaults to 0.

max_models
Maximum number of models to build in the AutoML process (does not include Stacked Ensembles). Defaults to NULL (no strict limit).

stopping_metric
Metric to use for early stopping ("AUTO" is logloss for classification, deviance for regression). Must be one of "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error". Defaults to "AUTO".

stopping_tolerance
Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much). This value defaults to 0.001 if the dataset is at least 1 million rows; otherwise it defaults to a bigger value determined by the size of the dataset and the non-NA-rate. In that case, the value is computed as 1/sqrt(nrows * non-NA-rate).

stopping_rounds
Integer. Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k (stopping_rounds) scoring events. Defaults to 3 and must be an non-zero integer. Use 0 to disable early stopping.
seed

Integer. Set a seed for reproducibility. AutoML can only guarantee reproducibility if max_models or early stopping is used because max_runtime_secs is resource limited, meaning that if the resources are not the same between runs, AutoML may be able to train more models on one run vs another.

project_name

Character string to identify an AutoML project. Defaults to NULL, which means a project name will be auto-generated.

exclude_algos

Vector of character strings naming the algorithms to skip during the model-building phase. An example use is exclude_algos = c("GLM", "DeepLearning", "DRF"), and the full list of options is: "DRF" (Random Forest and Extremely-Randomized Trees), "GLM", "XGBoost", "GBM", "DeepLearning" and "StackedEnsemble". Defaults to NULL, which means that all appropriate H2O algorithms will be used, if the search stopping criteria allow. Optional.

include_algos

Vector of character strings naming the algorithms to restrict to during the model-building phase. This can’t be used in combination with exclude_algos param. Defaults to NULL, which means that all appropriate H2O algorithms will be used, if the search stopping criteria allow. Optional.

modeling_plan

List. The list of modeling steps to be used by the AutoML engine (they may not all get executed, depending on other constraints). Optional (Expert usage only).

exploitation_ratio

The budget ratio (between 0 and 1) dedicated to the exploitation (vs exploration) phase. By default, the exploitation phase is disabled (exploitation_ratio=0) as this is still experimental; to activate it, it is recommended to try a ratio around 0.1. Note that the current exploitation phase only tries to fine-tune the best XGBoost and the best GBM found during exploration.

monotone_constraints

List. A mapping representing monotonic constraints. Use +1 to enforce an increasing constraint and -1 to specify a decreasing constraint.

algo_parameters

List. A list of param_name=param_value to be passed to internal models. Defaults to none (Expert usage only). By default, params are set only to algorithms accepting them, and ignored by others. Only following parameters are currently allowed: "monotone_constraints".

keep_cross_validation_predictions

Logical. Whether to keep the predictions of the cross-validation predictions. This needs to be set to TRUE if running the same AutoML object for repeated runs because CV predictions are required to build additional Stacked Ensemble models in AutoML. This option defaults to FALSE.

keep_cross_validation_models

Logical. Whether to keep the cross-validated models. Keeping cross-validation models may consume significantly more memory in the H2O cluster. This option defaults to FALSE.

keep_cross_validation_fold_assignment

Logical. Whether to keep fold assignments in the models. Deleting them will save memory in the H2O cluster. Defaults to FALSE.

sort_metric

Metric to sort the leaderboard by. For binomial classification choose between "AUC", "AUCPR", "logloss", "mean_per_class_error", "RMSE", "MSE". For regression choose between "mean_residual_deviance", "RMSE", "MSE", "MAE", and "RMSLE". For multinomial classification choose between "mean_per_class_error", "logloss", "RMSE", "MSE". Default is "AUTO". If set to "AUTO", then "AUC" will be used for binomial classification, "mean_per_class_error" for multinomial classification, and "mean_residual_deviance" for regression.
export_checkpoints_dir
(Optional) Path to a directory where every model will be stored in binary form.

verbosity
Verbosity of the backend messages printed during training: Optional. Must be one of NULL (live log disabled), "debug", "info", "warn". Defaults to "warn".

Details
AutoML finds the best model, given a training frame and response, and returns an H2OAutoML object, which contains a leaderboard of all the models that were trained in the process, ranked by a default model performance metric.

Value
An H2OAutoML object.

Examples
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importfile(path = prostate_path, header = TRUE)
y <- "CAPSULE"
prostate[,y] <- as.factor(prostate[,y]) #convert to factor for classification
aml <- h2o.automl(y = y, training_frame = prostate, max_runtime_secs = 30)
lb <- h2o.get_leaderboard(aml)
head(lb)
## End(Not run)

h2o.betweenss

Get the between cluster sum of squares

Description
Get the between cluster sum of squares. If "train", "valid", and "xval" parameters are FALSE (default), then the training betweenss value is returned. If more than one parameter is set to TRUE, then a named vector of betweenss’ are returned, where the names are "train", "valid" or "xval".

Usage
h2o.betweenss(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments
object An H2OClusteringModel object.
train Retrieve the training between cluster sum of squares
valid Retrieve the validation between cluster sum of squares
xval Retrieve the cross-validation between cluster sum of squares
Examples

```r
## Not run:
library(h2o)
h2o.init()
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.betweenss(km, train = TRUE)

## End(Not run)
```

---

**h2o.biases**

*Return the respective bias vector*

**Description**

Return the respective bias vector

**Usage**

```r
h2o.biases(object, vector_id = 1)
```

**Arguments**

- **object**: An `H2OModel` or `H2OModelMetrics`
- **vector_id**: An integer, ranging from 1 to number of layers + 1, that specifies the bias vector to return.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
f <- "https://h2o-public-test-data.s3.amazonaws.com/smalldata/chicago/chicagoCensus.csv"
census <- h2o.importFile(f)
census[, 1] <- as.factor(census[, 1])
dl_model <- h2o.deeplearning(x = c(1:3), y = 4, training_frame = census,
                            hidden = c(17, 191),
                            epochs = 1,
                            balance_classes = FALSE,
                            export_weights_and_biases = TRUE)
h2o.biases(dl_model, vector_id = 1)

## End(Not run)
```
h2o.bottomN

Description

bottomN function will grab the bottom N percent of values of a column and return it in a H2OFrame. Extract the top N percent of values of a column and return it in a H2OFrame.

Usage

h2o.bottomN(x, column, nPercent)

Arguments

x
an H2OFrame

column
is a column name or column index to grab the top N percent value from

nPercent
is a bottom percentage value to grab

Value

An H2OFrame with 2 columns. The first column is the original row indices, second column contains the bottomN values

Examples

## Not run:
library(h2o)
h2o.init()

f2 <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/jira/Bottom20Per.csv.zip"
data_Frame <- h2o.importFile(f1)
bottom_Answer <- h2o.importFile(f2)
nPercent <- c(1, 2, 3, 4)
frame_Names <- names(data_Frame)
nP <- nPercent[sample(1:length(nPercent), 1, replace = FALSE)]
col_Index <- sample(1:length(frame_Names), 1, replace = FALSE)
h2o.bottomN(data_Frame, frame_Names[col_Index], nP)

## End(Not run)

h2o.cbind

Combine H2O Datasets by Columns

Description

Takes a sequence of H2O data sets and combines them by column

Usage

h2o.cbind(...)

**h2o.ceiling**

**Arguments**

... A sequence of H2OFrame arguments. All datasets must exist on the same H2O instance (IP and port) and contain the same number of rows.

**Value**

An H2OFrame object containing the combined ...arguments column-wise.

**See Also**

cbind for the base R method.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate_cbind <- h2o.cbind(prostate, prostate)
head(prostate_cbind)
## End(Not run)
```

---

**h2o.ceiling**  
Take a single numeric argument and return a numeric vector with the smallest integers

**Description**

ceiling takes a single numeric argument x and returns a numeric vector containing the smallest integers not less than the corresponding elements of x.

**Usage**

```r
h2o.ceiling(x)
```

**Arguments**

x An H2OFrame object.

**See Also**

Round for the base R implementation, ceiling().
**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.ceiling(iris[, 1])

## End(Not run)
```

---

**h2o.centers**  
*Retrieve the Model Centers*

**Description**

Retrieve the Model Centers

**Usage**

```r
h2o.centers(object)
```

**Arguments**

- **object**  
  An H2OClusteringModel object.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
h2o.ceiling(fr[, 1])

## End(Not run)
```

---

**h2o.centersSTD**  
*Retrieve the Model Centers STD*

**Description**

Retrieve the Model Centers STD

**Usage**

```r
h2o.centersSTD(object)
```

**Arguments**

- **object**  
  An H2OClusteringModel object.
h2o.centroid_stats

Examples

## Not run:
library(h2o)
h2o.init()
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.centersSTD(km)

## End(Not run)

h2o.centroid_stats

Retrieve centroid statistics

Description

Retrieve the centroid statistics. If "train", "valid", and "xval" parameters are FALSE (default), then
the training centroid stats value is returned. If more than one parameter is set to TRUE, then a
named list of centroid stats data frames are returned, where the names are "train", "valid" or "xval".

Usage

h2o.centroid_stats(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object An H2OClusteringModel object.

train Retrieve the training centroid statistics

valid Retrieve the validation centroid statistics

xval Retrieve the cross-validation centroid statistics

Examples

## Not run:
library(h2o)
h2o.init()
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.centroid_stats(km, train = TRUE)

## End(Not run)
### h2o.clearLog

Delete All H2O R Logs

**Description**

Clear all H2O R command and error response logs from the local disk. Used primarily for debugging purposes.

**Usage**

```r
h2o.clearLog()
```

**See Also**

`h2o.startLogging`, `h2o.stopLogging`, `h2o.openLog`

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
h2o.startLogging()
australia_path = system.file("extdata", "australia.csv", package = "h2o")
australia = h2o.importFile(path = australia_path)
h2o.stopLogging()
h2o.clearLog()

## End(Not run)
```

### h2o.clusterInfo

Print H2O cluster info

**Description**

Print H2O cluster info

**Usage**

```r
h2o.clusterInfo()
```
h2o.clusterIsUp

Determine if an H2O cluster is up or not

Description
Determine if an H2O cluster is up or not

Usage
h2o.clusterIsUp(conn = h2o.getConnection())

Arguments
conn H2OConnection object

Value
TRUE if the cluster is up; FALSE otherwise

h2o.clusterStatus
Return the status of the cluster

Description
Retrieve information on the status of the cluster running H2O.

Usage
h2o.clusterStatus()

See Also
H2OConnection, h2o.init

Examples
## Not run:
h2o.init()
h2o.clusterStatus()

## End(Not run)
h2o.cluster_sizes  
**Retrieve the cluster sizes**

**Description**

Retrieve the cluster sizes. If "train", "valid", and "xval" parameters are FALSE (default), then the training cluster sizes value is returned. If more than one parameter is set to TRUE, then a named list of cluster size vectors are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.cluster_sizes(object, train = FALSE, valid = FALSE, xval = FALSE)
```

**Arguments**

- **object**: An H2OClusteringModel object.
- **train**: Retrieve the training cluster sizes
- **valid**: Retrieve the validation cluster sizes
- **xval**: Retrieve the cross-validation cluster sizes

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.cluster_sizes(km, train = TRUE)
## End(Not run)
```

---

h2o.coef  
**Return the coefficients that can be applied to the non-standardized data.**

**Description**

Note: standardize = True by default. If set to False, then coef() returns the coefficients that are fit directly.

**Usage**

```r
h2o.coef(object)
```

**Arguments**

- **object**: an H2OModel object.
Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "cylinders"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_glm <- h2o.glm(balance_classes = TRUE,
                    seed = 1234,
                    x = predictors,
                    y = response,
                    training_frame = train,
                    validation_frame = valid)
h2o.coef(cars_glm)

## End(Not run)

---

h2o.coef_norm

Return coefficients fitted on the standardized data (requires standardize = True, which is on by default). These coefficients can be used to evaluate variable importance.

Description

Return coefficients fitted on the standardized data (requires standardize = True, which is on by default). These coefficients can be used to evaluate variable importance.

Usage

h2o.coef_norm(object)

Arguments

object an H2OModel object.

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "cylinders"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_glm <- h2o.glm(balance_classes = TRUE,  
                  seed = 1234, 
                  x = predictors, 
                  y = response, 
                  training_frame = train, 
                  validation_frame = valid)

h2o.coef(cars_glm)

## End(Not run)

---

**h2o.colnames**

*Return column names of an H2OFrame*

**Description**

Return column names of an H2OFrame

**Usage**

h2o.colnames(x)

**Arguments**

x An H2OFrame object.

**See Also**

colnames for the base R implementation.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2, 
                          categorical_fraction = 0.0, 
                          missing_fraction = 0.7, 
                          seed = 123)

h2o.colnames(frame)

## End(Not run)
```
h2o.columns_by_type

Obtain a list of columns that are specified by 'coltype'

Description

Obtain a list of columns that are specified by 'coltype'

Usage

h2o.columns_by_type(object, coltype = "numeric", ...)

Arguments

object H2OFrame object
coltype A character string indicating which column type to filter by. This must be one of the following: "numeric" - Numeric, but not categorical or time "categorical" - Integer, with a categorical/factor String mapping "string" - String column "time" - Long msec since the Unix Epoch - with a variety of display/parse options "uuid" - UUID "bad" - No none-NA rows (triple negative! all NAs or zero rows)

Value

A list of column indices that correspond to "type"

Examples

## Not run:
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.columns_by_type(prostate, coltype = "numeric")

## End(Not run)

h2o.computeGram

Compute weighted gram matrix.

Description

Compute weighted gram matrix.

Usage

h2o.computeGram(
  X,
  weights = "",
  use_all_factor_levels = FALSE,
  standardize = TRUE,
  skip_missing = FALSE
)
Arguments

\begin{verbatim}
X an H2OModel corresponding to H2O framel.
weights character corresponding to name of weight vector in frame.
use_all_factor_levels logical flag telling h2o whether or not to skip first level of categorical variables during one-hot encoding.
standardize logical flag telling h2o whether or not to standardize data
skip_missing logical flag telling h2o whether skip rows with missing data or impute them with mean
\end{verbatim}

h2o.confusionMatrix  Access H2O Confusion Matrices

Description

Retrieve either a single or many confusion matrices from H2O objects.

Usage

\begin{verbatim}
h2o.confusionMatrix(object, ...)  
## S4 method for signature 'H2OModel'
h2o.confusionMatrix(object, newdata, valid = FALSE, ...)  
## S4 method for signature 'H2OModelMetrics'
h2o.confusionMatrix(object, thresholds = NULL, metrics = NULL)
\end{verbatim}

Arguments

\begin{verbatim}
object Either an H2OModel object or an H2OModelMetrics object.
... Extra arguments for extracting train or valid confusion matrices.
newdata An H2OFrame object that can be scored on. Requires a valid response column.
valid Retrieve the validation metric.
thresholds (Optional) A value or a list of valid values between 0.0 and 1.0. This value is only used in the case of H2OBinomialMetrics objects.
metrics (Optional) A metric or a list of valid metrics ("min_per_class_accuracy", "absolute_mcc", "tnr", "fnr", "fpr", "tpr", "precision", "accuracy", "f0point5", "f2", "f1"). This value is only used in the case of H2OBinomialMetrics objects.
\end{verbatim}

Details

The H2OModelMetrics version of this function will only take H2OBinomialMetrics or H2OMultinomialMetrics objects. If no threshold is specified, all possible thresholds are selected.

Value

Calling this function on H2OModel objects returns a confusion matrix corresponding to the predict function. If used on an H2OBinomialMetrics object, returns a list of matrices corresponding to the number of thresholds specified.
**h2o.connect**

Connect to a running H2O instance.

### Description

Connect to a running H2O instance.

### Usage

```r
h2o.connect(
  ip = "localhost",
  port = 54321,
  strict_version_check = TRUE,
  proxy = NA_character_,
  https = FALSE,
  cacert = NA_character_,
  insecure = FALSE,
  username = NA_character_,
  password = NA_character_,
  use_spnego = FALSE,
  cookies = NA_character_,
  context_path = NA_character_,
  config = NULL
)
```

### Arguments

- **ip**: Object of class `character` representing the IP address of the server where H2O is running.
- **port**: Object of class `numeric` representing the port number of the H2O server.
- **strict_version_check**: (Optional) Setting this to FALSE is unsupported and should only be done when advised by technical support.

### Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
h2o.confusionMatrix(model, prostate)
# Generating a ModelMetrics object
perf <- h2o.performance(model, prostate)
h2o.confusionMatrix(perf)
## End(Not run)
```

**See Also**

- `predict` for generating prediction frames, `h2o.performance` for creating H2OModelMetrics.
proxy  (Optional) A character string specifying the proxy path.
https  (Optional) Set this to TRUE to use https instead of http.
cacert Path to a CA bundle file with root and intermediate certificates of trusted CAs.
insecure (Optional) Set this to TRUE to disable SSL certificate checking.
username (Optional) Username to login with.
password (Optional) Password to login with.
use_spnego (Optional) Set this to TRUE to enable SPNEGO authentication.
cookies (Optional) Vector(list) of cookies to add to request.
context_path (Optional) The last part of connection URL: http://<ip>:<port>/<context_path>
config (Optional) A list describing connection parameters. Using config makes
h2o.connect ignore other parameters and collect named list members instead
(see examples).

Value

an instance of H2OConnection object representing a connection to the running H2O instance.

Examples

## Not run:
library(h2o)
# Try to connect to a H2O instance running at http://localhost:54321/cluster_X
# If not found, start a local H2O instance from R with the default settings.
#h2o.connect(ip = "localhost", port = 54321, context_path = "cluster_X")
# Or
#config = list(ip = "localhost", port = 54321, context_path = "cluster_X")
#h2o.connect(config = config)

# Skip strict version check during connecting to the instance
h2o.connect(config = c(strict_version_check = FALSE, config))

## End(Not run)

h2o.cor  Correlation of columns.

Description

Compute the correlation matrix of one or two H2OFrames.

Usage

h2o.cor(x, y = NULL, na.rm = FALSE, use, method = "Pearson")
cor(x, ...)
h2o.cos

Compute the cosine of x

Description

Compute the cosine of x

Usage

h2o.cos(x)

Arguments

x  
An H2OFrame object.

See Also

Trig for the base R implementation, cos().
Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
                          categorical_fraction = 0.0,
                          missing_fraction = 0.7,
                          seed = 123)
h2o.cos(frame["C1"])

## End(Not run)
```

h2o.cosh  

*Compute the hyperbolic cosine of x*

Description

Compute the hyperbolic cosine of x

Usage

```
h2o.cosh(x)
```

Arguments

- **x**  
  An H2OFrame object.

See Also

- `Hyperbolic` for the base R implementation, `cosh()`.

Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
                          categorical_fraction = 0.0,
                          missing_fraction = 0.7,
                          seed = 123)
h2o.cosh(frame["C1"])

## End(Not run)
```
h2o.coxph Trains a Cox Proportional Hazards Model (CoxPH) on an H2O dataset

Description
Trains a Cox Proportional Hazards Model (CoxPH) on an H2O dataset

Usage
h2o.coxph(
  x,
  event_column,
  training_frame,
  model_id = NULL,
  start_column = NULL,
  stop_column = NULL,
  weights_column = NULL,
  offset_column = NULL,
  stratify_by = NULL,
  ties = c("efron", "breslow"),
  init = 0,
  lre_min = 9,
  max_iterations = 20,
  interactions = NULL,
  interaction_pairs = NULL,
  interactions_only = NULL,
  use_all_factor_levels = FALSE,
  export_checkpoints_dir = NULL,
  single_node_mode = FALSE
)

Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except event_column, start_column and stop_column are used.

event_column The name of binary data column in the training frame indicating the occurrence of an event.

training_frame Id of the training data frame.

model_id Destination id for this model; auto-generated if not specified.

start_column Start Time Column.

stop_column Stop Time Column.

weights_column Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.
offset_column Offset column. This will be added to the combination of columns before applying the link function.

stratify_by List of columns to use for stratification.

ties Method for Handling Ties. Must be one of: "efron", "breslow". Defaults to efron.

init Coefficient starting value. Defaults to 0.

lre_min Minimum log-relative error. Defaults to 9.

max_iterations Maximum number of iterations. Defaults to 20.

interactions A list of predictor column indices to interact. All pairwise combinations will be computed for the list.

interaction_pairs A list of pairwise (first order) column interactions.

interactions_only A list of columns that should only be used to create interactions but should not itself participate in model training.

use_all_factor_levels Logical. (Internal. For development only!) Indicates whether to use all factor levels. Defaults to FALSE.

export_checkpoints_dir Automatically export generated models to this directory.

single_node_mode Logical. Run on a single node to reduce the effect of network overhead (for smaller datasets) Defaults to FALSE.

Examples

## Not run:
library(h2o)
h2o.init()

# Import the heart dataset
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/coxph_test/heart.csv"
heart <- h2o.importFile(f)

# Set the predictor and response
predictor <- "age"
response <- "event"

# Train a Cox Proportional Hazards model
heart_coxph <- h2o.coxph(x = predictor, training_frame = heart,
  event_column = "event",
  start_column = "start",
  stop_column = "stop")

## End(Not run)
h2o.createFrame

Data H2OFrame Creation in H2O

Description

Creates a data frame in H2O with real-valued, categorical, integer, and binary columns specified by the user.

Usage

h2o.createFrame(
  rows = 10000,
  cols = 10,
  randomize = TRUE,
  value = 0,
  real_range = 100,
  categorical_fraction = 0.2,
  factors = 100,
  integer_fraction = 0.2,
  integer_range = 100,
  binary_fraction = 0.1,
  binary_ones_fraction = 0.02,
  time_fraction = 0,
  string_fraction = 0,
  missing_fraction = 0.01,
  response_factors = 2,
  has_response = FALSE,
  seed,
  seed_for_column_types
)

Arguments

rows The number of rows of data to generate.
cols The number of columns of data to generate. Excludes the response column if has_response = TRUE.
randomize A logical value indicating whether data values should be randomly generated. This must be TRUE if either categorical_fraction or integer_fraction is non-zero.
value If randomize = FALSE, then all real-valued entries will be set to this value.
real_range The range of randomly generated real values.
categorical_fraction The fraction of total columns that are categorical.
factors The number of (unique) factor levels in each categorical column.
icontent_fraction The fraction of total columns that are integer-valued.
integer_range The range of randomly generated integer values.
binary_fraction The fraction of total columns that are binary-valued.
h2o.cross_validation_fold_assignment

Retrieve the cross-validation fold assignment

Description

Retrieve the cross-validation fold assignment

Usage

h2o.cross_validation_fold_assignment(object)
h2o.cross_validation_holdout_predictions

Arguments

object  An H2OModel object.

Value

Returns a H2OFrame

Examples

### Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
nfolds = 5, keep_cross_validation_fold_assignment = TRUE, seed = 1234)
h2o.cross_validation_fold_assignment(cars_gbm)

### End(Not run)
Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])  
predictors <- c("displacement","power","weight","acceleration","year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars,ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
    nfolds = 5, keep_cross_validation_predictions = TRUE, seed = 1234)
h2o.cross_validation_holdout_predictions(cars_gbm)
## End(Not run)
```

h2o.cross_validation_models

*Retrieve the cross-validation models*

Description

Retrieve the cross-validation models

Usage

h2o.cross_validation_models(object)

Arguments

- **object**: An H2OModel object.

Value

Returns a list of H2OModel objects

Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])  
predictors <- c("displacement","power","weight","acceleration","year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars,ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
    nfolds = 5, keep_cross_validation_predictions = TRUE, seed = 1234)
```

## h2o.cross_validation_models

### Description

Retrieve the cross-validation models

### Usage

```r
h2o.cross_validation_models(object)
```

### Arguments

- **object**: An H2OModel object.

### Value

Returns a list of H2OModel objects

### Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])  
predictors <- c("displacement","power","weight","acceleration","year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars,ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
    nfolds = 5, keep_cross_validation_predictions = TRUE, seed = 1234)
```
h2o.cross_validation_predictions

nfolds = 5, keep_cross_validation_models = TRUE, seed = 1234)
h2o.cross_validation_models(cars_gbm)

## End(Not run)

h2o.cross_validation_predictions

Retrieve the cross-validation predictions

Description

Retrieve the cross-validation predictions

Usage

h2o.cross_validation_predictions(object)

Arguments

object  
An H2OModel object.

Value

Returns a list of H2OFrame objects

Examples

## Not run:
library(h2o)
h2o.init()
cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
nfolds = 5, keep_cross_validation_predictions = TRUE, seed = 1234)
h2o.cross_validation_predictions(cars_gbm)

## End(Not run)
**h2o.cummax**

*Return the cumulative max over a column or across a row*

**Description**

Return the cumulative max over a column or across a row.

**Usage**

```r
h2o.cummax(x, axis = 0)
```

**Arguments**

- `x`: An H2OFrame object.
- `axis`: An int that indicates whether to do down a column (0) or across a row (1).

**See Also**

`cumsum` for the base R implementation, `cummax()`.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.cummax(frame, 1)
## End(Not run)
```

---

**h2o.cummin**

*Return the cumulative min over a column or across a row*

**Description**

Return the cumulative min over a column or across a row.

**Usage**

```r
h2o.cummin(x, axis = 0)
```

**Arguments**

- `x`: An H2OFrame object.
- `axis`: An int that indicates whether to do down a column (0) or across a row (1).
Return the cumulative product over a column or across a row

Description

Return the cumulative product over a column or across a row

Usage

h2o.cumprod(x, axis = 0)

Arguments

x
An H2OFrame object.
axis
An int that indicates whether to do down a column (0) or across a row (1).

See Also

cumsum for the base R implementation, cumprod().

Examples

## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0, 
missing_fraction = 0.7, 
seed = 123)

h2o.cumprod(frame, 1)

## End(Not run)
h2o.cumsum

Return the cumulative sum over a column or across a row

Description

Return the cumulative sum over a column or across a row

Usage

h2o.cumsum(x, axis = 0)

Arguments

x An H2OFrame object.
axis An int that indicates whether to do down a column (0) or across a row (1).

See Also

cumsum for the base R implementation.

Examples

## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.cumsum(frame, 1)

## End(Not run)

h2o.cut

Cut H2O Numeric Data to Factor

Description

Divides the range of the H2O data into intervals and codes the values according to which interval
they fall in. The leftmost interval corresponds to the level one, the next is level two, etc.

Usage

h2o.cut(
  x,
  breaks,
  labels = NULL,
  include.lowest = FALSE,
  right = TRUE,
  dig.lab = 3,
H2OFrame cut

## S3 method for class 'H2OFrame'
cut(
  x,
  breaks,
  labels = NULL,
  include.lowest = FALSE,
  right = TRUE,
  dig.lab = 3,
  ...
)

Arguments

- **x**: An H2OFrame object with a single numeric column.
- **breaks**: A numeric vector of two or more unique cut points.
- **labels**: Labels for the levels of the resulting category. By default, labels are constructed using "(a,b]" interval notation.
- **include.lowest**: Logical, indicating if an \(x[i]\) equal to the lowest (or highest, for right = FALSE) 'breaks' value should be included.
- **right**: Logical, indicating if the intervals should be closed on the right (opened on the left) or vice versa.
- **dig.lab**: Integer which is used when labels are not given, determines the number of digits used in formatting the break numbers.
- **...**: Further arguments passed to or from other methods.

Value

Returns an H2OFrame object containing the factored data with intervals as levels.

Examples

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
summary(iris_hf)

# Cut sepal length column into intervals determined by min/max/quantiles
sepal_len_cut <- cut(iris_hf$Sepal.Length, c(4.2, 4.8, 5.8, 6, 8))
head(sepal_len_cut)
summary(sepal_len_cut)

## End(Not run)
```
**h2o.day**  
*Convert Milliseconds to Day of Month in H2O Datasets*

**Description**  
Converts the entries of an H2OFrame object from milliseconds to days of the month (on a 1 to 31 scale).

**Usage**  
```r  
h2o.day(x)  
```

```r  
day(x)  
```

```r  
## S3 method for class 'H2OFrame'  
day(x)  
```

**Arguments**

- `x`  
  An H2OFrame object.

**Value**

An H2OFrame object containing the entries of `x` converted to days of the month.

**See Also**

- `h2o.month`

---

**h2o.dayOfWeek**  
*Convert Milliseconds to Day of Week in H2O Datasets*

**Description**  
Converts the entries of an H2OFrame object from milliseconds to days of the week (on a 0 to 6 scale).

**Usage**

```r  
h2o.dayOfWeek(x)  
```

```r  
dayOfWeek(x)  
```

```r  
## S3 method for class 'H2OFrame'  
dayOfWeek(x)  
```

**Arguments**

- `x`  
  An H2OFrame object.
h2o.dct

Compute DCT of an H2OFrame

Value

An H2OFrame object containing the entries of x converted to days of the week.

See Also

h2o.day, h2o.month

Description

Compute the Discrete Cosine Transform of every row in the H2OFrame

Usage

h2o.dct(data, destination_frame, dimensions, inverse = FALSE)

Arguments

data
An H2OFrame object representing the dataset to transform

destination_frame
A frame ID for the result

dimensions
An array containing the 3 integer values for height, width, depth of each sample. The product of HxWxD must total up to less than the number of columns. For 1D, use c(L,1,1), for 2D, use C(N,M,1).

inverse
Whether to perform the inverse transform

Value

Returns an H2OFrame object.

Examples

## Not run:
library(h2o)
h2o.init()
df <- h2o.createFrame(rows = 1000, cols = 8 * 16 * 24,
                     categorical_fraction = 0, integer_fraction = 0, missing_fraction = 0)
df1 <- h2o.dct(data = df, dimensions = c(8 * 16 * 24, 1, 1))
df2 <- h2o.dct(data = df1, dimensions = c(8 * 16 * 24, 1, 1), inverse = TRUE)
max(abs(df1 - df2))

df1 <- h2o.dct(data = df, dimensions = c(8 * 16, 24, 1))
df2 <- h2o.dct(data = df1, dimensions = c(8 * 16, 24, 1), inverse = TRUE)
max(abs(df1 - df2))

df1 <- h2o.dct(data = df, dimensions = c(8, 16, 24))
df2 <- h2o.dct(data = df1, dimensions = c(8, 16, 24), inverse = TRUE)
max(abs(df1 - df2))

## End(Not run)
Split H2O Dataset, Apply Function, and Return Results

Description

For each subset of an H2O data set, apply a user-specified function, then combine the results. This is an experimental feature based on plyr::ddply.

Usage

h2o.ddply(X, .variables, FUN, ..., .progress = "none")

Arguments

X An H2OFrame object to be processed.
Variables Variables to split X by, either the indices or names of a set of columns.
FUN Function to apply to each subset grouping.
... Additional arguments passed on to FUN.
.progress Name of the progress bar to use. #TODO: (Currently unimplemented)

Value

Returns an H2OFrame object containing the results from the split/apply operation, arranged

Examples

## Not run:
library(h2o)
h2o.init()
# Import iris dataset to H2O
iris_hf <- as.h2o(iris)
# Add function taking mean of Sepal.Length column
fun <- function(df) { sum(df[, 1], na.rm = TRUE) / nrow(df) }
# Apply function to groups by flower specie
# uses h2o's ddply, since iris_hf is an H2OFrame object
res <- h2o.ddply(iris_hf, "Species", fun)
head(res)
## End(Not run)
h2o.decryptionSetup  

**Setup a Decryption Tool**

**Description**

If your source file is encrypted - setup a Decryption Tool and then provide the reference (result of this function) to the import functions.

**Usage**

```r
h2o.decryptionSetup(
  keystore,
  keystore_type = "JCEKS",
  key_alias = NA_character_,
  password = NA_character_,
  decrypt_tool = "",
  decrypt_impl = "water.parser.GenericDecryptionTool",
  cipher_spec = NA_character_
)
```

**Arguments**

- `keystore`  
  An H2OFrame object referencing a loaded Java Keystore (see example).
- `keystore_type`  
  (Optional) Specification of Keystore type, defaults to JCEKS.
- `key_alias`  
  Which key from the keystore to use for decryption.
- `password`  
  Password to the keystore and the key.
- `decrypt_tool`  
  (Optional) Name of the decryption tool.
- `decrypt_impl`  
  (Optional) Java class name implementing the Decryption Tool.
- `cipher_spec`  
  Specification of a cipher (eg.: AES/ECB/PKCS5Padding).

**See Also**

- `h2o.importFile`, `h2o.parseSetup`

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

ks_path <- system.file("extdata", "keystore.jks", package = "h2o")
keystore <- h2o.importFile(path = ks_path, parse = FALSE) # don't parse, keep as a binary file
cipher <- "AES/ECB/PKCS5Padding"
pwd <- "Password123"
alias <- "secretKeyAlias"
dt <- h2o.decryptionSetup(keystore, key_alias = alias, password = pwd, cipher_spec = cipher)
data_path <- system.file("extdata", "prostate.csv.aes", package = "h2o")
data <- h2o.importFile(data_path, decrypt_tool = dt)
summary(data)

## End(Not run)
```
Feature Generation via H2O Deep Learning

Description

Extract the non-linear feature from an H2O data set using an H2O deep learning model.

Usage

h2o.deepfeatures(object, data, layer)

Arguments

- **object**: An H2OModel object that represents the deep learning model to be used for feature extraction.
- **data**: An H2OFrame object.
- **layer**: Index (integer) of the hidden layer to extract

Value

Returns an H2OFrame object with as many features as the number of units in the hidden layer of the specified index.

See Also

- **h2o.deeplearning** for making H2O Deep Learning models.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path = system.file("extdata", "prostate.csv", package = "h2o")
prostate = h2o.importFile(path = prostate_path)
prostate_dl = h2o.deeplearning(x = 3:9, y = 2, training_frame = prostate,
                              hidden = c(100, 200), epochs = 5)
prostate_deepfeatures_layer1 = h2o.deepfeatures(prostate_dl, prostate, layer = 1)
prostate_deepfeatures_layer2 = h2o.deepfeatures(prostate_dl, prostate, layer = 2)
head(prostate_deepfeatures_layer1)
head(prostate_deepfeatures_layer2)

## End(Not run)
```
Build a Deep Neural Network model using CPUs

**Description**

Builds a feed-forward multilayer artificial neural network on an H2OFrame.

**Usage**

```r
h2o.deeplearning(
  x, y, training_frame, model_id = NULL, validation_frame = NULL, nfolds = 0, keep_cross_validation_models = TRUE, keep_cross_validation_predictions = FALSE, keep_cross_validation_fold_assignment = FALSE, fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"), fold_column = NULL, ignore_const_cols = TRUE, score_each_iteration = FALSE, weights_column = NULL, offset_column = NULL, balance_classes = FALSE, class_sampling_factors = NULL, max_after_balance_size = 5, max_hit_ratio_k = 0, checkpoint = NULL, pretrained_autoencoder = NULL, overwrite_with_best_model = TRUE, use_all_factor_levels = TRUE, standardize = TRUE, activation = c("Tanh", "TanhWithDropout", "Rectifier", "RectifierWithDropout", "Maxout", "MaxoutWithDropout"), hidden = c(200, 200), epochs = 10, train_samples_per_iteration = -2, target_ratio_comm_to_comp = 0.05, seed = -1, adaptive_rate = TRUE, rho = 0.99, epsilon = 1e-08, rate = 0.005, rate_annealing = 1e-06, rate_decay = 1, momentum_start = 0, momentum_ramp = 1e+06, momentum_stable = 0, nesterov_accelerated_gradient = TRUE,
)```

input_dropout_ratio = 0,
hidden_dropout_ratios = NULL,
l1 = 0,
l2 = 0,
max_w2 = 3.4028235e+38,
initial_weight_distribution = c("UniformAdaptive", "Uniform", "Normal"),
initial_weight_scale = 1,
initial_weights = NULL,
initial_biases = NULL,
loss = c("Automatic", "CrossEntropy", "Quadratic", "Huber", "Absolute", "Quantile"),
distribution = c("AUTO", "bernoulli", "multinomial", "gaussian", "poisson", "gamma",
"tweedie", "laplace", "quantile", "huber"),
quantile_alpha = 0.5,
tweedie_power = 1.5,
huber_alpha = 0.9,
score_interval = 5,
score_training_samples = 10000,
score_validation_samples = 0,
score_duty_cycle = 0.1,
classification_stop = 0,
regression_stop = 1e-06,
stopping_rounds = 5,
stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE",
"AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error",
"custom", "custom_increasing"),
stopping_tolerance = 0,
max_runtime_secs = 0,
score_validation_sampling = c("Uniform", "Stratified"),
diagnostics = TRUE,
fast_mode = TRUE,
force_load_balance = TRUE,
variable_importances = TRUE,
replicate_training_data = TRUE,
single_node_mode = FALSE,
shuffle_training_data = FALSE,
missing_values_handling = c("MeanImputation", "Skip"),
quiet_mode = FALSE,
autoencoder = FALSE,
sparse = FALSE,
col_major = FALSE,
average_activation = 0,
sparsity_beta = 0,
max_categorical_features = 2147483647,
reproducible = FALSE,
export_weights_and_biases = FALSE,
mini_batch_size = 1,
categorical_encoding = c("AUTO", "Enum", "OneHotInternal", "OneHotExplicit",
"Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited"),
elastic_averaging = FALSE,
elastic_averaging_moving_rate = 0.9,
elastic_averaging_regularization = 0.001,
export_checkpoints_dir = NULL,
Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.

y The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

training_frame Id of the training data frame.

model_id Destination id for this model; auto-generated if not specified.

validation_frame Id of the validation data frame.

nfolds Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.

keep_cross_validation_models Logical. Whether to keep the cross-validation models. Defaults to TRUE.

keep_cross_validation_predictions Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.

keep_cross_validation_fold_assignment Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

fold_assignment Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.

fold_column Column with cross-validation fold index assignment per observation.

ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.

score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.

weights_column Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

offset_column Offset column. This will be added to the combination of columns before applying the link function.

balance_classes Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.
class_sampling_factors
Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.

max_after_balance_size
Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_hit_ratio_k
Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable). Defaults to 0.

checkpoint
Model checkpoint to resume training with.

pretrained_autoencoder
Pretrained autoencoder model to initialize this model with.

overwrite_with_best_model
Logical. If enabled, override the final model with the best model found during training. Defaults to TRUE.

use_all_factor_levels
Logical. Use all factor levels of categorical variables. Otherwise, the first factor level is omitted (without loss of accuracy). Useful for variable importances and auto-enabled for autoencoder. Defaults to TRUE.

standardize
Logical. If enabled, automatically standardize the data. If disabled, the user must provide properly scaled input data. Defaults to TRUE.

activation

hidden
Hidden layer sizes (e.g. [100, 100]). Defaults to c(200, 200).

epochs
How many times the dataset should be iterated (streamed), can be fractional. Defaults to 10.

train_samples_per_iteration
Number of training samples (globally) per MapReduce iteration. Special values are 0: one epoch, -1: all available data (e.g., replicated training data), -2: automatic. Defaults to -2.

target_ratio_comm_to_comp
Target ratio of communication overhead to computation. Only for multi-node operation and train_samples_per_iteration = -2 (auto-tuning). Defaults to 0.05.

seed
Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Note: only reproducible when running single threaded. Defaults to -1 (time-based random number).

adaptive_rate
Logical. Adaptive learning rate. Defaults to TRUE.

rho
Adaptive learning rate time decay factor (similarity to prior updates). Defaults to 0.99.

epsilon
Adaptive learning rate smoothing factor (to avoid divisions by zero and allow progress). Defaults to 1e-08.

rate
Learning rate (higher => less stable, lower => slower convergence). Defaults to 0.005.

rate_annealing
Learning rate annealing: rate / (1 + rate_annealing * samples). Defaults to 1e-06.

rate_decay
Learning rate decay factor between layers (N-th layer: rate * rate_decay ^ (n - 1)). Defaults to 1.
momentum_start  Initial momentum at the beginning of training (try 0.5). Defaults to 0.
momentum_ramp  Number of training samples for which momentum increases. Defaults to 1000000.
momentum_stable  Final momentum after the ramp is over (try 0.99). Defaults to 0.
nesterov_accelerated_gradient Logical. Use Nesterov accelerated gradient (recommended). Defaults to TRUE.
input_dropout_ratio  Input layer dropout ratio (can improve generalization, try 0.1 or 0.2). Defaults to 0.
hidden_dropout_ratios  Hidden layer dropout ratios (can improve generalization), specify one value per hidden layer, defaults to 0.5.
l1  L1 regularization (can add stability and improve generalization, causes many weights to become 0). Defaults to 0.
l2  L2 regularization (can add stability and improve generalization, causes many weights to be small. Defaults to 0.
max_w2  Constraint for squared sum of incoming weights per unit (e.g. for Rectifier). Defaults to 3.4028235e+38.
initial_weight_scale  Uniform: -value...value, Normal: stddev. Defaults to 1.
initial_weights  A list of H2OFrame ids to initialize the weight matrices of this model with.
initial_biases  A list of H2OFrame ids to initialize the bias vectors of this model with.
distribution  Distribution function Must be one of: "AUTO", "bernoulli", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber". Defaults to AUTO.
quantile_alpha  Desired quantile for Quantile regression, must be between 0 and 1. Defaults to 0.5.
tweedie_power  Tweedie power for Tweedie regression, must be between 1 and 2. Defaults to 1.5.
huber_alpha  Desired quantile for Huber/M-regression (threshold between quadratic and linear loss, must be between 0 and 1). Defaults to 0.9.
score_interval  Shortest time interval (in seconds) between model scoring. Defaults to 5.
score_training_samples  Number of training set samples for scoring (0 for all). Defaults to 10000.
score_validation_samples  Number of validation set samples for scoring (0 for all). Defaults to 0.
score_duty_cycle  Maximum duty cycle fraction for scoring (lower: more training, higher: more scoring). Defaults to 0.1.
classification_stop  Stopping criterion for classification error fraction on training data (-1 to disable). Defaults to 0.
regression_stop
Stopping criterion for regression error (MSE) on training data (-1 to disable).
Defaults to 1e-06.

stopping_rounds
Early stopping based on convergence of stopping_metric. Stop if simple moving
average of length k of the stopping_metric does not improve for k:=stopping_rounds
scoring events (0 to disable) Defaults to 5.

stopping_metric
Metric to use for early stopping (AUTO: logloss for classification, deviance
for regression and anomaly_score for Isolation Forest). Note that custom
and custom_increasing can only be used in GBM and DRF with the Python
client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE",
"MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification",
"mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.

stopping_tolerance
Relative tolerance for metric-based stopping criterion (stop if relative improve-
ment is not at least this much) Defaults to 0.

max_runtime_secs
Maximum allowed runtime in seconds for model training. Use 0 to disable.
Defaults to 0.

score_validation_sampling
Method used to sample validation dataset for scoring. Must be one of: "Uni-
form", "Stratified". Defaults to Uniform.

diagnostics
Logical. Enable diagnostics for hidden layers. Defaults to TRUE.

fast_mode
Logical. Enable fast mode (minor approximation in back-propagation). De-
defaults to TRUE.

force_load_balance
Logical. Force extra load balancing to increase training speed for small datasets
(to keep all cores busy). Defaults to TRUE.

variable_importances
Logical. Compute variable importances for input features (Gedeon method) -
can be slow for large networks. Defaults to TRUE.

replicate_training_data
Logical. Replicate the entire training dataset onto every node for faster training
on small datasets. Defaults to TRUE.

single_node_mode
Logical. Run on a single node for fine-tuning of model parameters. Defaults to
FALSE.

shuffle_training_data
Logical. Enable shuffling of training data (recommended if training data is
replicated and train_samples_per_iteration is close to #nodes x #rows, of if using
balance_classes). Defaults to FALSE.

missing_values_handling
Handling of missing values. Either MeanImputation or Skip. Must be one of:
"MeanImputation", "Skip". Defaults to MeanImputation.

quiet_mode
Logical. Enable quiet mode for less output to standard output. Defaults to
FALSE.

autoencoder
Logical. Auto-Encoder. Defaults to FALSE.

sparse
Logical. Sparse data handling (more efficient for data with lots of 0 values).
Defaults to FALSE.
col_major Logical. #DEPRECATED Use a column major weight matrix for input layer. Can speed up forward propagation, but might slow down backpropagation. Defaults to FALSE.

average_activation Average activation for sparse auto-encoder. #Experimental Defaults to 0.

sparsity_beta Sparsity regularization. #Experimental Defaults to 0.

max_categorical_features Max. number of categorical features, enforced via hashing. #Experimental Defaults to 2147483647.

reproducible Logical. Force reproducibility on small data (will be slow - only uses 1 thread). Defaults to FALSE.

export_weights_and_biases Logical. Whether to export Neural Network weights and biases to H2O Frames. Defaults to FALSE.

mini_batch_size Mini-batch size (smaller leads to better fit, larger can speed up and generalize better). Defaults to 1.

categorical_encoding Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

elastic_averaging Logical. Elastic averaging between compute nodes can improve distributed model convergence. #Experimental Defaults to FALSE.

elastic_averaging-moving-rate Elastic averaging moving rate (only if elastic averaging is enabled). Defaults to 0.9.

elastic_averaging-regularization Elastic averaging regularization strength (only if elastic averaging is enabled). Defaults to 0.001.

export_checkpoints-dir Automatically export generated models to this directory.

verbose Logical. Print scoring history to the console (Metrics per epoch). Defaults to FALSE.

See Also

predict.H2OModel for prediction

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
iris_dl <- h2o.deeplearning(x = 1:4, y = 5, training_frame = iris_hf, seed=123456)

# now make a prediction
predictions <- h2o.predict(iris_dl, iris_hf)

## End(Not run)
**h2o.describe**  
*H2O Description of A Dataset*

**Description**
Reports the "Flow" style summary rollups on an instance of H2OFrame. Includes information about column types, mins/maxs/missing/zero counts/stds/number of levels

**Usage**

```r
h2o.describe(frame)
```

**Arguments**

- `frame`  
  An H2OFrame object.

**Value**

A table with the Frame stats.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(path = prostate_path)
h2o.describe(prostate)

## End(Not run)
```

---

**h2o.difflag1**  
*Conduct a lag 1 transform on a numeric H2OFrame column*

**Description**
Conduct a lag 1 transform on a numeric H2OFrame column

**Usage**

```r
h2o.difflag1(object)
```

**Arguments**

- `object`  
  H2OFrame object

**Value**

Returns an H2OFrame object.
## Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "cylinders"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response, training_frame = train,
                   validation_frame = valid, nfolds = 5, seed = 1234)
h2o.dimflag1(cars["cylinders"])

## End(Not run)
```

---

**h2o.dim**

*Returns the number of rows and columns for an H2OFrame object.*

**Description**

Returns the number of rows and columns for an H2OFrame object.

**Usage**

```r
h2o.dim(x)
```

**Arguments**

- `x` An H2OFrame object.

**See Also**

`dim` for the base R implementation.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
h2o.dim(cars)

## End(Not run)
```
h2o.dimnames

Column names of an H2OFrame

Description

Column names of an H2OFrame

Usage

h2o.dimnames(x)

Arguments

x
An H2OFrame object.

See Also

dimnames for the base R implementation.

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
h2o.dimnames(cars)

## End(Not run)

h2o.distance

Compute a pairwise distance measure between all rows of two numeric H2OFrames.

Description

Compute a pairwise distance measure between all rows of two numeric H2OFrames.

Usage

h2o.distance(x, y, measure)

Arguments

x
An H2OFrame object (large, references).

y
An H2OFrame object (small, queries).

measure
An optional string indicating what distance measure to use. Must be one of: "l1" - Absolute distance (L1-norm, >=0) "l2" - Euclidean distance (L2-norm, >=0) "cosine" - Cosine similarity (-1...1) "cosine_sq" - Squared Cosine similarity (0...1)
## Examples

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.distance(prostate[11:30,], prostate[1:10,], "cosine")
## End(Not run)
```

---

### h2o.downloadAllLogs

**Download H2O Log Files to Disk**

**Description**

`h2o.downloadAllLogs` downloads all H2O log files to local disk in .zip format. Generally used for debugging purposes.

**Usage**

```r
h2o.downloadAllLogs(dirname = ".", filename = NULL)
```

**Arguments**

- **dirname** *(Optional)* A character string indicating the directory that the log file should be saved in.
- **filename** *(Optional)* A character string indicating the name that the log file should be saved to. Note that the saved format is .zip, so the file name must include the .zip extension.

**Examples**

```r
## Not run:
h2o.downloadAllLogs(dirname="./your_directory_name/", filename = "autoh2o_log.zip")
## End(Not run)
```

---

### h2o.downloadCSV

**Download H2O Data to Disk**

**Description**

Download an H2O data set to a CSV file on the local disk

**Usage**

```r
h2o.downloadCSV(data, filename)
```
Arguments

data : an H2OFrame object to be downloaded.
filename : A string indicating the name that the CSV file should be saved to.

Warning

Files located on the H2O server may be very large! Make sure you have enough hard drive space to accommodate the entire file.

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)

file_path <- paste(getwd(), "my_iris_file.csv", sep = .Platform$file.sep)
h2o.downloadCSV(iris_hf, file_path)
file.info(file_path)
file.remove(file_path)

## End(Not run)

h2o.download_model

Download the model in binary format. The owner of the file saved is the user by which python session was executed.

Description

Download the model in binary format. The owner of the file saved is the user by which python session was executed.

Usage

h2o.download_model(model, path = NULL)

Arguments

model : An H2OModel
path : The path where binary file should be downloaded. Downloaded to current directory by default.

Examples

## Not run:
library(h2o)
h <- h2o.init()
fr <- as.h2o(iris)
my_model <- h2o.gbm(x = 1:4, y = 5, training_frame = fr)
h2o.download_model(my_model) # save to the current working directory

## End(Not run)
Description

Download the model in MOJO format.

Usage

```r
h2o.download_mojo(
  model,
  path = getwd(),
  get_genmodel_jar = FALSE,
  genmodel_name = "",
  genmodel_path = ""
)
```

Arguments

- **model**: An H2OModel
- **path**: The path where MOJO file should be saved. Saved to current directory by default.
- **get_genmodel_jar**: If TRUE, then also download h2o-genmodel.jar and store it in either in the same folder
- **genmodel_name**: Custom name of genmodel jar.
- **genmodel_path**: Path to store h2o-genmodel.jar. If left blank and “get_genmodel_jar” is TRUE, then the h2o-genmodel.jar

Value

Name of the MOJO file written to the path.

Examples

```r
## Not run:
library(h2o)
h <- h2o.init()
fr <- as.h2o(iris)
my_model <- h2o.gbm(x = 1:4, y = 5, training_frame = fr)
h2o.download_mojo(my_model) # save to the current working directory

## End(Not run)
```
**h2o.download_pojo**  
*Download the Scoring POJO (Plain Old Java Object) of an H2O Model*

**Description**

Download the Scoring POJO (Plain Old Java Object) of an H2O Model

**Usage**

```r
h2o.download_pojo(
  model,  
  path = NULL,  
  getjar = NULL,  
  get_jar = TRUE,  
  jar_name = ""
)
```

**Arguments**

- `model`  
  An H2OModel

- `path`  
  The path to the directory to store the POJO (no trailing slash). If NULL, then print to to console. The file name will be a compilable java file name.

- `getjar`  
  (DEPRECATED) Whether to also download the `h2o-genmodel.jar` file needed to compile the POJO. This argument is now called `get_jar`.

- `get_jar`  
  Whether to also download the `h2o-genmodel.jar` file needed to compile the POJO

- `jar_name`  
  Custom name of genmodel jar.

**Value**

If path is NULL, then pretty print the POJO to the console. Otherwise save it to the specified directory and return POJO file name.

**Examples**

```r
## Not run:
library(h2o)
h <- h2o.init()
fr <- as.h2o(iris)
my_model <- h2o.gbm(x = 1:4, y = 5, training_frame = fr)

h2o.download_pojo(my_model) # print the model to screen
# h2o.download_pojo(my_model, getwd()) # save the POJO and jar file to the current working directory, NOT RUN
# h2o.download_pojo(my_model, getwd(), get_jar = FALSE ) # save only the POJO to the current working directory, NOT RUN
h2o.download_pojo(my_model, getwd()) # save to the current working directory
```

## End(Not run)
h2o.drop_duplicates   Drops duplicated rows.

Description

Drops duplicated rows across specified columns.

Usage

h2o.drop_duplicates(frame, columns, keep = "first")

Arguments

frame     An H2OFrame object to drop duplicates on.
columns   Columns to compare during the duplicate detection process.
keep      Which rows to keep. The "first" value (default) keeps the first row and deletes the rest. The "last" keeps the last row.

Examples

## Not run:
library(h2o)
h2o.init()

data <- as.h2o(iris)
deduplicated_data <- h2o.drop_duplicates(data, c("Species", "Sepal.Length"), keep = "first")

## End(Not run)

h2o.entropy   Shannon entropy

Description

Return the Shannon entropy of a string column. If the string is empty, the entropy is 0.

Usage

h2o.entropy(x)

Arguments

x        The column on which to calculate the entropy.

Examples

## Not run:
library(h2o)
h2o.init()

buys <- as.h2o(c("no", "no", "yes", "yes", "no", "yes", "no", "yes", "yes", "yes","no"))

buys_entropy <- h2o.entropy(buys)

## End(Not run)
h2o.exp

Compute the exponential function of x

Description
Compute the exponential function of x

Usage
h2o.exp(x)

Arguments
x
An H2OFrame object.

See Also
Log for the base R implementation, exp().

Examples
## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.exp(frame["C1"])
## End(Not run)

h2o.exportFile

Export an H2O Data Frame (H2OFrame) to a File or to a collection of Files.

Description
Exports an H2OFrame (which can be either VA or FV) to a file. This file may be on the H2O instance’s local filesystem, or to HDFS (preface the path with hdfs://) or to S3N (preface the path with s3n://).

Usage
h2o.exportFile(
  data,
  path,
  force = FALSE,
  sep = ",",
  compression = NULL,
  parts = 1
)
h2o.exportHDFS

Export a Model to HDFS

Description
Exports an H2OModel to HDFS.

Usage
h2o.exportHDFS(object, path, force = FALSE)

Arguments

object
an H2OModel class object.

path
The path to write the model to. Must include the directory and filename.

force
logical, indicates how to deal with files that already exist.

Examples
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)

# These aren’t real paths
# h2o.exportFile(iris_hf, path = "/path/on/h2o/server/filesystem/iris.csv")
# h2o.exportFile(iris_hf, path = "hdfs://path/in/hdfs/iris.csv")
# h2o.exportFile(iris_hf, path = "s3n://path/in/s3/iris.csv")

## End(Not run)
Examples

```r
## Not run:
library(h2o)
h2o.init()

train <- h2o.importFile(f)
h2o.exportHDFS(train, path = " ", force = FALSE)
## End(Not run)
```

Description

Fill NA's in a sequential manner up to a specified limit

Usage

```r
h2o.fillna(x, method = "forward", axis = 1, maxlen = 1L)
```

Arguments

- `x`: an H2OFrame
- `method`: A String: "forward" or "backward"
- `axis`: An Integer 1 for row-wise fill (default), 2 for column-wise fill
- `maxlen`: An Integer for maximum number of consecutive NA's to fill

Value

An H2OFrame after filling missing values

Examples

```r
## Not run:
library(h2o)
h2o.init()

frame_with_nas <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
frame <- h2o.fillna(frame_with_nas, "forward", axis = 1, maxlen = 2L)
## End(Not run)
```
h2o.filterNACols

Filter NA Columns

Description
Filter NA Columns

Usage
h2o.filterNACols(data, frac = 0.2)

Arguments
data
A dataset to filter on.
frac
The threshold of NAs to allow per column (columns >= this threshold are filtered)

Value
Returns a numeric vector of indexes that pertain to non-NA columns

Examples
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.filterNACols(frame, frac = 0.5)
h2o.filterNACols(frame, frac = 0.6)
## End(Not run)

h2o.findSynonyms

Find synonyms using a word2vec model.

Description
Find synonyms using a word2vec model.

Usage
h2o.findSynonyms(word2vec, word, count = 20)

Arguments
word2vec
A word2vec model.
word
A single word to find synonyms for.
count
The top `count` synonyms will be returned.
Examples

```r
## Not run:
library(h2o)
h2o.init()

job_titles <- h2o.importFile(
  col.names = c("category", "jobtitle"), col.types = c("String", "String"), header = TRUE )
words <- h2o.tokenize(job_titles, " ")
vec <- h2o.word2vec(training_frame = words)
h2o.findSynonyms(vec, "teacher", count = 20)

## End(Not run)
```

---

**h2o.find_row_by_threshold**

Find the threshold, give the max metric. No duplicate thresholds allowed

### Description

Find the threshold, give the max metric. No duplicate thresholds allowed

### Usage

```r
h2o.find_row_by_threshold(object, threshold)
```

### Arguments

- `object` : H2OBinomialMetrics
- `threshold` : number between 0 and 1

### Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response,
  training_frame = train, validation_frame = valid,
  build_tree_one_node = TRUE , seed = 1234)
perf <- h2o.performance(cars_gbm, cars)
h2o.find_row_by_threshold(perf, 0.5)

## End(Not run)
```
h2o.find_threshold_by_max_metric

*Find the threshold, give the max metric*

**Description**

Find the threshold, give the max metric

**Usage**

```r
h2o.find_threshold_by_max_metric(object, metric)
```

**Arguments**

- `object` H2OBinomialMetrics
- `metric` "F1," for example

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars[economy_20mpg] <- as.factor(cars[economy_20mpg])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response,
                   training_frame = train, validation_frame = valid,
                   build_tree_one_node = TRUE, seed = 1234)
perf <- h2o.performance(cars_gbm, cars)
h2o.find_threshold_by_max_metric(perf, "fpr")

## End(Not run)
```

h2o.floor

*Take a single numeric argument and return a numeric vector with the largest integers*

**Description**

floor takes a single numeric argument x and returns a numeric vector containing the largest integers not greater than the corresponding elements of x.

**Usage**

```r
h2o.floor(x)
```
Arguments

* x: An H2OFrame object.

See Also

Round for the base R implementation, floor().

Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.floor(frame["C2"])

## End(Not run)
```

h2o.flow  

Open H2O Flow

Description

Open H2O Flow in your browser

Usage

h2o.flow()

h2o.gainsLift  

Access H2O Gains/Lift Tables

Description

Retrieve either a single or many Gains/Lift tables from H2O objects.

Usage

h2o.gainsLift(object, ...)

## S4 method for signature 'H2OModel'
h2o.gainsLift(object, newdata, valid = FALSE, xval = FALSE, ...)

## S4 method for signature 'H2OModelMetrics'
h2o.gainsLift(object)
h2o.gam

Fit a General Additive Model

Description

Creates a generalized additive model, specified by a response variable, a set of predictors, and a description of the error distribution.

Arguments

- `object`: Either an H2OModel object or an H2OModelMetrics object.
- `...`: further arguments to be passed to/from this method.
- `newdata`: An H2OFrame object that can be scored on. Requires a valid response column.
- `valid`: Retrieve the validation metric.
- `xval`: Retrieve the cross-validation metric.

Details

The H2OModelMetrics version of this function will only take H2OBinomialMetrics objects.

Value

Calling this function on H2OModel objects returns a Gains/Lift table corresponding to the predict function.

See Also

- `predict` for generating prediction frames, `h2o.performance` for creating H2OModelMetrics.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, distribution = "bernoulli",
                 training_frame = prostate, validation_frame = prostate, nfolds = 3)
h2o.gainsLift(model) ## extract training metrics
h2o.gainsLift(model, valid = TRUE) ## extract validation metrics (here: the same)
h2o.gainsLift(model, xval = TRUE) ## extract cross-validation metrics
h2o.gainsLift(model, newdata = prostate) ## score on new data (here: the same)
# Generating a ModelMetrics object
perf <- h2o.performance(model, prostate)
h2o.gainsLift(perf) ## extract from existing metrics object

## End(Not run)
```
Usage

h2o.gam(
  x,
  y,
  training_frame,
  gam_columns,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
  seed = -1,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  offset_column = NULL,
  weights_column = NULL,
  family = c("AUTO", "gaussian", "binomial", "quasibinomial", "ordinal", "multinomial",
            "poisson", "gamma", "tweedie", "negativebinomial", "fractionalbinomial"),
  tweedie_variance_power = 0,
  tweedie_link_power = 0,
  solver = c("AUTO", "IRLSM", "L_BFGS", "COORDINATE_DESCENT_NAIVE",
             "COORDINATE_DESCENT", "GRADIENT_DESCENT_LH", "GRADIENT_DESCENT_SQERR"),
  alpha = NULL,
  lambda = NULL,
  lambda_search = FALSE,
  early_stopping = TRUE,
  nlambdas = -1,
  standardize = FALSE,
  missing_values_handling = c("MeanImputation", "Skip", "PlugValues"),
  plug_values = NULL,
  compute_p_values = FALSE,
  remove_collinear_columns = FALSE,
  intercept = TRUE,
  non_negative = FALSE,
  max_iterations = -1,
  objective_epsilon = -1,
  beta_epsilon = 1e-04,
  gradient_epsilon = -1,
  link = c("family_default", "identity", "logit", "log", "inverse", "tweedie",
           "ologit"),
  prior = -1,
  cold_start = FALSE,
  lambda_min_ratio = -1,
  beta_constraints = NULL,
  max_active_predictors = -1,
  interactions = NULL,
  interaction_pairs = NULL,
  obj_reg = -1,
export_checkpoints_dir = NULL,
stopping_rounds = 0,
stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE",
"AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error",
"custom", "custom_increasing"),
stopping_tolerance = 0.001,
balance_classes = FALSE,
class_sampling_factors = NULL,
max_after_balance_size = 5,
max_hit_ratio_k = 0,
max_runtime_secs = 0,
custom_metric_func = NULL,
num_knots = NULL,
knot_ids = NULL,
bs = NULL,
scale = NULL,
keep_gam_cols = FALSE
)

Arguments

x  (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.

y  The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

training_frame  Id of the training data frame.

gam_columns  Predictor column names for gam

model_id  Destination id for this model; auto-generated if not specified.

validation_frame  Id of the validation data frame.

nfolds  Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.

seed  Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

keep_cross_validation_models  Logical. Whether to keep the cross-validation models. Defaults to TRUE.

keep_cross_validation_predictions  Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.

keep_cross_validation_fold_assignment  Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

fold_assignment  Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.
fold_column Column with cross-validation fold index assignment per observation.
ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.
score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.
offset_column Offset column. This will be added to the combination of columns before applying the link function.
weights_column Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.
family Family. Use binomial for classification with logistic regression, others are for regression problems. Must be one of: "AUTO", "gaussian", "binomial", "quasibinomial", "ordinal", "multinomial", "poisson", "gamma", "tweedie", "negativebinomial", "fractionalbinomial". Defaults to AUTO.
tweedie_variance_power Tweedie variance power Defaults to 0.
tweedie_link_power Tweedie link power Defaults to 0.
theta Theta Defaults to 0.
solver AUTO will set the solver based on given data and the other parameters. IRLSM is fast on problems with small number of predictors and for lambda-search with L1 penalty, L_BFGS scales better for datasets with many columns. Must be one of: "AUTO", "IRLSM", "L_BFGS", "COORDINATE_DESCENT_NAIVE", "COORDINATE_DESCENT", "GRADIENT_DESCENT_LH", "GRADIENT_DESCENT_SQERR". Defaults to AUTO.
alpha Distribution of regularization between the L1 (Lasso) and L2 (Ridge) penalties. A value of 1 for alpha represents Lasso regression, a value of 0 produces Ridge regression, and anything in between specifies the amount of mixing between the two. Default value of alpha is 0 when SOLVER = 'L-BFGS': 0.5 otherwise.
lambda Regularization strength
lambda_search Logical. Use lambda search starting at lambda max, given lambda is then interpreted as lambda min Defaults to FALSE.
early_stopping Logical. Stop early when there is no more relative improvement on train or validation (if provided) Defaults to TRUE.
nlambdas Number of lambdas to be used in a search. Default indicates: If alpha is zero, with lambda search set to True, the value of nlamdas is set to 30 (fewer lambdas are needed for ridge regression) otherwise it is set to 100. Defaults to -1.
standardize Logical. Standardize numeric columns to have zero mean and unit variance Defaults to FALSE.
missing_values_handling Handling of missing values. Either MeanImputation, Skip or PlugValues. Must be one of: "MeanImputation", "Skip", "PlugValues". Defaults to MeanImputation.
plug_values  Plug Values (a single row frame containing values that will be used to im-
pute missing values of the training/validation frame, use with conjunction missing_values_handling = PlugValues)

compute_p_values  Logical. Request p-values computation, p-values work only with IRLSM solver and no regularization Defaults to FALSE.

remove_collinear_columns  Logical. In case of linearly dependent columns, remove some of the dependent columns Defaults to FALSE.

intercept  Logical. Include constant term in the model Defaults to TRUE.

non_negative  Logical. Restrict coefficients (not intercept) to be non-negative Defaults to FALSE.

max_iterations  Maximum number of iterations Defaults to -1.

objective_epsilon  Converge if objective value changes less than this. Default indicates: If lambda_search is set to True the value of objective_epsilon is set to .0001. If the lambda_search is set to False and lambda is equal to zero, the value of objective_epsilon is set to .000001, for any other value of lambda the default value of objective_epsilon is set to .0001. Defaults to -1.

beta_epsilon  Converge if beta changes less (using L-infinity norm) than beta epsilon, ONLY applies to IRLSM solver Defaults to 0.0001.

gradient_epsilon  Converge if objective changes less (using L-infinity norm) than this, ONLY applies to L-BFGS solver. Default indicates: If lambda_search is set to False and lambda is equal to zero, the default value of gradient_epsilon is equal to .000001, otherwise the default value is .001. If lambda_search is set to True, the conditional values above are 1E-8 and 1E-6 respectively. Defaults to -1.

link  Link function. Must be one of: "family_default", "identity", "logit", "log", "inverse", "tweedie", "ologit". Defaults to family_default.

prior  Prior probability for y==1. To be used only for logistic regression iff the data has been sampled and the mean of response does not reflect reality. Defaults to -1.

cold_start  Logical. Only applicable to multiple alpha/lambda values when calling GLM from GAM. If false, build the next model for next set of alpha/lambdas starting from the values provided by current model. If true will start GLM model from scratch. Defaults to FALSE.

lambda_min_ratio  Minimum lambda used in lambda search, specified as a ratio of lambda_max (the smallest lambda that drives all coefficients to zero). Default indicates: if the number of observations is greater than the number of variables, then lambda_min_ratio is set to 0.0001; if the number of observations is less than the number of variables, then lambda_min_ratio is set to 0.01. Defaults to -1.

beta_constraints  Beta constraints

max_active_predictors  Maximum number of active predictors during computation. Use as a stopping criterion to prevent expensive model building with many predictors. Default indicates: If the IRLSM solver is used, the value of max_active_predictors is set to 5000 otherwise it is set to 100000000. Defaults to -1.
interactions  A list of predictor column indices to interact. All pairwise combinations will be computed for the list.

interaction_pairs  A list of pairwise (first order) column interactions.

obj_reg  Likelihood divider in objective value computation, default is 1/nobs Defaults to -1.

export_checkpoints_dir  Automatically export generated models to this directory.

stopping_rounds  Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable) Defaults to 0.

stopping_metric  Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anomaly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.

stopping_tolerance  Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much) Defaults to 0.001.

balance_classes  Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors  Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.

max_after_balance_size  Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_hit_ratio_k  This argument is deprecated and has no use. Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable).

max_runtime_secs  Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

custom_metric_func  Reference to custom evaluation function, format: 'language:keyName=funcName'

num_knots  Number of knots for gam predictors

knot_ids  String arrays storing frame keys of knots. One for each gam column specified in gam_columns

bs  Basis function type for each gam predictors, 0 for cr

scale  Smoothing parameter for gam predictors

keep_gam_cols  Logical. Save keys of model matrix Defaults to FALSE.
Examples

```r
## Not run:
h2o.init()

# Run GAM of CAPSULE ~ AGE + RACE + PSA + DCAPS
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
h2o.gam(y = "CAPSULE", x = c("RACE"), gam_columns = c("PSA"),
       training_frame = prostate, family = "binomial")

## End(Not run)
```

h2o.gbm

Build gradient boosted classification or regression trees

Description

Builds gradient boosted classification trees and gradient boosted regression trees on a parsed data set. The default distribution function will guess the model type based on the response column type. In order to run properly, the response column must be an numeric for "gaussian" or an enum for "bernoulli" or "multinomial".

Usage

```r
h2o.gbm(
  x,
  y,
  training_frame,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  score_each_iteration = FALSE,
  score_tree_interval = 0,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  ignore_const_cols = TRUE,
  offset_column = NULL,
  weights_column = NULL,
  balance_classes = FALSE,
  class_sampling_factors = NULL,
  max_after_balance_size = 5,
  max_hit_ratio_k = 0,
  ntrees = 50,
  max_depth = 5,
  min_rows = 10,
  nbins = 20,
)```
Arguments

x  (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.

y  The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

training_frame  Id of the training data frame.

model_id  Destination id for this model; auto-generated if not specified.
validation_frame  
Id of the validation data frame.

nfolds  
Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.

keep_cross_validation_models  
Logical. Whether to keep the cross-validation models. Defaults to TRUE.

keep_cross_validation_predictions  
Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.

keep_cross_validation_fold_assignment  
Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

score_each_iteration  
Logical. Whether to score during each iteration of model training. Defaults to FALSE.

score_tree_interval  
Score the model after every so many trees. Disabled if set to 0. Defaults to 0.

fold_assignment  
Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.

fold_column  
Column with cross-validation fold index assignment per observation.

ignore_const_cols  
Logical. Ignore constant columns. Defaults to TRUE.

offset_column  
Offset column. This will be added to the combination of columns before applying the link function.

weights_column  
Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

balance_classes  
Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors  
Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.

max_after_balance_size  
Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_hit_ratio_k  
This argument is deprecated and has no use. Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable).

ntrees  
Number of trees. Defaults to 50.

max_depth  
Maximum tree depth (0 for unlimited). Defaults to 5.
**min_rows**  Fewest allowed (weighted) observations in a leaf. Defaults to 10.

**nbins**  For numerical columns (real/int), build a histogram of (at least) this many bins, then split at the best point. Defaults to 20.

**nbins_top_level**  For numerical columns (real/int), build a histogram of (at most) this many bins at the root level, then decrease by factor of two per level. Defaults to 1024.

**nbins_cats**  For categorical columns (factors), build a histogram of this many bins, then split at the best point. Higher values can lead to more overfitting. Defaults to 1024.

**r2_stopping**  r2_stopping is no longer supported and will be ignored if set - please use stopping_rounds, stopping_metric and stopping_tolerance instead. Previous version of H2O would stop making trees when the R^2 metric equals or exceeds this. Defaults to 1.797693135e+308.

**stopping_rounds**  Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable). Defaults to 0.

**stopping_metric**  Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anomaly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.

**stopping_tolerance**  Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much). Defaults to 0.001.

**max_runtime_secs**  Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

**seed**  Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

**build_tree_one_node**  Logical. Run on one node only; no network overhead but fewer cpus used. Suitable for small datasets. Defaults to FALSE.

**learn_rate**  Learning rate (from 0.0 to 1.0). Defaults to 0.1.

**learn_rate_annealing**  Scale the learning rate by this factor after each tree (e.g., 0.99 or 0.999). Defaults to 1.

**distribution**  Distribution function. Must be one of: "AUTO", "bernoulli", "quasibinomial", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber", "custom". Defaults to AUTO.

**quantile_alpha**  Desired quantile for Quantile regression, must be between 0 and 1. Defaults to 0.5.

**tweedie_power**  Tweedie power for Tweedie regression, must be between 1 and 2. Defaults to 1.5.

**huber_alpha**  Desired quantile for Huber/M-regression (threshold between quadratic and linear loss, must be between 0 and 1). Defaults to 0.9.
checkpoint  
Model checkpoint to resume training with.

sample_rate  
Row sample rate per tree (from 0.0 to 1.0) Defaults to 1.

sample_rate_per_class  
A list of row sample rates per class (relative fraction for each class, from 0.0 to 1.0), for each tree

col_sample_rate  
Column sample rate (from 0.0 to 1.0) Defaults to 1.

col_sample_rate_change_per_level  
Relative change of the column sampling rate for every level (must be > 0.0 and <= 2.0) Defaults to 1.

col_sample_rate_per_tree  
Column sample rate per tree (from 0.0 to 1.0) Defaults to 1.

min_split_improvement  
Minimum relative improvement in squared error reduction for a split to happen Defaults to 1e-05.

histogram_type  
What type of histogram to use for finding optimal split points Must be one of: "AUTO", "UniformAdaptive", "Random", "QuantilesGlobal", "RoundRobin". Defaults to AUTO.

max_abs_leafnode_pred  
Maximum absolute value of a leaf node prediction Defaults to 1.797693135e+308.

pred_noise_bandwidth  
Bandwidth (sigma) of Gaussian multiplicative noise ~N(1,sigma) for tree node predictions Defaults to 0.

categorical_encoding  
Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

calibrate_model  
Logical. Use Platt Scaling to calculate calibrated class probabilities. Calibration can provide more accurate estimates of class probabilities. Defaults to FALSE.

calibration_frame  
Calibration frame for Platt Scaling

custom_metric_func  
Reference to custom evaluation function, format: 'language:keyName=funcName'

custom_distribution_func  
Reference to custom distribution, format: 'language:keyName=funcName'

export_checkpoints_dir  
Automatically export generated models to this directory.

monotone_constraints  
A mapping representing monotonic constraints. Use +1 to enforce an increasing constraint and -1 to specify a decreasing constraint.

check_constant_response  
Logical. Check if response column is constant. If enabled, then an exception is thrown if the response column is a constant value. If disabled, then model will train regardless of the response column being a constant value or not. Defaults to TRUE.

gainslift_bins  
Gains/Lift table number of bins. 0 means disabled. Default value -1 means automatic binning. Defaults to -1.

verbose  
Logical. Print scoring history to the console (Metrics per tree). Defaults to FALSE.
See Also

`predict.H2OModel` for prediction

Examples

```r
## Not run:
library(h2o)
h2o.init()

# Run regression GBM on australia data
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.uploadFile(path = australia_path)
independent <- c("premax", "salmax", "minairtemp", "maxairtemp", "maxsst",
                "maxsoilmoist", "Max_czcs")
dependent <- "runoffnew"
h2o.gbm(y = dependent, x = independent, training_frame = australia,
        ntrees = 3, max_depth = 3, min_rows = 2)

## End(Not run)
```

---

**h2o.generic**

Imports a generic model into H2O. Such model can be used then used for scoring and obtaining additional information about the model. The imported model has to be supported by H2O.

**Description**

Imports a generic model into H2O. Such model can be used then used for scoring and obtaining additional information about the model. The imported model has to be supported by H2O.

**Usage**

```r
h2o.generic(model_id = NULL, model_key = NULL, path = NULL)
```

**Arguments**

- `model_id`: Destination id for this model; auto-generated if not specified.
- `model_key`: Key to the self-contained model archive already uploaded to H2O.
- `path`: Path to file with self-contained model archive.

**Examples**

```r
## Not run:
# library(h2o)
# h2o.init()

# generic_model <- h2o.genericModel("/path/to/model.zip")
# predictions <- h2o.predict(generic_model, dataset)

## End(Not run)
```
h2o.genericModel

Imports a model under given path, creating a Generic model with it.

Description

Usage example: generic_model <- h2o.genericModel(model_file_path = "/path/to/mojo.zip") predictions <- h2o.predict(generic_model, dataset)

Usage

h2o.genericModel(mojo_file_path)

Arguments

mojo_file_path  Filesystem path to the model imported

Value

Returns H2O Generic Model based on given embedded model

Examples

## Not run:

# Import default Iris dataset as H2O frame
data <- as.h2o(iris)

# Train a very simple GBM model

# Download the trained GBM model as MOJO (temporary directory used in this example)
mojo_original_name <- h2o.download_mojo(model = original_model, path = tempdir())
mojo_original_path <- paste0(tempdir(), "/", mojo_original_name)

# Import the MOJO as Generic model
generic_model <- h2o.genericModel(mojo_original_path)

# Perform scoring with the generic model
generic_model_predictions <- h2o.predict(generic_model, data)

## End(Not run)

h2o.getConnection

Retrieve an H2O Connection

Description

Attempt to recover an h2o connection.
Usage

h2o.getConnection()

Value

Returns an H2OConnection object.

Description

Get the reference to a frame with the given id in the H2O instance.

Usage

h2o.getFrame(id)

Arguments

id

A string indicating the unique frame of the dataset to retrieve.

Examples

```r
## Not run:
library(h2o)
h2o.init()

train <- h2o.importFile(f)
y <- "species"
x <- setdiff(names(train), y)
train[, y] <- as.factor(train[, y])
nfolds <- 5
num_base_models <- 2
my_gbm <- h2o.gbm(x = x, y = y, training_frame = train,
  distribution = "multinomial", ntree = 10,
  max_depth = 3, min_rows = 2, learn_rate = 0.2,
  nfolds = nfolds, fold_assignment = "Modulo",
  keep_cross_validation_predictions = TRUE, seed = 1)
my_rf <- h2o.randomForest(x = x, y = y, training_frame = train,
  ntrees = 50, nfolds = nfolds, fold_assignment = "Modulo",
  keep_cross_validation_predictions = TRUE, seed = 1)
stack <- h2o.stackedEnsemble(x = x, y = y, training_frame = train,
  model_id = "my_ensemble_l1",
  base_models = list(my_gbm@model_id, my_rf@model_id),
  keep_levelone_frame = TRUE)
h2o.getFrame(stack@model$levelone_frame_id$name)
## End(Not run)
```
h2o.getGLMFullRegularizationPath

Extract full regularization path from a GLM model

Description

Extract the full regularization path from a GLM model (assuming it was run with the lambda search option).

Usage

h2o.getGLMFullRegularizationPath(model)

Arguments

model an H2OModel corresponding from a h2o.glm call.

h2o.getGrid

Get a grid object from H2O distributed K/V store.

Description

Note that if neither cross-validation nor a validation frame is used in the grid search, then the training metrics will display in the "get grid" output. If a validation frame is passed to the grid, and nfolds = 0, then the validation metrics will display. However, if nfolds > 1, then cross-validation metrics will display even if a validation frame is provided.

Usage

h2o.getGrid(grid_id, sort_by, decreasing, verbose = FALSE)

Arguments

grid_id ID of existing grid object to fetch
sort_by Sort the models in the grid space by a metric. Choices are "logloss", "residual_deviance", "mse", "auc", "accuracy", "precision", "recall", "f1", etc.
decreasing Specify whether sort order should be decreasing
verbose Controls verbosity of the output, if enabled prints out error messages for failed models (default: FALSE)

Examples

## Not run:
library(h2o)
library(jsonlite)
h2o.init()
iris_hf <- as.h2o(iris)
h2o.grid("gbm", grid_id = "gbm_grid_id", x = c(1:4), y = 5,
training_frame = iris_hf, hyper_params = list(ntrees = c(1, 2, 3)))
grid <- h2o.getGrid("gbm_grid_id")
# Get grid summary
summary(grid)
# Fetch grid models
model_ids <- grid@model_ids
models <- lapply(model_ids, function(id) { h2o.getModel(id)})

## End(Not run)

### h2o.getId

*Get back-end distributed key/value store id from an H2OFrame.*

**Description**

Get back-end distributed key/value store id from an H2OFrame.

**Usage**

h2o.getId(x)

**Arguments**

- **x**
  
  An H2OFrame

**Value**

The id of the H2OFrame

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.getId(iris)

## End(Not run)
```

### h2o.getModel

*Get an R reference to an H2O model*

**Description**

Returns a reference to an existing model in the H2O instance.

**Usage**

h2o.getModel(model_id)
h2o.getModelTree

Fetches a single tree of a H2O model. This function is intended to be used on Gradient Boosting Machine models or Distributed Random Forest models.

**Description**

Fetches a single tree of a H2O model. This function is intended to be used on Gradient Boosting Machine models or Distributed Random Forest models.

**Usage**

h2o.getModelTree(model, tree_number, tree_class = NA)

**Arguments**

- **model**: Model with trees
- **tree_number**: Number of the tree in the model to fetch, starting with 1
- **tree_class**: Name of the class of the tree (if applicable). This value is ignored for regression and binomial response column, as there is only one tree built. As there is exactly one class per categorical level, name of tree’s class equals to the corresponding categorical level of response column.

**Value**

Returns an H2OTree object with detailed information about a tree.

---

### Arguments

- **model_id**: A string indicating the unique model_id of the model to retrieve.

### Value

Returns an object that is a subclass of H2OModel.

### Examples

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
model_id <- h2o.gbm(x = 1:4, y = 5, training_frame = iris_hf)@model_id
model_retrieved <- h2o.getModel(model_id)
## End(Not run)
```
Examples

```
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)

## End(Not run)
```

h2o.getTimezone

Get the Time Zone on the H2O cluster
Returns a string

Usage

h2o.getTimezone()

h2o.getTypes

Get the types-per-column

Description

Get the types-per-column

Usage

h2o.getTypes(x)

Arguments

x
An H2OFrame

Value

A list of types per column

Examples

```
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.getTypes(iris)

## End(Not run)
```
**h2o.getVersion**

Get h2o version

### Description

Get h2o version

### Usage

```r
h2o.getVersion()
```

---

**h2o.get_automl**

Get an R object that is a subclass of `H2OAutoML`

### Description

Get an R object that is a subclass of `H2OAutoML`

### Usage

```r
h2o.get_automl(project_name)
```

```r
h2o.getAutoML(project_name)
```

### Arguments

- `project_name` A string indicating the project_name of the automl instance to retrieve.

### Value

Returns an object that is a subclass of `H2OAutoML`.

### Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(path = prostate_path, header = TRUE)
y <- "CAPSULE"
prostate[,y] <- as.factor(prostate[,y]) #convert to factor for classification
aml <- h2o.automl(y = y, training_frame = prostate,
                  max_runtime_secs = 30, project_name = "prostate")
aml2 <- h2o.get_automl("prostate")

## End(Not run)
```
h2o.get_leaderboard  Retrieve the leaderboard from the AutoML instance.

Description
Contrary to the default leaderboard attached to the automl instance, this one can return columns other than the metrics.

Usage
h2o.get_leaderboard(object, extra_columns = NULL)

Arguments

object The object for which to return the leaderboard. Currently, only H2OAutoML instances are supported.

extra_columns A string or a list of string specifying which optional columns should be added to the leaderboard. Defaults to None. Currently supported extensions are:

- 'ALL': adds all columns below.
- 'training_time_ms': column providing the training time of each model in milliseconds (doesn’t include the training of cross validation models).
- 'predict_time_per_row_ms': column providing the average prediction time by the model for a single row.

Value
An H2OFrame representing the leaderboard.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(path = prostate_path, header = TRUE)
y <- "CAPSULE"
prostate[,y] <- as.factor(prostate[,y])  #convert to factor for classification
aml <- h2o.automl(y = y, training_frame = prostate, max_runtime_secs = 30)
lb <- h2o.get_leaderboard(aml)
head(lb)

## End(Not run)
```
### h2o.get_ntrees_actual

Retrieve actual number of trees for tree algorithms

**Usage**

```r
h2o.get_ntrees_actual(object)
```

**Arguments**

- `object` : An H2OModel object.

### h2o.get_segment_models

Retrieves an instance of H2OSegmentModels for a given id.

**Usage**

```r
h2o.get_segment_models(segment_models_id)
```

**Arguments**

- `segment_models_id` : A string indicating the unique segment_models_id

**Value**

Returns an object that is a subclass of H2OSegmentModels.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
h2o.train_segments(algorithm = "gbm",
  segment_columns = "Species", segment_models_id="models_by_species",
  x = c(1:3), y = 4, training_frame = iris_hf, ntrees = 5, max_depth = 4)
models <- h2o.get_segment_models("models_by_species")
as.data.frame(models)
## End(Not run)
```
h2o.giniCoef

Retrieve the GINI Coefficient

Description

Retrieves the GINI coefficient from an H2OBinomialMetrics. If "train", "valid", and "xval" parameters are FALSE (default), then the training GINI value is returned. If more than one parameter is set to TRUE, then a named vector of GINIs are returned, where the names are "train", "valid" or "xval".

Usage

h2o.giniCoef(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

- object: an H2OBinomialMetrics object.
- train: Retrieve the training GINI Coefficient
- valid: Retrieve the validation GINI Coefficient
- xval: Retrieve the cross-validation GINI Coefficient

See Also

h2o.auc for AUC, h2o.giniCoef for the GINI coefficient, and h2o.metric for the various threshold metrics. See h2o.performance for creating H2OModelMetrics objects.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.giniCoef(perf)

## End(Not run)
```
**h2o.glm**

**Fit a generalized linear model**

**Description**

Fits a generalized linear model, specified by a response variable, a set of predictors, and a description of the error distribution.

**Usage**

```r
h2o.glm(
  x,
  y,
  training_frame,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
  seed = -1,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  random_columns = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  score_iteration_interval = -1,
  offset_column = NULL,
  weights_column = NULL,
  family = c("AUTO", "gaussian", "binomial", "fractionalbinomial", "quasibinomial",
             "ordinal", "multinomial", "poisson", "gamma", "tweedie", "negativebinomial"),
  rand_family = c("[gaussian]"),
  tweedie_variance_power = 0,
  tweedie_link_power = 1,
  theta = 1e-10,
  solver = c("AUTO", "IRLSM", "L_BFGS", "COORDINATE_DESCENT_NAIVE",
             "COORDINATE_DESCENT", "GRADIENT_DESCENT_LH", "GRADIENT_DESCENT_SQERR"),
  alpha = NULL,
  lambda = NULL,
  lambda_search = FALSE,
  early_stopping = TRUE,
  nlambdas = -1,
  standardize = TRUE,
  missing_values_handling = c("MeanImputation", "Skip", "PlugValues"),
  plug_values = NULL,
  compute_p_values = FALSE,
  remove_collinear_columns = FALSE,
  intercept = TRUE,
  non_negative = FALSE,
  max_iterations = -1,
  objective_epsilon = -1,
)
```
beta.epsilon = 1e-04,
gradient.epsilon = -1,
link = c("family_default", "identity", "logit", "log", "inverse", "tweedie", "o-logit"),
rand.link = c(["identity"], ["family_default"]),
startval = NULL,
calc.like = FALSE,
HGLM = FALSE,
prior = -1,
cold_start = FALSE,
lambda.min.ratio = -1,
beta.constraints = NULL,
max.active.predictors = -1,
interactions = NULL,
interaction.pairs = NULL,
obj.reg = -1,
export.checkpoints.dir = NULL,
stopping.rounds = 0,
stopping.metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift.top.group", "misclassification", "mean.per.class.error", "custom", "custom.increasing"),
stopping.tolerance = 0.001,
balance.classes = FALSE,
class.sampling.factors = NULL,
max.after.balance.size = 5,
max.hit.ratio.k = 0,
max.runtime_secs = 0,
custom.metric.func = NULL

Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.
y The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.
training_frame Id of the training data frame.
model_id Destination id for this model; auto-generated if not specified.
validation_frame Id of the validation data frame.
nfolds Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.
seed Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).
keep.cross-validation.models Logical. Whether to keep the cross-validation models. Defaults to TRUE.
keep.cross-validation.predictions Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.
keep_cross_validation_fold_assignment
  Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

fold_assignment
  Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.

fold_column
  Column with cross-validation fold index assignment per observation.

random_columns
  random columns indices for HGLM.

ignore_const_cols
  Logical. Ignore constant columns. Defaults to TRUE.

score_each_iteration
  Logical. Whether to score during each iteration of model training. Defaults to FALSE.

score_iteration_interval
  Perform scoring for every score_iteration_interval iterations Defaults to -1.

offset_column
  Offset column. This will be added to the combination of columns before applying the link function.

weights_column
  Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

family
  Family. Use binomial for classification with logistic regression, others are for regression problems. Must be one of: "AUTO", "gaussian", "binomial", "fractionalbinomial", "quasibinomial", "ordinal", "multinomial", "poisson", "gamma", "tweedie", "negativebinomial". Defaults to AUTO.

rand_family
  Random Component Family array. One for each random component. Only support gaussian for now. Must be one of: [gaussian].

tweedie_variance_power
  Tweedie variance power Defaults to 0.

tweedie_link_power
  Tweedie link power Defaults to 1.

theta
  Theta Defaults to 1e-10.

solver
  AUTO will set the solver based on given data and the other parameters. IRLSM is fast on problems with small number of predictors and for lambda-search with L1 penalty. L_BFGS scales better for datasets with many columns. Must be one of: "AUTO", "IRLSM", "L_BFGS", "COORDINATE_DESCENT_NAIVE", "COORDINATE_DESCENT", "GRADIENT_DESCENT_LH", "GRADIENT_DESCENT_SQERR". Defaults to AUTO.

alpha
  Distribution of regularization between the L1 (Lasso) and L2 (Ridge) penalties. A value of 1 for alpha represents Lasso regression, a value of 0 produces Ridge regression, and anything in between specifies the amount of mixing between the two. Default value of alpha is 0 when SOLVER = 'L-BFGS'; 0.5 otherwise.

lambda
  Regularization strength
lambda_search Logical. Use lambda search starting at lambda max, given lambda is then interpreted as lambda min. Defaults to FALSE.

early_stopping Logical. Stop early when there is no more relative improvement on train or validation (if provided). Defaults to TRUE.

nlambdas Number of lambdas to be used in a search. Default indicates: If alpha is zero, with lambda search set to True, the value of nlamdas is set to 30 (fewer lambdas are needed for ridge regression) otherwise it is set to 100. Defaults to -1.

standardize Logical. Standardize numeric columns to have zero mean and unit variance. Defaults to TRUE.

missing_values_handling Handling of missing values. Either MeanImputation, Skip or PlugValues. Must be one of: "MeanImputation", "Skip", "PlugValues". Defaults to MeanImputation.

plug_values Plug Values (a single row frame containing values that will be used to impute missing values of the training/validation frame, use with conjunction missing_values_handling = PlugValues).

compute_p_values Logical. Request p-values computation. p-values work only with IRLSM solver and no regularization. Defaults to FALSE.

remove_collinear_columns Logical. In case of linearly dependent columns, remove some of the dependent columns. Defaults to FALSE.

intercept Logical. Include constant term in the model. Defaults to TRUE.

non_negative Logical. Restrict coefficients (not intercept) to be non-negative. Defaults to FALSE.

max_iterations Maximum number of iterations. Defaults to -1.

objective_epsilon Converge if objective value changes less than this. Default indicates: If lambda_search is set to True the value of objective_epsilon is set to .0001. If the lambda_search is set to False and lambda is equal to zero, the value of objective_epsilon is set to .000001, for any other value of lambda the default value of objective_epsilon is set to .0001. Defaults to -1.

beta_epsilon Converge if beta changes less (using L-infinity norm) than beta epsilon. ONLY applies to IRLSM solver. Defaults to 0.0001.

gradient_epsilon Converge if objective changes less (using L-infinity norm) than this, ONLY applies to L-BFGS solver. Default indicates: If lambda_search is set to False and lambda is equal to zero, the default value of gradient_epsilon is equal to .000001, otherwise the default value is .0001. If lambda_search is set to True, the conditional values above are 1E-8 and 1E-6 respectively. Defaults to -1.

link Link function. Must be one of: "family_default", "identity", "logit", "log", "inverse", "tweedie", "ologit". Defaults to family_default.

rand_link Link function array for random component in HGLM. Must be one of: "[identity]", "[family_default]".

startval double array to initialize fixed and random coefficients for HGLM, coefficients for GLM.

calc_like Logical. If true, will return likelihood function value for HGLM. Defaults to FALSE.
HGLM Logical. If set to true, will return HGLM model. Otherwise, normal GLM model will be returned Defaults to FALSE.

prior Prior probability for y==1. To be used only for logistic regression iff the data has been sampled and the mean of response does not reflect reality. Defaults to -1.

cold_start Logical. Only applicable to multiple alpha/lambda values. If false, build the next model for next set of alpha/lambda values starting from the values provided by current model. If true will start GLM model from scratch. Defaults to FALSE.

lambda_min_ratio Minimum lambda used in lambda search, specified as a ratio of lambda_max (the smallest lambda that drives all coefficients to zero). Default indicates: if the number of observations is greater than the number of variables, then lambda_min_ratio is set to 0.0001; if the number of observations is less than the number of variables, then lambda_min_ratio is set to 0.01. Defaults to -1.

beta_constraints Beta constraints

max_active_predictors Maximum number of active predictors during computation. Use as a stopping criterion to prevent expensive model building with many predictors. Default indicates: If the IRLSM solver is used, the value of max_active_predictors is set to 5000 otherwise it is set to 10000000. Defaults to -1.

interactions A list of predictor column indices to interact. All pairwise combinations will be computed for the list.

interaction_pairs A list of pairwise (first order) column interactions.

obj_reg Likelihood divider in objective value computation, default is 1/nobs Defaults to -1.

export_checkpoints_dir Automatically export generated models to this directory.

stopping_rounds Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable) Defaults to 0.

stopping_metric Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anomoly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.

stopping_tolerance Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much) Defaults to 0.001.

balance_classes Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.
h2o.glm

**max_after_balance_size**

Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

**max_hit_ratio_k**

This argument is deprecated and has no use. Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable).

**max_runtime_secs**

Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

**custom_metric_func**

Reference to custom evaluation function, format: ‘language:keyName=funcName’

**Value**

A subclass of H2OModel is returned. The specific subclass depends on the machine learning task at hand (if it’s binomial classification, then an H2OBinomialModel is returned, if it’s regression then a H2ORegressionModel is returned). The default print-out of the models is shown, but further GLM-specific information can be queried out of the object. To access these various items, please refer to the seealso section below. Upon completion of the GLM, the resulting object has coefficients, normalized coefficients, residual/null deviance, aic, and a host of model metrics including MSE, AUC (for logistic regression), degrees of freedom, and confusion matrices. Please refer to the more in-depth GLM documentation available here: https://h2o-release.s3.amazonaws.com/h2o-dev/rel-shannon/2/docs-website/h2o-docs/index.html#Data+Science+Algorithms-GLM

**See Also**

predict.H2OModel for prediction, h2o.mse, h2o.auc, h2o.confusionMatrix, h2o.performance, h2o.giniCoef, h2o.logloss, h2o.varimp, h2o.scoreHistory

**Examples**

```r
## Not run:
h2o.init()

# Run GLM of CAPSULE ~ AGE + RACE + PSA + DCAPS
prostate_path = system.file("extdata", "prostate.csv", package = "h2o")
prostate = h2o.importFile(path = prostate_path)
h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"), training_frame = prostate,
       family = "binomial", nfolds = 0, alpha = 0.5, lambda_search = FALSE)

# Run GLM of VOL ~ CAPSULE + AGE + RACE + PSA + GLEASON
predictors = setdiff(colnames(prostate), c("ID", "DPROS", "DCAPS", "VOL"))
h2o.glm(y = "VOL", x = predictors, training_frame = prostate, family = "gaussian",
        nfolds = 0, alpha = 0.1, lambda_search = FALSE)

# GLM variable importance
# Also see:
# https://github.com/h2oai/h2o/blob/master/R/tests/testdir_demos/runit_demo_VI_all_algos.R
bank = h2o.importFile("https://s3.amazonaws.com/h2o-public-test-data/smalldata/demos/bank-additional-full.csv")
predictors = 1:20
target = "y"
glm = h2o.glm(x = predictors,

```

h2o.glrm

```r
y = target,
training_frame = bank,
family = "binomial",
standardize = TRUE,
lambda_search = TRUE)
h2o.std_coef_plot(glm, num_of_features = 20)
```

## End(Not run)

---

**h2o.glrm**  
*Generalized low rank decomposition of an H2O data frame*

**Description**

Builds a generalized low rank decomposition of an H2O data frame

**Usage**

```r
h2o.glrm(
  training_frame,
  cols = NULL,
  model_id = NULL,
  validation_frame = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  representation_name = NULL,
  loading_name = NULL,
  transform = c("NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE"),
  k = 1,
  loss = c("Quadratic", "Absolute", "Huber", "Poisson", "Hinge", "Logistic", "Periodic"),
  loss_by_col_idx = NULL,
  multi_loss = c("Categorical", "Ordinal"),
  period = 1,
  regularization_x = c("None", "Quadratic", "L2", "L1", "NonNegative", "OneSparse", "UnitOneSparse", "Simplex"),
  regularization_y = c("None", "Quadratic", "L2", "L1", "NonNegative", "OneSparse", "UnitOneSparse", "Simplex"),
  gamma_x = 0,
  gamma_y = 0,
  max_iterations = 1000,
  max_updates = 2000,
  init_step_size = 1,
  min_step_size = 1e-04,
  seed = -1,
  init = c("Random", "SVD", "PlusPlus", "User"),
  svd_method = c("GramSVD", "Power", "Randomized"),
  user_y = NULL,
  user_x = NULL,
  expand_user_y = TRUE,
)```

Arguments

- training_frame: Id of the training data frame.
- cols: (Optional) A vector containing the data columns on which k-means operates.
- model_id: Destination id for this model; auto-generated if not specified.
- validation_frame: Id of the validation data frame.
- ignore_const_cols: Logical. Ignore constant columns. Defaults to TRUE.
- score_each_iteration: Logical. Whether to score during each iteration of model training. Defaults to FALSE.
- representation_name: Frame key to save resulting X.
- loading_name: [Deprecated] Use representation_name instead. Frame key to save resulting X.
- transform: Transformation of training data Must be one of: "NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE". Defaults to NONE.
- k: Rank of matrix approximation Defaults to 1.
- loss_by_col_idx: Loss function by column index (override)
- multi_loss: Categorical loss function Must be one of: "Categorical", "Ordinal". Defaults to Categorical.
- period: Length of period (only used with periodic loss function) Defaults to 1.
- regularization_x: Regularization function for X matrix Must be one of: "None", "Quadratic", "L2", "L1", "NonNegative", "OneSparse", "UnitOneSparse", "Simplex". Defaults to None.
- regularization_y: Regularization function for Y matrix Must be one of: "None", "Quadratic", "L2", "L1", "NonNegative", "OneSparse", "UnitOneSparse", "Simplex". Defaults to None.
- gamma_x: Regularization weight on X matrix Defaults to 0.
- gamma_y: Regularization weight on Y matrix Defaults to 0.
- max_iterations: Maximum number of iterations Defaults to 1000.
- max_updates: Maximum number of updates, defaults to 2*max_iterations Defaults to 2000.
- init_step_size: Initial step size Defaults to 1.
- min_step_size: Minimum step size Defaults to 0.0001.
seed

Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

init


svd_method

Method for computing SVD during initialization (Caution: Randomized is currently experimental and unstable) Must be one of: "GramSVD", "Power", "Randomized". Defaults to Randomized.

user_y

User-specified initial Y

user_x

User-specified initial X

expand_user_y

Logical. Expand categorical columns in user-specified initial Y. Defaults to TRUE.

impute_original

Logical. Reconstruct original training data by reversing transform. Defaults to FALSE.

recover_svd

Logical. Recover singular values and eigenvectors of XY. Defaults to FALSE.

max_runtime_secs

Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

export_checkpoints_dir

Automatically export generated models to this directory.

Value

an object of class H2ODimReductionModel.

References


See Also

h2o.kmeans, h2o.svd, h2o.prcomp

Examples

```r
## Not run:
library(h2o)
h2o.init()
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.uploadFile(path = australia_path)
h2o.glrm(training_frame = australia, k = 5, loss = "Quadratic", regularization_x = "L1",
          gamma_x = 0.5, gamma_y = 0, max_iterations = 1000)
```

```r
## End(Not run)
```
**h2o.grep**  
Search for matches to an argument pattern

**Description**

Searches for matches to argument ‘pattern’ within each element of a string column.

**Usage**

```r
h2o.grep(
  pattern,
  x,
  ignore.case = FALSE,
  invert = FALSE,
  output.logical = FALSE
)
```

**Arguments**

- `pattern`: A character string containing a regular expression.
- `x`: An H2O frame that wraps a single string column.
- `ignore.case`: If TRUE case is ignored during matching.
- `invert`: Identify elements that do not match the pattern.
- `output.logical`: If TRUE returns logical vector of indicators instead of list of matching positions.

**Details**

This function has similar semantics as R’s native grep function and it supports a subset of its parameters. Default behavior is to return indices of the elements matching the pattern. Parameter ‘output.logical’ can be used to return a logical vector indicating if the element matches the pattern (1) or not (0).

**Value**

H2OFrame holding the matching positions or a logical vector if ‘output.logical' is enabled.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
addresses <- as.h2o(c("2307", "Leghorn St", "Mountain View", "CA", "94043"))
zip_codes <- addresses[h2o.grep([0-9]{5}, addresses, output.logical = TRUE),]
## End(Not run)
```
**h2o.grid**  

**H2O Grid Support**

**Description**

Provides a set of functions to launch a grid search and get its results.

**Usage**

```r
h2o.grid(
  algorithm,
  grid_id,
  x,
  y,
  training_frame,
  ...
  hyper_params = list(),
  is_supervised = NULL,
  do_hyper_params_check = FALSE,
  search_criteria = NULL,
  export_checkpoints_dir = NULL,
  parallelism = 1
)
```

**Arguments**

- `algorithm` Name of algorithm to use in grid search (gbm, randomForest, kmeans, glm, deepLearning, naiveBayes, pca).
- `grid_id` (Optional) ID for resulting grid search. If it is not specified then it is autogenerated.
- `x` (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If `x` is missing, then all columns except `y` are used.
- `y` The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.
- `training_frame` Id of the training data frame.
- `...` arguments describing parameters to use with algorithm (i.e., `x`, `y`, `training_frame`). Look at the specific algorithm - `h2o.gbm`, `h2o.glm`, `h2o.kmeans`, `h2o.deepLearning` - for available parameters.
- `hyper_params` List of lists of hyper parameters (i.e., `list(ntrees=c(1,2), max_depth=c(5,7))`).
- `is_supervised` (Optional) If specified then override the default heuristic which decides if the given algorithm name and parameters specify a supervised or unsupervised algorithm.
- `do_hyper_params_check` Perform client check for specified hyper parameters. It can be time expensive for large hyper space.
h2o.group_by

**Description**

Performs a group by and apply similar to ddply.

**Examples**

```r
## Not run:
library(h2o)
library(jsonlite)
h2o.init()
iris_hf <- as.h2o(iris)
grid <- h2o.grid("gbm", x = c(1:4), y = 5, training_frame = iris_hf,
  hyper_params = list(ntrees = c(1, 2, 3)))
# Get grid summary
summary(grid)
# Fetch grid models
model_ids <- grid@model_ids
models <- lapply(model_ids, function(id) { h2o.getModel(id)})
## End(Not run)
```
Usage

h2o.group_by(
    data,
    by,
    ...

gb.control = list(na.methods = NULL, col.names = NULL)
)

Arguments

data an H2OFrame object.

by a list of column names

... any supported aggregate function. See Details: for more help.

gb.control a list of how to handle NA values in the dataset as well as how to name output columns. The method is specified using the rm.method argument. See Details: for more help.

Details

In the case of na.methods within gb.control, there are three possible settings. "all" will include NAs in computation of functions. "rm" will completely remove all NA fields. "ignore" will remove NAs from the numerator but keep the rows for computational purposes. If a list smaller than the number of columns groups is supplied, the list will be padded by "ignore".

Note that to specify a list of column names in the gb.control list, you must add the col.names argument. Similar to na.methods, col.names will pad the list with the default column names if the length is less than the number of columns groups supplied.

Supported functions include nrow. This function is required and accepts a string for the name of the generated column. Other supported aggregate functions accept col and na arguments for specifying columns and the handing of NAs ("all", "ignore", and GroupBy object; max calculates the maximum of each column specified in col for each group of a GroupBy object; mean calculates the mean of each column specified in col for each group of a GroupBy object; min calculates the minimum of each column specified in col for each group of a GroupBy object; mode calculates the mode of each column specified in col for each group of a GroupBy object; sd calculates the standard deviation of each column specified in col for each group of a GroupBy object; ss calculates the sum of squares of each column specified in col for each group of a GroupBy object; sum calculates the sum of each column specified in col for each group of a GroupBy object; and var calculates the variance of each column specified in col for each group of a GroupBy object. If an aggregate is provided without a value (for example, as max in sum(col="X1", na="all"), mean(col="X5", na="all"), max()), then it is assumed that the aggregation should apply to all columns except the GroupBy columns. However, operations will not be performed on String columns. They will be skipped. Note again that nrow is required and cannot be empty.

Value

Returns a new H2OFrame object with columns equivalent to the number of groups created

Examples

## Not run:
library(h2o)
h2o.init()
df <- h2o.importFile(paste("https://s3.amazonaws.com/h2o-public-test-data", "dataset.csv"),"
h2o.head

"/smalldata/prostate/prostate.csv",
sep="")

h2o.group_by(data = df, by = "RACE", nrow("VOL"))

## End(Not run)

h2o.gsub

String Global Substitute

Description

Creates a copy of the target column in which each string has all occurrence of the regex pattern replaced with the replacement substring.

Usage

h2o.gsub(pattern, replacement, x, ignore.case = FALSE)

Arguments

pattern The pattern to replace.
replacement The replacement pattern.
x The column on which to operate.
ignore.case Case sensitive or not

Examples

## Not run:
library(h2o)
h2o.init()

string_to_gsub <- as.h2o("r tutorial")

sub_string <- h2o.gsub("r ", "H2O ", string_to_gsub)

## End(Not run)

h2o.head

Return the Head or Tail of an H2O Dataset.

Description

Returns the first or last rows of an H2OFrame object.

Usage

h2o.head(x, n = 6L, m = 200L, ...)

## S3 method for class 'H2OFrame'

head(x, n = 6L, m = 200L, ...)

h2o.tail(x, n = 6L, m = 200L, ...)

## S3 method for class 'H2OFrame'

tail(x, n = 6L, m = 200L, ...)
Arguments

x  An H2OFrame object.
n  (Optional) A single integer. If positive, number of rows in x to return. If negative, all but the n first/last number of rows in x.
m  (Optional) A single integer. If positive, number of columns in x to return. If negative, all but the m first/last number of columns in x.
...  Ignored.

Value

An H2OFrame containing the first or last n rows and m columns of an H2OFrame object.

Examples

## Not run:
library(h2o)
h2o.init(ip <- "localhost", port = 54321, startH2O = TRUE)
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.uploadFile(path = australia_path)
# Return the first 10 rows and 6 columns
h2o.head(australia, n = 10L, m = 6L)
# Return the last 10 rows and 6 columns
h2o.tail(australia, n = 10L, m = 6L)

# For Jupyter notebook with an R kernel,
# view all rows of a data frame
options(repr.matrix.max.rows = 600, repr.matrix.max.cols = 200)
## End(Not run)
h2o.hist  
Compute A Histogram

Description
Compute a histogram over a numeric column. If breaks="FD", the MAD is used over the IQR in computing bin width. Note that we do not beautify the breakpoints as R does.

Usage
h2o.hist(x, breaks = "Sturges", plot = TRUE)

Arguments
x  A single numeric column from an H2OFrame.
bbreaks  Can be one of the following: A string: "Sturges", "Rice", "sqrt", "Doane", "FD", "Scott" A single number for the number of breaks splitting the range of the vec into number of breaks bins of equal width A vector of numbers giving the split points, e.g., c(-50,213.213,9324834)
plot  A logical value indicating whether or not a plot should be generated (default is TRUE).

Examples
## Not run:
library(h2o)
h2o.init()
iris <- h2o.importFile(f)
h2o.asnumeric(iris["petal_len"])
h2o.hist(iris["petal_len"], breaks = "Sturges", plot = TRUE)
## End(Not run)

h2o.hit_ratio_table  
Retrieve the Hit Ratios

Description
If "train", "valid", and "xval" parameters are FALSE (default), then the training Hit Ratios value is returned. If more than one parameter is set to TRUE, then a named list of Hit Ratio tables are returned, where the names are "train", "valid" or "xval".

Usage
h2o.hit_ratio_table(object, train = FALSE, valid = FALSE, xval = FALSE)
**h2o.hour**

Convert Milliseconds to Hour of Day in H2O Datasets

**Description**

Converts the entries of an H2OFrame object from milliseconds to hours of the day (on a 0 to 23 scale).

**Usage**

```r
def h2o.hour(x)
```

**Arguments**

- `x` An H2OFrame object.

**Value**

An H2OFrame object containing the entries of `x` converted to hours of the day.

**See Also**

- `h2o.day`
**Description**

Applies conditional statements to numeric vectors in H2O parsed data objects when the data are numeric.

**Usage**

```r
h2o.ifelse(test, yes, no)
ifelse(test, yes, no)
```

**Arguments**

- `test` A logical description of the condition to be met (>, <, =, etc...)
- `yes` The value to return if the condition is TRUE.
- `no` The value to return if the condition is FALSE.

**Details**

Both numeric and categorical values can be tested. However when returning a yes and no condition both conditions must be either both categorical or numeric.

**Value**

Returns a vector of new values matching the conditions stated in the ifelse call.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.importFile(path = australia_path)
australia[, 9] <- ifelse(australia[, 3] < 279.9, 1, 0)
summary(australia)
## End(Not run)
```
**h2o.importFile**  
*Import Files into H2O*

**Description**
Imports files into an H2O cluster. The default behavior is to pass-through to the parse phase automatically.

**Usage**

```r
h2o.importFile(
  path,
  destination_frame = "",
  parse = TRUE,
  header = NA,
  sep = "",
  col.names = NULL,
  col.types = NULL,
  na.strings = NULL,
  decrypt_tool = NULL,
  skipped_columns = NULL,
  custom_non_data_line_markers = NULL,
  partition_by = NULL
)
```

```r
h2o.importFolder(
  path,
  pattern = "",
  destination_frame = "",
  parse = TRUE,
  header = NA,
  sep = "",
  col.names = NULL,
  col.types = NULL,
  na.strings = NULL,
  decrypt_tool = NULL,
  skipped_columns = NULL,
  custom_non_data_line_markers = NULL,
  partition_by = NULL
)
```

```r
h2o.importHDFS(
  path,
  pattern = "",
  destination_frame = "",
  parse = TRUE,
  header = NA,
  sep = "",
  col.names = NULL,
  na.strings = NULL
)
```
h2o.uploadFile(
    path,
    destination_frame = "",
    parse = TRUE,
    header = NA,
    sep = "",
    col.names = NULL,
    col.types = NULL,
    na.strings = NULL,
    progress_bar = FALSE,
    parse_type = NULL,
    decrypt_tool = NULL,
    skipped_columns = NULL
)

Arguments

path
The complete URL or normalized file path of the file to be imported. Each row of data appears as one line of the file.

destination_frame
(Optional) The unique hex key assigned to the imported file. If none is given, a key will automatically be generated based on the URL path.

parse
(Optional) A logical value indicating whether the file should be parsed after import, for details see h2o.parseRaw.

header
(Optional) A logical value indicating whether the first line of the file contains column headers. If left empty, the parser will try to automatically detect this.

sep
(Optional) The field separator character. Values on each line of the file are separated by this character. If sep = "", the parser will automatically detect the separator.

col.names
(Optional) An H2OFrame object containing a single delimited line with the column names for the file.

col.types
(Optional) A vector to specify whether columns should be forced to a certain type upon import parsing.

na.strings
(Optional) H2O will interpret these strings as missing.

decrypt_tool
(Optional) Specify a Decryption Tool (key-reference acquired by calling h2o.decryptionSetup.

skipped_columns
a list of column indices to be skipped during parsing.

custom_non_data_line_markers
(Optional) If a line in imported file starts with any character in given string it will NOT be imported. Empty string means all lines are imported, NULL means that default behaviour for given format will be used

partition_by
names of the columns the persisted dataset has been partitioned by.

pattern
(Optional) Character string containing a regular expression to match file(s) in the folder.

progress_bar
(Optional) When FALSE, tell H2O parse call to block synchronously instead of polling. This can be faster for small datasets but loses the progress bar.

parse_type
(Optional) Specify which parser type H2O will use. Valid types are "ARFF", "XLS", "CSV", "SVMLight"
h2o.import_hive_table

Import Hive Table into H2O

Description

Import Hive table to H2OFrame in memory. Make sure to start H2O with Hive on classpath. Uses hive-site.xml on classpath to connect to Hive. When database is specified as jdbc URL uses Hive JDBC driver to obtain table metadata. then uses direct HDFS access to import data.

Usage

h2o.import_hive_table(
  database,
  table,
  partitions = NULL,
  allow_multi_format = FALSE
)
h2o.import_mojo

**Arguments**

- **database**: Name of Hive database (default database will be used by default), can be also a JDBC URL.
- **table**: name of Hive table to import.
- **partitions**: a list of lists of strings - partition key column values of partitions you want to import.
- **allow_multi_format**: enable import of partitioned tables with different storage formats used. WARNING: this may fail on out-of-memory for tables with a large number of small partitions.

**Details**

For example, `my_citibike_data = h2o.import_hive_table("default", "citibike20k", partitions = list(c("2017", "01"), c("2017", "02"))) my_citibike_data = h2o.import_hive_table("jdbc:hive2://hive-server:10000/default", "citibike20k", allow_multi_format = TRUE)`

---

**h2o.import_mojo**

*Imports a MOJO under given path, creating a Generic model with it.*

**Description**

Usage example:

```
mojo_model <- h2o.import_mojo(model_file_path = "/path/to/mojo.zip")
predictions <- h2o.predict(mojo_model, dataset)
```

**Usage**

```
h2o.import_mojo(mojo_file_path)
```

**Arguments**

- **mojo_file_path**: Filesystem path to the model imported

**Value**

Returns H2O Generic Model embedding given MOJO model

**Examples**

````
## Not run:
# Import default Iris dataset as H2O frame
data <- as.h2o(iris)

# Train a very simple GBM model
original_model <- h2o.gbm(x = features, y = "Species", training_frame = data)

# Download the trained GBM model as MOJO (temporary directory used in this example)
mojo_original_path <- h2o.save_mojo(original_model, path = tempdir())
```
# Import the MOJO and obtain a Generic model
mojo_model <- h2o.import_mojo(mojo_original_path)

# Perform scoring with the generic model
predictions <- h2o.predict(mojo_model, data)

## End(Not run)

## h2o.import_sql_select

**Import SQL table that is result of SELECT SQL query into H2O**

### Description

Creates a temporary SQL table from the specified sql_query. Runs multiple SELECT SQL queries on the temporary table concurrently for parallel ingestion, then drops the table. Be sure to start the h2o.jar in the terminal with your downloaded JDBC driver in the classpath: `java -cp <path_to_h2o_jar>:<path_to_jdbc_driver_jar> water.H2OApp` Also see h2o.import_sql_table. Currently supported SQL databases are MySQL, PostgreSQL, MariaDB, Hive, Oracle and Microsoft SQL Server.

### Usage

```r
h2o.import_sql_select(
  connection_url,
  select_query,
  username,
  password,
  use_temp_table = NULL,
  temp_table_name = NULL,
  optimize = NULL,
  fetch_mode = NULL
)
```

### Arguments

- **connection_url** URL of the SQL database connection as specified by the Java Database Connectivity (JDBC) Driver. For example, "jdbc:mysql://localhost:3306/menagerie?&useSSL=false"
- **select_query** SQL query starting with ‘SELECT’ that returns rows from one or more database tables.
- **username** Username for SQL server
- **password** Password for SQL server
- **use_temp_table** Whether a temporary table should be created from select_query
- **temp_table_name** Name of temporary table to be created from select_query
- **optimize** (Optional) Optimize import of SQL table for faster imports. Experimental. Default is true.
- **fetch_mode** (Optional) Set to DISTRIBUTED to enable distributed import. Set to SINGLE to force a sequential read from the database. Can be used for databases that do not support OFFSET-like clauses in SQL statements.
Details

For example, my_sql_conn_url <- "jdbc:mysql://172.16.2.178:3306/ingestSQL?&useSSL=false"
select_query <- "SELECT bikeid from citibike20k" username <- "root" password <- "abc123"
my_citibike_data <- h2o.import_sql_select(my_sql_conn_url, select_query, username, password)

h2o.import_sql_table

Usage

h2o.import_sql_table(
  connection_url, 
  table, 
  username, 
  password, 
  columns = NULL, 
  optimize = NULL, 
  fetch_mode = NULL
)

Arguments

connection_url  URL of the SQL database connection as specified by the Java Database Connectivity (JDBC) Driver. For example, "jdbc:mysql://localhost:3306/menagerie?&useSSL=false"
table  Name of SQL table
username  Username for SQL server
password  Password for SQL server
columns  (Optional) Character vector of column names to import from SQL table. Default is to import all columns.
optimize  (Optional) Optimize import of SQL table for faster imports. Default is true. Ignored - use fetch_mode instead.
fetch_mode  (Optional) Set to DISTRIBUTED to enable distributed import. Set to SINGLE to force a sequential read from the database. Can be used for databases that do not support OFFSET-like clauses in SQL statements.

Details

For example, my_sql_conn_url <- "jdbc:mysql://172.16.2.178:3306/ingestSQL?&useSSL=false"
table <- "citibike20k" username <- "root" password <- "abc123" my_citibike_data <- h2o.import_sql_table(my_sql_conn_url, table, username, password)
h2o.impute

Basic Imputation of H2O Vectors

Description

Perform inplace imputation by filling missing values with aggregates computed on the "na.rm'd" vector. Additionally, it's possible to perform imputation based on groupings of columns from within data; these columns can be passed by index or name to the by parameter. If a factor column is supplied, then the method must be "mode".

Usage

h2o.impute(
  data,
  column = 0,
  method = c("mean", "median", "mode"),
  combine_method = c("interpolate", "average", "lo", "hi"),
  by = NULL,
  groupByFrame = NULL,
  values = NULL
)

Arguments

data The dataset containing the column to impute.
column A specific column to impute, default of 0 means impute the whole frame.
method "mean" replaces NAs with the column mean; "median" replaces NAs with the column median; "mode" replaces with the most common factor (for factor columns only);
combine_method If method is "median", then choose how to combine quantiles on even sample sizes. This parameter is ignored in all other cases.
by group by columns
groupByFrame Impute the column col with this pre-computed grouped frame.
values A vector of impute values (one per column). NaN indicates to skip the column

Details

The default method is selected based on the type of the column to impute. If the column is numeric then "mean" is selected; if it is categorical, then "mode" is selected. Other column types (e.g. String, Time, UUID) are not supported.

Value

an H2OFrame with imputed values
Examples

```r
## Not run:
h2o.init()
iris_hf <- as.h2o(iris)
iris_hf[sample(nrow(iris_hf), 40), 5] <- NA  # randomly replace 50 values with NA
# impute with a group by
iris_hf <- h2o.impute(iris_hf, "Species", "mode", by = c("Sepal.Length", "Sepal.Width"))
## End(Not run)
```

Description

Attempts to start and/or connect to an H2O instance.

Usage

```r
h2o.init(
ip = "localhost",
port = 54321,
name = NA_character_,
startH2O = TRUE,
forceDL = FALSE,
enable_assertions = TRUE,
license = NULL,
nthreads = -1,
max_mem_size = NULL,
min_mem_size = NULL,
ice_root = tempdir(),
log_dir = NA_character_,
log_level = NA_character_,
strict_version_check = TRUE,
proxy = NA_character_,
https = FALSE,
cacert = NA_character_,
insecure = FALSE,
username = NA_character_,
password = NA_character_,
use_spnego = FALSE,
cookies = NA_character_,
context_path = NA_character_,
ignore_config = FALSE,
extra_classpath = NULL,
jvm_custom_args = NULL,
bind_to_localhost = TRUE
)
```
Arguments

**ip**
Object of class character representing the IP address of the server where H2O is running.

**port**
Object of class numeric representing the port number of the H2O server.

**name**  
(Optional) A character string representing the H2O cluster name.

**startH2O**  
(Optional) A logical value indicating whether to try to start H2O from R if no connection with H2O is detected. This is only possible if `ip = "localhost"` or `ip = "127.0.0.1"`. If an existing connection is detected, R does not start H2O.

**forceDL**  
(Optional) A logical value indicating whether to force download of the H2O executable. Defaults to FALSE, so the executable will only be downloaded if it does not already exist in the h2o R library resources directory `h2o/java/h2o.jar`. This value is only used when R starts H2O.

**enable_assertions**  
(Optional) A logical value indicating whether H2O should be launched with assertions enabled. Used mainly for error checking and debugging purposes. This value is only used when R starts H2O.

**license**  
(Optional) A character string value specifying the full path of the license file. This value is only used when R starts H2O.

**nthreads**  
(Optional) Number of threads in the thread pool. This relates very closely to the number of CPUs used. -1 means use all CPUs on the host (Default). A positive integer specifies the number of CPUs directly. This value is only used when R starts H2O.

**max_mem_size**  
(Optional) A character string specifying the maximum size, in bytes, of the memory allocation pool to H2O. This value must a multiple of 1024 greater than 2MB. Append the letter m or M to indicate megabytes, or g or G to indicate gigabytes. This value is only used when R starts H2O. If `max_mem_size` is not defined, then the amount of memory that H2O allocates will be determined by the default memory of Java Virtual Machine. This amount is dependent on the Java version, but it will generally be 25 percent of the machine’s physical memory.

**min_mem_size**  
(Optional) A character string specifying the minimum size, in bytes, of the memory allocation pool to H2O. This value must a multiple of 1024 greater than 2MB. Append the letter m or M to indicate megabytes, or g or G to indicate gigabytes. This value is only used when R starts H2O.

**ice_root**  
(Optional) A directory to handle object spillage. The default varies by OS.

**log_dir**  
(Optional) A directory where H2O server logs are stored. The default varies by OS.

**log_level**  
(Optional) The level of logging of H2O server. The default is INFO.

**strict_version_check**  
(Optional) Setting this to FALSE is unsupported and should only be done when advised by technical support.

**proxy**  
(Optional) A character string specifying the proxy path.

**https**  
(Optional) Set this to TRUE to use https instead of http.

**cacert**  
(Optional) Path to a CA bundle file with root and intermediate certificates of trusted CAs.

**insecure**  
(Optional) Set this to TRUE to disable SSL certificate checking.
**Details**

By default, this method first checks if an H2O instance is connectible. If it cannot connect and start = TRUE with ip = "localhost", it will attempt to start and instance of H2O at localhost:54321. If an open ip and port of your choice are passed in, then this method will attempt to start an H2O instance at that specified ip port.

When initializing H2O locally, this method searches for h2o.jar in the R library resources (system.file("java", "h2o.jar")), and if the file does not exist, it will automatically attempt to download the correct version from Amazon S3. The user must have Internet access for this process to be successful.

Once connected, the method checks to see if the local H2O R package version matches the version of H2O running on the server. If there is a mismatch and the user indicates she wishes to upgrade, it will remove the local H2O R package and download/install the H2O R package from the server.

**Value**

this method will load it and return a H2OConnection object containing the IP address and port number of the H2O server.

**Note**

Users may wish to manually upgrade their package (rather than waiting until being prompted), which requires that they fully uninstall and reinstall the H2O package, and the H2O client package. You must unload packages running in the environment before upgrading. It’s recommended that users restart R or R studio after upgrading

**See Also**

H2O R package documentation for more details. h2o.shutdown for shutting down from R.
h2o.insertMissingValues

Insert Missing Values into an H2OFrame

Description

Randomly replaces a user-specified fraction of entries in an H2O dataset with missing values.

Usage

h2o.insertMissingValues(data, fraction = 0.1, seed = -1)

Arguments

data An H2OFrame object representing the dataset.

fraction A number between 0 and 1 indicating the fraction of entries to replace with missing.

seed A random number used to select which entries to replace with missing values. Default of seed = -1 will automatically generate a seed in H2O.

Value

Returns an H2OFrame object.

WARNING

This will modify the original dataset. Unless this is intended, this function should only be called on a subset of the original.
## Examples

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
summary(iris_hf)

iris_miss <- h2o.insertMissingValues(iris_hf, fraction = 0.25)
head(iris_miss)
summary(iris_miss)

## End(Not run)
```

---

### h2o.interaction  
*Categorical Interaction Feature Creation in H2O*

#### Description

Creates a data frame in H2O with n-th order interaction features between categorical columns, as specified by the user.

#### Usage

```r
h2o.interaction(
  data,  
  destination_frame,  
  factors,  
  pairwise,  
  max_factors,  
  min_occurrence
)
```

#### Arguments

- **data**: An H2OFrame object containing the categorical columns.
- **destination_frame**: A string indicating the destination key. If empty, this will be auto-generated by H2O.
- **factors**: Factor columns (either indices or column names).
- **pairwise**: Whether to create pairwise interactions between factors (otherwise create one higher-order interaction). Only applicable if there are 3 or more factors.
- **max_factors**: Max. number of factor levels in pair-wise interaction terms (if enforced, one extra catch-all factor will be made)
- **min_occurrence**: Min. occurrence threshold for factor levels in pair-wise interaction terms

#### Value

Returns an H2OFrame object.
Examples

## Not run:
library(h2o)
h2o.init()

# Create some random data
my_frame <- h2o.createFrame(rows = 20, cols = 5,
seed = -12301283, randomize = TRUE, value = 0,
categorical_fraction = 0.8, factors = 10, real_range = 1,
integer_fraction = 0.2, integer_range = 10,
binary_fraction = 0, binary_ones_fraction = 0.5,
missing_fraction = 0.2,
response_factors = 1)

# Turn integer column into a categorical
my_frame[,5] <- as.factor(my_frame[,5])
head(my_frame, 20)

# Create pairwise interactions
pairwise <- h2o.interaction(my_frame,
  factors = list(c(1, 2), c("C2", "C3", "C4")),
  pairwise = TRUE, max_factors = 10, min_occurrence = 1)
head(pairwise, 20)

# Create 5-th order interaction
higherorder <- h2o.interaction(my_frame, factors = c(1, 2, 3, 4, 5),
  pairwise = FALSE, max_factors = 10000, min_occurrence = 1)
head(higherorder, 20)

# Limit the number of factors of the "categoricalized" integer column
# to at most 3 factors, and only if they occur at least twice
head(my_frame[,5], 20)
trim_integer_levels <- h2o.interaction(my_frame, factors = "C5", pairwise = FALSE, max_factors = 3,
  min_occurrence = 2)
head(trim_integer_levels, 20)

# Put all together
my_frame <- h2o.cbind(my_frame, pairwise, higherorder, trim_integer_levels)
my_frame
head(my_frame, 20)
summary(my_frame)

## End(Not run)

### h2o.isax

**Description**

Compute the iSAX index for a DataFrame which is assumed to be numeric time series data

**Usage**

```
h2o.isax(x, num_words, max_cardinality, optimize_card = FALSE)
```
Arguments

x          an H2OFrame
num_words  Number of iSAX words for the timeseries. ie granularity along the time series
max_cardinality  Maximum cardinality of the iSAX word. Each word can have less than the max
optimize_card  An optimization flag that will find the max cardinality regardless of what is
               passed in for max_cardinality.

Value

An H2OFrame with the name of time series, string representation of iSAX word, followed by binary
representation

References

https://www.cs.ucr.edu/~eamonn/iSAX_2.0.pdf
https://www.cs.ucr.edu/~eamonn/SAX.pdf

Examples

## Not run:
library(h2o)
h2o.init()
df <- h2o.createFrame(rows = 1, cols = 256, randomize = TRUE, value = 0,
                      real_range = 100, categorical_fraction = 0, factors = 0,
                      integer_fraction = 0, integer_range = 100, binary_fraction = 0,
                      binary_ones_fraction = 0, time_fraction = 0, string_fraction = 0,
                      missing_fraction = 0, has_response = FALSE, seed = 123)
df2 <- h2o.cumsum(df, axis = 1)
h2o.isax(df2, num_words = 10, max_cardinality = 10)

## End(Not run)

h2o.ischaracter  Check if character

Description

Check if character

Usage

h2o.ischaracter(x)

Arguments

x          An H2OFrame object.

See Also

character for the base R implementation, is.character().
Examples

```R
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
iris_char <- h2o.ascharacter(iris["class"])
h2o.ischaracter(iris_char)

## End(Not run)
```

---

h2o.isfactor | Check if factor

Description

Check if factor

Usage

```R
h2o.isfactor(x)
```

Arguments

- `x`
  - An H2OFrame object.

See Also

- `factor` for the base R implementation, `is.factor()`.

Examples

```R
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
h2o.isfactor(cars["economy_20mpg"])

## End(Not run)
```
h2o.isnumeric  
Check if numeric

Description
Check if numeric

Usage
h2o.isnumeric(x)

Arguments
x  An H2OFrame object.

See Also
numeric for the base R implementation, is.numeric().

Examples
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.isnumeric(iris["sepal_len"])
## End(Not run)

h2o.isolationForest  
Trains an Isolation Forest model

Description
Trains an Isolation Forest model

Usage
h2o.isolationForest(
  training_frame,
  x,
  model_id = NULL,
  score_each_iteration = FALSE,
  score_tree_interval = 0,
  ignore_const_cols = TRUE,
  ntrees = 50,
  max_depth = 8,
  min_rows = 1,
  max_runtime_secs = 0,
h2o.isolationForest

seed = -1,
build_tree_one_node = FALSE,
mtries = -1,
sample_size = 256,
sample_rate = -1,
col_sample_rate_change_per_level = 1,
col_sample_rate_per_tree = 1,
categorical_encoding = c("AUTO", "Enum", "OneHotInternal", "OneHotExplicit",
"Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited"),
stopping_rounds = 0,
stopping_metric = c("AUTO", "anomaly_score"),
stopping_tolerance = 0.01,
export_checkpoints_dir = NULL,
contamination = -1,
validation_frame = NULL,
validation_response_column = NULL
)

Arguments

training_frame  Id of the training data frame.
x  A vector containing the character names of the predictors in the model.
model_id  Destination id for this model; auto-generated if not specified.
score_each_iteration  Logical. Whether to score during each iteration of model training. Defaults to FALSE.
score_tree_interval  Score the model after every so many trees. Disabled if set to 0. Defaults to 0.
ignore_const_cols  Logical. Ignore constant columns. Defaults to TRUE.
ntrees  Number of trees. Defaults to 50.
max_depth  Maximum tree depth (0 for unlimited). Defaults to 8.
min_rows  Fewest allowed (weighted) observations in a leaf. Defaults to 1.
max_runtime_secs  Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.
seed  Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).
build_tree_one_node  Logical. Run on one node only; no network overhead but fewer cpus used. Suitable for small datasets. Defaults to FALSE.
mtries  Number of variables randomly sampled as candidates at each split. If set to -1, defaults (number of predictors)/3. Defaults to -1.
sample_size  Number of randomly sampled observations used to train each Isolation Forest tree. Only one of parameters sample_size and sample_rate should be defined. If sample_rate is defined, sample_size will be ignored. Defaults to 256.
sample_rate  Rate of randomly sampled observations used to train each Isolation Forest tree. Needs to be in range from 0.0 to 1.0. If set to -1, sample_rate is disabled and sample_size will be used instead. Defaults to -1.
col_sample_rate_change_per_level
Relative change of the column sampling rate for every level (must be > 0.0 and <= 2.0) Defaults to 1.

col_sample_rate_per_tree
Column sample rate per tree (from 0.0 to 1.0) Defaults to 1.

categorical_encoding
Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

stopping_rounds
Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable) Defaults to 0.

stopping_metric
Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anomaly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "anomaly_score". Defaults to AUTO.

stopping_tolerance
Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much) Defaults to 0.01.

export_checkpoints_dir
Automatically export generated models to this directory.

contamination
Contamination ratio - the proportion of anomalies in the input dataset. If undefined (-1) the predict function will not mark observations as anomalies and only anomaly score will be returned. Defaults to -1 (undefined). Defaults to -1.

validation_frame
Id of the validation data frame.

validation_response_column
(experimental) Name of the response column in the validation frame. Response column should be binary and indicate not anomaly/anomaly.

Examples

```r
## Not run:
library(h2o)
h2o.init()

# Import the cars dataset
cars <- h2o.importFile(f)

# Set the predictors
predictors <- c("displacement", "power", "weight", "acceleration", "year")

# Train the IF model
cars_if <- h2o.isolationForest(x = predictors, training_frame = cars,
                              seed = 1234, stopping_metric = "anomaly_score",
                              stopping_rounds = 3, stopping_tolerance = 0.1)

## End(Not run)
```
h2o.is_client  
Check Client Mode Connection

Description

Check Client Mode Connection

Usage

h2o.is_client()

---

h2o.keyof  
Method on Keyed objects allowing to obtain their key.

Description

Method on Keyed objects allowing to obtain their key.

Usage

h2o.keyof(object)

## S4 method for signature 'Keyed'
h2o.keyof(object)

## S4 method for signature 'H2OModel'
h2o.keyof(object)

## S4 method for signature 'H2OGrid'
h2o.keyof(object)

## S4 method for signature 'H2OFrame'
h2o.keyof(object)

## S4 method for signature 'H2OAutoML'
h2o.keyof(object)

Arguments

object  
A Keyed object

Value

the string key holding the persistent object.
**h2o.kfold_column**  
*Produce a k-fold column vector.*

**Description**
Create a k-fold vector useful for H2O algorithms that take a fold_assignments argument.

**Usage**
```r
h2o.kfold_column(data, nfolds, seed = -1)
```

**Arguments**
- `data`: A dataframe against which to create the fold column.
- `nfolds`: The number of desired folds.
- `seed`: A random seed, -1 indicates that H2O will choose one.

**Value**
Returns an H2OFrame object with fold assignments.

**Examples**
```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
kfolds <- h2o.kfold_column(iris, nfolds = 5, seed = 1234)

## End(Not run)
```

---

**h2o.killMinus3**  
*Dump the stack into the JVM’s stdout.*

**Description**
A poor man’s profiler, but effective.

**Usage**
```r
h2o.killMinus3()
```
h2o.kmeans

Performs k-means clustering on an H2O dataset

Description

Performs k-means clustering on an H2O dataset

Usage

h2o.kmeans(
  training_frame,
  x,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  k = 1,
  estimate_k = FALSE,
  user_points = NULL,
  max_iterations = 10,
  standardize = TRUE,
  seed = -1,
  init = c("Random", "PlusPlus", "Furthest", "User"),
  max_runtime_secs = 0,
  categorical_encoding = c("AUTO", "Enum", "OneHotInternal", "OneHotExplicit",
                          "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited"),
  export_checkpoints_dir = NULL,
  cluster_size_constraints = NULL
)

Arguments

training_frame  Id of the training data frame.

x               A vector containing the character names of the predictors in the model.

model_id        Destination id for this model; auto-generated if not specified.

validation_frame  Id of the validation data frame.

nfolds           Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.

keep_cross_validation_models  Logical. Whether to keep the cross-validation models. Defaults to TRUE.

keep_cross_validation_predictions  Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.
keep_cross_validation_fold_assignment
   Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

fold_assignment
   Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.

fold_column  
   Column with cross-validation fold index assignment per observation.

ignore_const_cols
   Logical. Ignore constant columns. Defaults to TRUE.

score_each_iteration
   Logical. Whether to score during each iteration of model training. Defaults to FALSE.

k
   The max. number of clusters. If estimate_k is disabled, the model will find k centroids, otherwise it will find up to k centroids. Defaults to 1.

estimate_k
   Logical. Whether to estimate the number of clusters (<=k) iteratively and deterministically. Defaults to FALSE.

user_points
   This option allows you to specify a dataframe, where each row represents an initial cluster center. The user- specified points must have the same number of columns as the training observations. The number of rows must equal the number of clusters.

max_iterations
   Maximum training iterations (if estimate_k is enabled, then this is for each inner Lloyds iteration) Defaults to 10.

standardize
   Logical. Standardize columns before computing distances Defaults to TRUE.

seed
   Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

init
   Initialization mode Must be one of: "Random", "PlusPlus", "Furthest", "User". Defaults to Furthest.

max_runtime_secs
   Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

categorical_encoding
   Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited". Defaults to AUTO.

export_checkpoints_dir
   Automatically export generated models to this directory.

cluster_size_constraints
   An array specifying the minimum number of points that should be in each cluster. The length of the constraints array has to be the same as the number of clusters.

Value

   an object of class H2OClusteringModel.
See Also

h2o.cluster_sizes, h2o.totss, h2o.num_iterations, h2o.betweenss, h2o.tot_withinss, h2o.withinss, h2o.centersSTD, h2o.centers

Examples

## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.kmeans(training_frame = prostate, k = 10, x = c("AGE", "RACE", "VOL", "GLEASON"))
## End(Not run)

h2o.kolmogorov_smirnov

Kolmogorov-Smirnov metric for binomial models

Description

Retrieves a Kolmogorov-Smirnov metric for given binomial model. The number returned is in range between 0 and 1. K-S metric represents the degree of separation between the positive (1) and negative (0) cumulative distribution functions. Detailed metrics per each group are to be found in the gains-lift table.

Usage

h2o.kolmogorov_smirnov(object)

## S4 method for signature 'H2OModelMetrics'

h2o.kolmogorov_smirnov(object)

## S4 method for signature 'H2OModel'

h2o.kolmogorov_smirnov(object)

Arguments

object Either an H2OModel object or an H2OModelMetrics object.

Details

The H2OModelMetrics version of this function will only take H2OBinomialMetrics objects.

Value

Kolmogorov-Smirnov metric, a number between 0 and 1.

See Also

h2o.gainsLift to see detailed K-S metrics per group
### Examples

```r
## Not run:
library(h2o)
h2o.init()
data <- h2o.importFile(
  path = "https://s3.amazonaws.com/h2o-public-test-data/smalldata/airlines/allyears2k_headers.zip")
model <- h2o.gbm(x = c("Origin", "Distance"), y = "IsDepDelayed",
  training_frame = data, ntrees = 1)
h2o.kolmogorov_smirnov(model)

## End(Not run)
```

---

**h2o.kurtosis**

**Kurtosis of a column**

---

### Description

Obtain the kurtosis of a column of a parsed H2O data object.

### Usage

```r
h2o.kurtosis(x, ..., na.rm = TRUE)
kurtosis.H2OFrame(x, ..., na.rm = TRUE)
```

### Arguments

- **x**: An H2OFrame object.
- **...**: Further arguments to be passed from or to other methods.
- **na.rm**: A logical value indicating whether NA or missing values should be stripped before the computation.

### Value

Returns a list containing the kurtosis for each column (NaN for non-numeric columns).

### Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.kurtosis(prostate$AGE)

## End(Not run)
```
h2o.levels

Return the levels from the column requested column.

Description

Return the levels from the column requested column.

Usage

h2o.levels(x, i)

Arguments

x An H2OFrame object.
i Optional, the index of the column whose domain is to be returned.

See Also

levels for the base R method.

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
h2o.levels(iris_hf, 5) # returns "setosa" "versicolor" "virginica"
## End(Not run)

h2o.listTimezones

List all of the Time Zones Acceptable by the H2O cluster.

Description

List all of the Time Zones Acceptable by the H2O cluster.

Usage

h2o.listTimezones()
<table>
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<td>h2o.list_jobs</td>
<td>Return list of jobs performed by the H2O cluster</td>
<td>h2o.list_jobs()</td>
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</tbody>
</table>
h2o.loadGrid

*Loads previously saved grid with all its models from the same folder*

**Description**

Returns a reference to the loaded Grid.

**Usage**

h2o.loadGrid(grid_path)

**Arguments**

| grid_path | A character string containing the path to the file with the grid saved. |

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris <- as.h2o(iris)

ntrees_opts = c(1, 5)
learn_rate_opts = c(0.1, 0.01)
size_of_hyper_space = length(ntrees_opts) * length(learn_rate_opts)

hyper_parameters = list(ntrees = ntrees_opts, learn_rate = learn_rate_opts)
# Tempdir is chosen arbitrarily. May be any valid folder on an H2O-supported filesystem.
baseline_grid <- h2o.grid("gbm", grid_id="gbm_grid_test", x=1:4, y=5, training_frame=iris,
hyper_params = hyper_parameters, export_checkpoints_dir = tempdir())
# Remove everything from the cluster or restart it
h2o.removeAll()
grid <- h2o.loadGrid(paste0(tempdir(), "/", baseline_grid@grid_id))
## End(Not run)
```

h2o.loadModel

*Load H2O Model from HDFS or Local Disk*

**Description**

Load a saved H2O model from disk. (Note that ensemble binary models can now be loaded using this method.)

**Usage**

h2o.loadModel(path)

**Arguments**

| path | The path of the H2O Model to be imported. |
Value

Returns a H2OModel object of the class corresponding to the type of model loaded.

See Also

h2o.saveModel, H2OModel

Examples

## Not run:
# library(h2o)
# h2o.init()
# prostate_path = system.file("extdata", "prostate.csv", package = "h2o")
# prostate = h2o.importFile(path = prostate_path)
# prostate_glm = h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
# training_frame = prostate, family = "binomial", alpha = 0.5)
# glmmodel_path = h2o.saveModel(prostate_glm, dir = "/Users/UserName/Desktop")
# glmmodel_load = h2o.loadModel(glmmodel_path)

## End(Not run)

h2o.log

Compute the logarithm of x

Description

Compute the logarithm of x

Usage

h2o.log(x)

Arguments

x

An H2OFrame object.

See Also

Log for the base R implementation, log.

Examples

## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
                         categorical_fraction = 0.0,
                         missing_fraction = 0.7,
                         seed = 123)

h2o.log(frame)

## End(Not run)
h2o.log10

**Description**

Compute the log10 of x

**Usage**

h2o.log10(x)

**Arguments**

x  
An H2OFrame object.

**See Also**

Log for the base R implementation, log10().

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.log10(frame)
## End(Not run)
```

h2o.log1p

**Description**

Compute the log1p of x

**Usage**

h2o.log1p(x)

**Arguments**

x  
An H2OFrame object.

**See Also**

Log for the base R implementation, log1p().
Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
    categorical_fraction = 0.0,
    missing_fraction = 0.7,
    seed = 123)
h2o.log1p(frame)

## End(Not run)
```

h2o.log2

Compute the log2 of x

Description

Compute the log2 of x

Usage

h2o.log2(x)

Arguments

x

An H2OFrame object.

See Also

Log for the base R implementation, log2()

Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
    categorical_fraction = 0.0,
    missing_fraction = 0.7,
    seed = 123)
h2o.log2(frame)

## End(Not run)
```
**h2o.logAndEcho**

*Log a message on the server-side logs*

**Description**

This is helpful when running several pieces of work one after the other on a single H2O cluster and you want to make a notation in the H2O server side log where one piece of work ends and the next piece of work begins.

**Usage**

h2o.logAndEcho(message)

**Arguments**

- **message** A character string with the message to write to the log.

**Details**

h2o.logAndEcho sends a message to H2O for logging. Generally used for debugging purposes.

---

**h2o.logloss**

*Retrieve the Log Loss Value*

**Description**

Retrieves the log loss output for a H2OBinomialMetrics or H2OMultinomialMetrics object. If "train", "valid", and "xval" parameters are FALSE (default), then the training Log Loss value is returned. If more than one parameter is set to TRUE, then a named vector of Log Losses are returned, where the names are "train", "valid" or "xval".

**Usage**

h2o.logloss(object, train = FALSE, valid = FALSE, xval = FALSE)

**Arguments**

- **object** a H2OModelMetrics object of the correct type.
- **train** Retrieve the training Log Loss
- **valid** Retrieve the validation Log Loss
- **xval** Retrieve the cross-validation Log Loss
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_splits <- h2o.splitFrame(data = cars, ratios = .8, seed = 1234)
train <- cars_splits[[1]]
valid <- cars_splits[[2]]
car_drf <- h2o.randomForest(x = predictors,
                           y = response,
                           training_frame = train,
                           validation_frame = valid)
h2o.logloss(car_drf, train = TRUE, valid = TRUE)

## End(Not run)

---

**h2o.ls**

### List Keys on an H2O Cluster

**Description**

Accesses a list of object keys in the running instance of H2O.

**Usage**

```r
h2o.ls()
```

**Value**

Returns a list of hex keys in the current H2O instance.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.ls()

## End(Not run)
```
h2o.lstrip  
**Strip set from left**

**Description**

Return a copy of the target column with leading characters removed. The set argument is a string specifying the set of characters to be removed. If omitted, the set argument defaults to removing whitespace.

**Usage**

```r
h2o.lstrip(x, set = " ")
```

**Arguments**

- `x`: The column whose strings should be lstrip-ed.
- `set`: string of characters to be removed

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
string_to_lstrip <- as.h2o("1234567890")
lstrip_string <- h2o.lstrip(string_to_lstrip, "123") #Remove "123"
## End(Not run)
```

h2o.mae  
**Retrieve the Mean Absolute Error Value**

**Description**

Retrieves the mean absolute error (MAE) value from an H2O model. If "train", "valid", and "xval" parameters are FALSE (default), then the training MAE value is returned. If more than one parameter is set to TRUE, then a named vector of MAEs are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.mae(object, train = FALSE, valid = FALSE, xval = FALSE)
```

**Arguments**

- `object`: An H2OModel object.
- `train`: Retrieve the training MAE
- `valid`: Retrieve the validation set MAE if a validation set was passed in during model build time.
- `xval`: Retrieve the cross-validation MAE
Examples

```r
## Not run:
library(h2o)

h <- h2o.init()
fr <- as.h2o(iris)

m <- h2o.deeplearning(x = 2:5, y = 1, training_frame = fr)

h2o.mae(m)
## End(Not run)
```

h2o.makeGLMModel  
Set betas of an existing H2O GLM Model

Description

This function allows setting betas of an existing glm model.

Usage

```r
h2o.makeGLMModel(model, beta)
```

Arguments

- `model`  
an H2OModel corresponding from a h2o.glm call.
- `beta`  
a new set of betas (a named vector)

h2o.make_metrics  
Create Model Metrics from predicted and actual values in H2O

Description

Given predicted values (target for regression, class-1 probabilities or binomial or per-class probabilities for multinomial), compute a model metrics object

Usage

```r
h2o.make_metrics( 
  predicted, 
  actuals, 
  domain = NULL, 
  distribution = NULL, 
  weights = NULL 
)
```
Arguments

predicted: An H2OFrame containing predictions.
actuals: An H2OFrame containing actual values.
domain: Vector with response factors for classification.
distribution: Distribution for regression.
weights: (optional) An H2OFrame containing observation weights.

Value

Returns an object of the H2OModelMetrics subclass.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
prostate_gbm <- h2o.gbm(3:9, "CAPSULE", prostate)
pred <- h2o.predict(prostate_gbm, prostate)[, 3] ## class-1 probability
h2o.make_metrics(pred, prostate$CAPSULE)
## End(Not run)
```

---

**Value Matching in H2O**

**Description**

`match` and `%in%` return values similar to the base R generic functions.

**Usage**

```r
h2o.match(x, table, nomatch = 0, incomparables = NULL)
match.H2OFrame(x, table, nomatch = 0, incomparables = NULL)
```

**Arguments**

- `x`: A categorical vector from an H2OFrame object with values to be matched.
- `table`: An R object to match `x` against.
- `nomatch`: The value to be returned in the case when no match is found.
- `incomparables`: A vector of values that cannot be matched. Any value in `x` matching a value in this vector is assigned the `nomatch` value.

**Value**

Returns a vector of the positions of (first) matches of its first argument in its second argument.
See Also

`match` for base R implementation.

Examples

```r
## Not run:
h2o.init()
iris_hf <- as.h2o(iris)
h2o.match(iris_hf[, 5], c("setosa", "versicolor"))
## End(Not run)
```

h2o.max

*Returns the maxima of the input values.*

Description

Returns the maxima of the input values.

Usage

```r
h2o.max(x, na.rm = FALSE)
```

Arguments

- `x` An H2OFrame object.
- `na.rm` logical. indicating whether missing values should be removed.

See Also

Extremes for the base R implementation, `max()`.

Examples

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.max(iris["petal_len"], na.rm = TRUE)
## End(Not run)
```
h2o.mean  

Compute the frame’s mean by-column (or by-row).

Description
Compute the frame’s mean by-column (or by-row).

Usage
h2o.mean(x, na.rm = FALSE, axis = 0, return_frame = FALSE, ...)

## S3 method for class 'H2OFrame'
mean(x, na.rm = FALSE, axis = 0, return_frame = FALSE, ...)

Arguments

x An H2OFrame object.
na.rm logical. Indicate whether missing values should be removed.
axis integer. Indicate whether to calculate the mean down a column (0) or across a
row (1). NOTE: This is only applied when return_frame is set to TRUE. Other-
wise, this parameter is ignored.
return_frame logical. Indicate whether to return an H2O frame or a list. Default is FALSE
(returns a list).
...
Further arguments to be passed from or to other methods.

Value
Returns a list containing the mean for each column (NaN for non-numeric columns) if return_frame
is set to FALSE. If return_frame is set to TRUE, then it will return an H2O frame with means per
column or row (depends on axis argument).

See Also
Round for base R implementation, mean() and colSums for the base R implementation, colMeans().

Examples
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
# Default behavior. Will return list of means per column.
h2o.mean(prostate$AGE)
# return_frame set to TRUE. This will return an H2O Frame
# with mean per row or column (depends on axis argument)
h2o.mean(prostate, na.rm = TRUE, axis = 1, return_frame = TRUE)

## End(Not run)
Retrieve the mean per class error

Description

Retrieves the mean per class error from an H2OBinomialMetrics. If "train", "valid", and "xval" parameters are FALSE (default), then the training mean per class error value is returned. If more than one parameter is set to TRUE, then a named vector of mean per class errors are returned, where the names are "train", "valid" or "xval".

Usage

h2o.mean_per_class_error(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object An H2OBinomialMetrics object.
train Retrieve the training mean per class error
valid Retrieve the validation mean per class error
xval Retrieve the cross-validation mean per class error

See Also

h2o.mse for MSE, and h2o.metric for the various threshold metrics. See h2o.performance for creating H2OModelMetrics objects.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.mean_per_class_error(perf)
h2o.mean_per_class_error(model, train=TRUE)
## End(Not run)
```
h2o.mean_residual_deviance

Retrieves the Mean Residual Deviance value from an H2O model. If "train", "valid", and "xval" parameters are FALSE (default), then the training Mean Residual Deviance value is returned. If more than one parameter is set to TRUE, then a named vector of Mean Residual Deviances are returned, where the names are "train", "valid" or "xval".

Usage

h2o.mean_residual_deviance(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

- **object**: An H2OModel object.
- **train**: Retrieve the training Mean Residual Deviance.
- **valid**: Retrieve the validation Mean Residual Deviance.
- **xval**: Retrieve the cross-validation Mean Residual Deviance.

Examples

```r
## Not run:
library(h2o)

h <- h2o.init()
fr <- as.h2o(iris)
m <- h2o.deeplearning(x = 2:5, y = 1, training_frame = fr)
h2o.mean_residual_deviance(m)
## End(Not run)
```

h2o.median

H2O Median

Description

Compute the median of an H2OFrame.

Usage

h2o.median(x, na.rm = TRUE)

## S3 method for class 'H2OFrame'
median(x, na.rm = TRUE)
h2o.melt

Converts a frame to key-value representation while optionally skipping NA values. Inverse operation to h2o.pivot.

Description

Pivot the frame designated by the three columns: index, column, and value. Index and column should be of type enum, int, or time. For cases of multiple indexes for a column label, the aggregation method is to pick the first occurrence in the data frame.

Usage

```r
h2o.melt(
  x, 
  id_vars, 
  value_vars = NULL, 
  var_name = "variable", 
  value_name = "value", 
  skipna = FALSE
)
```

Arguments

- `x`: an H2OFrame
- `id_vars`: the columns used as identifiers
- `value_vars`: what columns will be converted to key-value pairs (optional, if not specified complement to id_vars will be used)
- `var_name`: name of the key-column (default: "variable")
- `value_name`: name of the value-column (default: "value")
- `skipna`: if enabled, do not include NAs in the result (default: FALSE)
**Value**

an unpivoted H2OFrame

---

**Description**

Merges two H2OFrame objects with the same arguments and meanings as merge() in base R. However, we do not support all=TRUE, all.x=TRUE and all.y=TRUE. The default method is auto and it will default to the radix method. The radix method will return the correct merge result regardless of duplicated rows in the right frame. In addition, the radix method can perform merge even if you have string columns in your frames. If there are duplicated rows in your right frame, they will not be included if you use the hash method. The hash method cannot perform merge if you have string columns in your left frame. Hence, we consider the radix method superior to the hash method and is the default method to use.

**Usage**

```r
h2o.merge(
  x,
  y,
  by = intersect(names(x), names(y)),
  by.x = by,
  by.y = by,
  all = FALSE,
  all.x = all,
  all.y = all,
  method = "auto"
)
```

**Arguments**

- **x, y**  
  H2OFrame objects
- **by**  
  columns used for merging by default the common names
- **by.x**  
  x columns used for merging by name or number
- **by.y**  
  y columns used for merging by name or number
- **all**  
  TRUE includes all rows in x and all rows in y even if there is no match to the other
- **all.x**  
  If all.x is true, all rows in the x will be included, even if there is no matching row in y, and vice-versa for all.y.
- **all.y**  
  see all.x
- **method**  
  auto(default), radix, hash
Examples

## Not run:
library(h2o)
h2o.init()
left <- data.frame(fruit = c('apple', 'orange', 'banana', 'lemon', 'strawberry', 'blueberry'),
color = c('red', 'orange', 'yellow', 'yellow', 'red', 'blue'))
right <- data.frame(fruit = c('apple', 'orange', 'banana', 'lemon', 'strawberry', 'watermelon'),
citrus = c(FALSE, TRUE, FALSE, TRUE, FALSE, FALSE))
left_hf <- as.h2o(left)
right_hf <- as.h2o(right)
merged <- h2o.merge(left_hf, right_hf, all.x = TRUE)

## End(Not run)

h2o.metric

**H2O Model Metric Accessor Functions**

**Description**

A series of functions that retrieve model metric details.

**Usage**

h2o.metric(object, thresholds, metric, transform = NULL)
h2o.F0point5(object, thresholds)
h2o.F1(object, thresholds)
h2o.F2(object, thresholds)
h2o.accuracy(object, thresholds)
h2o.error(object, thresholds)
h2o.maxPerClassError(object, thresholds)
h2o.mean_per_class_accuracy(object, thresholds)
h2o.mcc(object, thresholds)
h2o.precision(object, thresholds)
h2o.tpr(object, thresholds)
h2o.fpr(object, thresholds)
h2o.fnr(object, thresholds)
h2o.tnr(object, thresholds)
h2o.recall(object, thresholds)
h2o.metric

h2o.sensitivity(object, thresholds)
h2o.fallout(object, thresholds)
h2o.missrate(object, thresholds)
h2o.specificity(object, thresholds)

Arguments

object An H2OModelMetrics object of the correct type.
thresholds (Optional) A value or a list of values between 0.0 and 1.0. If not set, then all thresholds will be returned. If "max", then the threshold maximizing the metric will be used.
metric (Optional) the metric to retrieve. If not set, then all metrics will be returned.
transform (Optional) a list describing a transformer for the given metric, if any. e.g. transform=list(op=foo_fn, name="foo") will rename the given metric to "foo" and apply function foo_fn to the metric values.

Details

Many of these functions have an optional thresholds parameter. Currently only increments of 0.1 are allowed. If not specified, the functions will return all possible values. Otherwise, the function will return the value for the indicated threshold.

Currently, the these functions are only supported by H2OBinomialMetrics objects.

Value

Returns either a single value, or a list of values.

See Also

h2o.auc for AUC, h2o.giniCoef for the GINI coefficient, and h2o.mse for MSE. See h2o.performance for creating H2OModelMetrics objects.

Examples

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.F1(perf)

## End(Not run)
```
h2o.min

Description
Returns the minima of the input values.

Usage
h2o.min(x, na.rm = FALSE)

Arguments
x An H2OFrame object.
na.rm logical indicating whether missing values should be removed.

See Also
Extremes for the base R implementation, min().

Examples
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.min(iris["sepal_len"], na.rm = TRUE)
## End(Not run)

h2o.mktime

Description
Compute msec since the Unix Epoch

Usage
h2o.mktime(
  year = 1970,
  month = 0,
  day = 0,
  hour = 0,
  minute = 0,
  second = 0,
  msec = 0
)
h2o.mojo_predict_csv

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>year</td>
<td>Defaults to 1970</td>
</tr>
<tr>
<td>month</td>
<td>zero based (months are 0 to 11)</td>
</tr>
<tr>
<td>day</td>
<td>zero based (days are 0 to 30)</td>
</tr>
<tr>
<td>hour</td>
<td>hour</td>
</tr>
<tr>
<td>minute</td>
<td>minute</td>
</tr>
<tr>
<td>second</td>
<td>second</td>
</tr>
<tr>
<td>msec</td>
<td>msec</td>
</tr>
</tbody>
</table>

Examples

```r
## Not run:
library(h2o)
h2o.init()

x = as.h2o(c(2018, 3, 2, 6, 32, 0, 0))
h2o.mktime(x)

## End(Not run)
```

h2o.mojo_predict_csv  H2O Prediction from R without having H2O running

Description

Provides the method h2o.mojo_predict_csv with which you can predict a MOJO model from R.

Usage

```r
h2o.mojo_predict_csv(
  input_csv_path,  # Path to input CSV file.
  mojo_zip_path,   # Path to MOJO zip downloaded from H2O.
  output_csv_path = NULL,  # Optional, path to the output CSV file with computed predictions. If NULL (default), then predictions will be saved as prediction.csv in the same folder as the MOJO zip.
  genmodel_jar_path = NULL,
  classpath = NULL,
  java_options = NULL,
  verbose = F,
  setInvNumNA = F
)
```

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>input_csv_path</td>
<td>Path to input CSV file.</td>
</tr>
<tr>
<td>mojo_zip_path</td>
<td>Path to MOJO zip downloaded from H2O.</td>
</tr>
<tr>
<td>output_csv_path</td>
<td>Optional, path to the output CSV file with computed predictions. If NULL (default), then predictions will be saved as prediction.csv in the same folder as the MOJO zip.</td>
</tr>
</tbody>
</table>
h2o.mojo_predict_df

**Value**

Returns a data.frame containing computed predictions

---

**h2o.mojo_predict_df**  
_H2O Prediction from R without having H2O running_

**Description**

Provides the method h2o.mojo_predict_df with which you can predict a MOJO model from R.

**Usage**

```r
h2o.mojo_predict_df(
  frame,
  mojo_zip_path,
  genmodel_jar_path = NULL,
  classpath = NULL,
  java_options = NULL,
  verbose = F,
  setInvNumNA = F
)
```

**Arguments**

- `frame`: data.frame to score.
- `mojo_zip_path`: Path to MOJO zip downloaded from H2O.
- `genmodel_jar_path`: Optional, path to genmodel jar file. If NULL (default) then the h2o-genmodel.jar in the same folder as the MOJO zip will be used.
- `classpath`: Optional, specifies custom user defined classpath which will be used when scoring. If NULL (default) then the default classpath for this MOJO model will be used.
- `java_options`: Optional, custom user defined options for Java. By default `-Xmx4g -XX:ReservedCodeCacheSize=256m` is used.
- `verbose`: Optional, if TRUE, then additional debug information will be printed. FALSE by default.
- `setInvNumNA`: Optional, if TRUE, then for an string that cannot be parsed into a number an N/A value will be produced, if false the command will fail. FALSE by default.
**h2o.month**

Converts the entries of an H2OFrame object from milliseconds to months (on a 1 to 12 scale).

**Usage**

```r
h2o.month(x)
```

```r
month(x)
```

```r
## S3 method for class 'H2OFrame'
month(x)
```

**Arguments**

- `x`: An H2OFrame object.

**Value**

An H2OFrame object containing the entries of `x` converted to months of the year.

**See Also**

- `h2o.year`

---

**h2o.mse**

Retrieves Mean Squared Error Value

**Description**

Retrieves the mean squared error value from an H2OModelMetrics object. If "train", "valid", and "xval" parameters are FALSE (default), then the training MSE value is returned. If more than one parameter is set to TRUE, then a named vector of MSEs are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.mse(object, train = FALSE, valid = FALSE, xval = FALSE)
```
h2o.nacnt

**Arguments**
- **object**: An H2OModelMetrics object of the correct type.
- **train**: Retrieve the training MSE
- **valid**: Retrieve the validation MSE
- **xval**: Retrieve the cross-validation MSE

**Details**
This function only supports H2OBinomialMetrics, H2OMultinomialMetrics, and H2ORegressionMetrics objects.

**See Also**
- h2o.auc for AUC, h2o.mse for MSE, and h2o.metric for the various threshold metrics. See h2o.performance for creating H2OModelMetrics objects.

**Examples**
```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
perf <- h2o.performance(model, prostate)
h2o.mse(perf)
## End(Not run)
```

---

**h2o.nacnt**

**Count of NAs per column**

**Description**
Gives the count of NAs per column.

**Usage**
```
h2o.nacnt(x)
```

**Arguments**
- **x**: An H2OFrame object.

**Value**
Returns a list containing the count of NAs per column.
Examples

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
h2o.nacnt(iris_hf)  # should return all 0s
h2o.insertMissingValues(iris_hf)
h2o.nacnt(iris_hf)

## End(Not run)
```

h2o.naiveBayes

Compute naive Bayes probabilities on an H2O dataset.

Description

The naive Bayes classifier assumes independence between predictor variables conditional on the response, and a Gaussian distribution of numeric predictors with mean and standard deviation computed from the training dataset. When building a naive Bayes classifier, every row in the training dataset that contains at least one NA will be skipped completely. If the test dataset has missing values, then those predictors are omitted in the probability calculation during prediction.

Usage

```r
h2o.naiveBayes(
  x,
  y,
  training_frame,
  model_id = NULL,
  nfolds = 0,
  seed = -1,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  validation_frame = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  balance_classes = FALSE,
  class_sampling_factors = NULL,
  max_after_balance_size = 5,
  max_hit_ratio_k = 0,
  laplace = 0,
  threshold = 0.001,
  min_sdev = 0.001,
  eps = 0,
  eps_sdev = 0,
  min_prob = 0.001,
  eps_prob = 0,
)```
compute_metrics = TRUE,
max_runtime_secs = 0,
export_checkpoints_dir = NULL,
gainslift_bins = -1
)

Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.
y The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

training_frame Id of the training data frame.
model_id Destination id for this model; auto-generated if not specified.
nfolds Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.
seed Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.
fold_column Column with cross-validation fold index assignment per observation.
keep_cross_validation_models Logical. Whether to keep the cross-validation models. Defaults to TRUE.
keep_cross_validation_predictions Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.
keep_cross_validation_fold_assignment Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.
validation_frame Id of the validation data frame.
ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.

score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.
balance_classes Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.
max_after_balance_size
Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_hit_ratio_k
Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable) Defaults to 0.

laplace
Laplace smoothing parameter Defaults to 0.

threshold
This argument is deprecated, use `min_sdev` instead. The minimum standard deviation to use for observations without enough data. Must be at least 1e-10.

min_sdev
The minimum standard deviation to use for observations without enough data. Must be at least 1e-10.

eps
This argument is deprecated, use `eps_sdev` instead. A threshold cutoff to deal with numeric instability, must be positive.

eps_sdev
A threshold cutoff to deal with numeric instability, must be positive.

min_prob
Min. probability to use for observations with not enough data.

eps_prob
Cutoff below which probability is replaced with min_prob.

compute_metrics
Logical. Compute metrics on training data Defaults to TRUE.

max_runtime_secs
Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

export_checkpoints_dir
Automatically export generated models to this directory.

gainslift_bins
Gains/Lift table number of bins. 0 means disabled. Default value -1 means automatic binning. Defaults to -1.

Value
an object of class H2OBinomialModel if the response has two categorical levels, and H2OMultinomialModel otherwise.

Examples
```r
## Not run:
h2o.init()
votes_path <- system.file("extdata", "housevotes.csv", package = "h2o")
votes <- h2o.uploadFile(path = votes_path, header = TRUE)
h2o.naiveBayes(x = 2:17, y = 1, training_frame = votes, laplace = 3)
## End(Not run)
```

h2o.names
Column names of an H2OFrame

Description
Column names of an H2OFrame
**Usage**

`h2o.names(x)`

**Arguments**

- `x` An H2OFrame object.

**See Also**

`names` for the base R implementation.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.names(iris)

## End(Not run)
```

---

**h2o.na_omit**

*Remove Rows With NAs*

**Description**

Remove Rows With NAs

**Usage**

`h2o.na_omit(object, ...)`

**Arguments**

- `object` H2OFrame object
- `...` Ignored

**Value**

Returns an H2OFrame object containing non-NA rows.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
```
h2o.nchar

h2o.nchar

String length

Description

String length

Usage

h2o.nchar(x)

Arguments

x

The column whose string lengths will be returned.

Examples

## Not run:
library(h2o)
h2o.init()
string_to_nchar <- as.h2o("r tutorial")
nchar_string <- h2o.nchar(string_to_nchar)

## End(Not run)

h2o.ncol

Return the number of columns present in x.

Description

Return the number of columns present in x.

Usage

h2o.ncol(x)

Arguments

x

An H2OFrame object.

See Also

nrow for the base R implementation, ncol().
Examples

## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.ncol(iris)

## End(Not run)

h2o.networkTest     View Network Traffic Speed

Description

View speed with various file sizes.

Usage

h2o.networkTest()

Value

Returns a table listing the network speed for 1B, 10KB, and 10MB.

h2o.nlevels     Get the number of factor levels for this frame.

Description

Get the number of factor levels for this frame.

Usage

h2o.nlevels(x)

Arguments

x        An H2OFrame object.

See Also

nlevels for the base R method.
### Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
h2o.nlevels(cars)

## End(Not run)
```

### Description

Disable Progress Bar

### Usage

```r
h2o.no_progress()
```

### Examples

```r
## Not run:
library(h2o)
h2o.init()
h2o.no_progress()

iris <- h2o.importFile(f)
iris["class"] <- as.factor(iris["class"])
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
splits <- h2o.splitFrame(iris, ratios = 0.8, seed = 1234)
train <- splits[[1]]
valid <- splits[[2]]

iris_km <- h2o.kmeans(x = predictors,
                      training_frame = train,
                      validation_frame = valid,
                      k = 10, estimate_k = TRUE,
                      standardize = FALSE, seed = 1234)

## End(Not run)
```
h2o.nrow

Return the number of rows present in x.

Description

Return the number of rows present in x.

Usage

h2o.nrow(x)

Arguments

x An H2OFrame object.

See Also

nrow for the base R implementation.

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
h2o.nrow(cars)

## End(Not run)

h2o.null_deviance

Retrieve the null deviance

Description

If "train", "valid", and "xval" parameters are FALSE (default), then the training null deviance value is returned. If more than one parameter is set to TRUE, then a named vector of null deviances are returned, where the names are "train", "valid" or "xval".

Usage

h2o.null_deviance(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object An H2OModel or H2OModelMetrics
train Retrieve the training null deviance
valid Retrieve the validation null deviance
xval Retrieve the cross-validation null deviance
Examples

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
  training_frame = prostate, family = "binomial", nfolds = 0,
  alpha = 0.5, lambda_search = FALSE)
h2o.null_deviance(prostate_glm, train = TRUE)
## End(Not run)
```

---

### h2o.null_dof

**Retrieve the null degrees of freedom**

**Description**

If "train", "valid", and "xval" parameters are FALSE (default), then the training null degrees of freedom value is returned. If more than one parameter is set to TRUE, then a named vector of null degrees of freedom are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.null_dof(object, train = FALSE, valid = FALSE, xval = FALSE)
```

**Arguments**

- `object` An H2OModel or H2OModelMetrics
- `train` Retrieve the training null degrees of freedom
- `valid` Retrieve the validation null degrees of freedom
- `xval` Retrieve the cross-validation null degrees of freedom

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
  training_frame = prostate, family = "binomial", nfolds = 0,
  alpha = 0.5, lambda_search = FALSE)
h2o.null_dof(prostate_glm, train = TRUE)
## End(Not run)
```
h2o.num_iterations  
Retrieve the number of iterations.

**Description**
Retrieve the number of iterations.

**Usage**
`h2o.num_iterations(object)`

**Arguments**
- **object**  
  An H2OClusteringModel object.

**Examples**
```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
                        training_frame = prostate, family = "binomial",
                        nfolds = 0, alpha = 0.5, lambda_search = FALSE)
h2o.num_iterations(prostate_glm)
## End(Not run)
```

h2o.num_valid_substrings  
Count of substrings >= 2 chars that are contained in file

**Description**
Find the count of all possible substrings >= 2 chars that are contained in the specified line-separated text file.

**Usage**
`h2o.num_valid_substrings(x, path)`

**Arguments**
- **x**  
  The column on which to calculate the number of valid substrings.
- **path**  
  Path to text file containing line-separated strings to be referenced.
h2o.openLog  View H2O R Logs

Description
Open existing logs of H2O R POST commands and error responses on local disk. Used primarily for debugging purposes.

Usage
h2o.openLog(type)

Arguments
- type  Currently unimplemented.

See Also
h2o.startLogging, h2o.stopLogging, h2o.clearLog

Examples
## Not run:
h2o.init()

  h2o.startLogging()
australia_path = system.file("extdata", "australia.csv", package = "h2o")
australia = h2o.importFile(path = australia_path)
h2o.stopLogging()

  # Not run to avoid windows being opened during R CMD check
  # h2o.openLog("Command")
  # h2o.openLog("Error")

  ## End(Not run)

h2o.parseRaw  H2O Data Parsing

Description
The second phase in the data ingestion step.

Usage
h2o.parseRaw(
  data,
  pattern = "",
  destination_frame = "",
  header = NA,
  sep = "",
)
\texttt{h2o.parseRaw}

\begin{verbatim}
col.names = NULL,
col.types = NULL,
na.strings = NULL,
blocking = FALSE,
parse_type = NULL,
chunk_size = NULL,
decrypt_tool = NULL,
skipped_columns = NULL,
custom_non_data_line_markers = NULL,
partition_by = NULL
)
\end{verbatim}

**Arguments**

- **data**: An H2OFrame object to be parsed.
- **pattern**: (Optional) Character string containing a regular expression to match file(s) in the folder.
- **destination_frame**: (Optional) The hex key assigned to the parsed file.
- **header**: (Optional) A logical value indicating whether the first row is the column header. If missing, H2O will automatically try to detect the presence of a header.
- **sep**: (Optional) The field separator character. Values on each line of the file are separated by this character. If \texttt{sep = ""}, the parser will automatically detect the separator.
- **col.names**: (Optional) An H2OFrame object containing a single delimited line with the column names for the file. If \texttt{skipped_columns} are specified, only list column names of columns that are not skipped.
- **col.types**: (Optional) A vector specifying the types to attempt to force over columns. If \texttt{skipped_columns} are specified, only list column types of columns that are not skipped.
- **na.strings**: (Optional) H2O will interpret these strings as missing.
- **blocking**: (Optional) Tell H2O parse call to block synchronously instead of polling. This can be faster for small datasets but loses the progress bar.
- **parse_type**: (Optional) Specify which parser type H2O will use. Valid types are "ARFF", "XLS", "CSV", "SVMLight"
- **chunk_size**: size of chunk of (input) data in bytes
- **decrypt_tool**: (Optional) Specify a Decryption Tool (key-reference acquired by calling \texttt{h2o.decryptionSetup}).
- **skipped_columns**: a list of column indices to be excluded from parsing
- **custom_non_data_line_markers**: (Optional) If a line in imported file starts with any character in given string it will NOT be imported. Empty string means all lines are imported, NULL means that default behaviour for given format will be used
- **partition_by**: (Optional) Names of the columns the persisted dataset has been partitioned by.

**Details**

Parse the Raw Data produced by the import phase.
See Also

h2o.importFile, h2o.parseSetup

h2o.parseSetup

Get a parse setup back for the staged data.

Description

Get a parse setup back for the staged data.

Usage

h2o.parseSetup(
  data,
  pattern = "",
  destination_frame = "",
  header = NA,
  sep = "",
  col.names = NULL,
  col.types = NULL,
  na.strings = NULL,
  parse_type = NULL,
  chunk_size = NULL,
  decrypt_tool = NULL,
  skipped_columns = NULL,
  custom_non_data_line_markers = NULL,
  partition_by = NULL
)

Arguments

data An H2OFrame object to be parsed.

pattern (Optional) Character string containing a regular expression to match file(s) in the folder.

destination_frame (Optional) The hex key assigned to the parsed file.

header (Optional) A logical value indicating whether the first row is the column header. If missing, H2O will automatically try to detect the presence of a header.

sep (Optional) The field separator character. Values on each line of the file are separated by this character. If sep = " ", the parser will automatically detect the separator.

col.names (Optional) An H2OFrame object containing a single delimited line with the column names for the file. If skipped_columns are specified, only list column names of columns that are not skipped.

col.types (Optional) A vector specifying the types to attempt to force over columns. If skipped_columns are specified, only list column types of columns that are not skipped.

na.strings (Optional) H2O will interpret these strings as missing.
parse_type (Optional) Specify which parser type H2O will use. Valid types are "ARFF", "XLS", "CSV", "SVMLight"
chunk_size size of chunk of (input) data in bytes
decrypt_tool (Optional) Specify a Decryption Tool (key-reference acquired by calling h2o.decryptionSetup.
skipped_columns a list of column indices to be excluded from parsing
custom_non_data_line_markers (Optional) If a line in imported file starts with any character in given string it will NOT be imported. Empty string means all lines are imported, NULL means that default behaviour for given format will be used
partition_by (Optional) Names of the columns the persisted dataset has been partitioned by.

See Also
h2o.parseRaw

h2o.partialPlot Partial Dependence Plots

Description
Partial dependence plot gives a graphical depiction of the marginal effect of a variable on the response. The effect of a variable is measured in change in the mean response. Note: Unlike randomForest’s partialPlot when plotting partial dependence the mean response (probabilities) is returned rather than the mean of the log class probability.

Usage
h2o.partialPlot(
  object,
  data,
  cols,
  destination_key,
  nbins = 20,
  plot = TRUE,
  plot_stddev = TRUE,
  weight_column = -1,
  include_na = FALSE,
  user_splits = NULL,
  col_pairs_2dpdp = NULL,
  save_to = NULL,
  row_index = -1,
  targets = NULL
)
Arguments

object  An H2OModel object.
data  An H2OFrame object used for scoring and constructing the plot.
cols  Feature(s) for which partial dependence will be calculated.
destination_key  An key reference to the created partial dependence tables in H2O.
nbins  Number of bins used. For categorical columns make sure the number of bins exceeds the level count. If you enable add_missing_NA, the returned length will be nbins+1.
plot  A logical specifying whether to plot partial dependence table.
plot_stddev  A logical specifying whether to add std err to partial dependence plot.
weight_column  A string denoting which column of data should be used as the weight column.
include_na  A logical specifying whether missing value should be included in the Feature values.
user_splits  A two-level nested list containing user defined split points for pdp plots for each column. If there are two columns using user defined split points, there should be two lists in the nested list. Inside each list, the first element is the column name followed by values defined by the user.
col_pairs_2dpdp  A two-level nested list like this: col_pairs_2dpdp = list(c("col1_name","col2_name"), c("col1_name","col3_name"), ...), where a 2D partial plots will be generated for col1_name, col2_name pair, for col1_name, col3_name pair and whatever other pairs that are specified in the nested list.
save_to  Fully qualified prefix of the image files the resulting plots should be saved to, e.g. '/home/user/pdp'. Plots for each feature are saved separately in PNG format, each file receives a suffix equal to the corresponding feature name, e.g. '/home/user/pdp_AGE.png'. If the files already exists, they will be overridden. Files are only saves if plot = TRUE (default).
row_index  Row for which partial dependence will be calculated instead of the whole input frame.
targets  Target classes for multinomial model.

Value

Plot and list of calculated mean response tables for each feature requested.

Examples

```r
# Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate[, "CAPSULE"] <- as.factor(prostate[, "CAPSULE"] )
prostate[, "RACE"] <- as.factor(prostate[, "RACE"] )
prostate_gbm <- h2o.gbm(x = c("AGE", "RACE"),
y = "CAPSULE",
training_frame = prostate,
ntrees = 10,
)```
h2o.performance

max_depth = 5,
learn_rate = 0.1)
h2o.partialPlot(object = prostate_gbm, data = prostate, cols = c("AGE", "RACE"))

iris_hex <- as.h2o(iris)
iris_gbm <- h2o.gbm(x = c(1:4), y = 5, training_frame = iris_hex)

# one target class
h2o.partialPlot(object = iris_gbm, data = iris_hex, cols="Petal.Length", targets=c("setosa"))

# three target classes
h2o.partialPlot(object = iris_gbm, data = iris_hex, cols="Petal.Length",
                targets=c("setosa", "virginica", "versicolor"))

## End(Not run)

h2o.performance

Model Performance Metrics in H2O

Description
Given a trained h2o model, compute its performance on the given dataset. However, if the dataset
does not contain the response/target column, no performance will be returned. Instead, a warning
message will be printed.

Usage
h2o.performance(
  model,
  newdata = NULL,
  train = FALSE,
  valid = FALSE,
  xval = FALSE,
  data = NULL
)

Arguments
model An H2OModel object
newdata An H2OFrame. The model will make predictions on this dataset, and subsequently score them. The dataset should match the dataset that was used to train the model, in terms of column names, types, and dimensions. If newdata is passed in, then train, valid, and xval are ignored.
train A logical value indicating whether to return the training metrics (constructed during training).
        Note: when the trained h2o model uses balance_classes, the training metrics constructed during training will be from the balanced training dataset. For more information visit: https://0xdata.atlassian.net/browse/TN-9
valid A logical value indicating whether to return the validation metrics (constructed during training).
xval A logical value indicating whether to return the cross-validation metrics (constructed during training).
data (DEPRECATED) An H2OFrame. This argument is now called ‘newdata’.  


Value

Returns an object of the `H2OModelMetrics` subclass.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
prostate_gbm <- h2o.gbm(3:9, "CAPSULE", prostate)
h2o.performance(model = prostate_gbm, newdata=prostate)

## If model uses balance_classes
## the results from train = TRUE will not match the results from newdata = prostate
prostate_gbm_balanced <- h2o.gbm(3:9, "CAPSULE", prostate, balance_classes = TRUE)
h2o.performance(model = prostate_gbm_balanced, newdata = prostate)
h2o.performance(model = prostate_gbm_balanced, train = TRUE)

## End(Not run)
```

---

**h2o.pivot**

**Pivot a frame**

**Description**

Pivot the frame designated by the three columns: index, column, and value. Index and column should be of type enum, int, or time. For cases of multiple indexes for a column label, the aggregation method is to pick the first occurrence in the data frame.

**Usage**

```r
h2o.pivot(x, index, column, value)
```

**Arguments**

- `x`: an H2OFrame
- `index`: the column where pivoted rows should be aligned on
- `column`: the column to pivot
- `value`: values of the pivoted table

**Value**

An H2OFrame with columns from the columns arg, aligned on the index arg, with values from values arg.
### Examples

```r
## Not run:
library(h2o)
h2o.init()

df = h2o.createFrame(rows = 1000, cols = 3, factors = 10, integer_fraction = 1.0/3,
categorical_fraction = 1.0/3, missing_fraction = 0.0, seed = 123)
df$C3 = h2o.abs(df$C3)
h2o.pivot(df, index="C3", column="C2", value="C1")

## End(Not run)
```

### h2o.prcomp

Principal component analysis of an H2O data frame

### Description

Principal components analysis of an H2O data frame using the power method to calculate the singular value decomposition of the Gram matrix.

### Usage

```r
h2o.prcomp(
  training_frame,
  x,
  model_id = NULL,
  validation_frame = NULL,
  ignore_const_cols = TRUE,
  score_each_iteration = FALSE,
  transform = c("NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE"),
  pca_method = c("GramSVD", "Power", "Randomized", "GLRM"),
  pca_impl = c("MTJ_EVD_DENSEMATRIX", "MTJ_EVD_SYMMATRIX", "MTJ_SVD_DENSEMATRIX", "JAMA"),
  k = 1,
  max_iterations = 1000,
  use_all_factor_levels = FALSE,
  compute_metrics = TRUE,
  impute_missing = FALSE,
  seed = -1,
  max_runtime_secs = 0,
  export_checkpoints_dir = NULL
)
```

### Arguments

- `training_frame`: Id of the training data frame.
- `x`: A vector containing the character names of the predictors in the model.
- `model_id`: Destination id for this model; auto-generated if not specified.
- `validation_frame`: Id of the validation data frame.
ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.

score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.

transform Transformation of training data Must be one of: "NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE". Defaults to NONE.

pca_method Specify the algorithm to use for computing the principal components: GramSVD - uses a distributed computation of the Gram matrix, followed by a local SVD; Power - computes the SVD using the power iteration method (experimental); Randomized - uses randomized subspace iteration method; GLRM - fits a generalized low-rank model with L2 loss function and no regularization and solves for the SVD using local matrix algebra (experimental) Must be one of: "GramSVD", "Power", "Randomized", "GLRM". Defaults to GramSVD.


k Rank of matrix approximation Defaults to 1.

max_iterations Maximum training iterations Defaults to 1000.

use_all_factor_levels Logical. Whether first factor level is included in each categorical expansion Defaults to FALSE.

compute_metrics Logical. Whether to compute metrics on the training data Defaults to TRUE.

impute_missing Logical. Whether to impute missing entries with the column mean Defaults to FALSE.

seed Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

max_runtime_secs Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

export_checkpoints_dir Automatically export generated models to this directory.

Value an object of class H2ODimReductionModel.

References
See Also

h2o.svd, h2o.g1rm

Examples

## Not run:
library(h2o)
h2o.init()
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.uploadFile(path = australia_path)
h2o.prcomp(training_frame = australia, k = 8, transform = "STANDARDIZE")

## End(Not run)

---

### h2o.predict

**Predict on an H2O Model**

**Description**

Predict on an H2O Model

**Usage**

h2o.predict(object, newdata, ...)

**Arguments**

- object: a fitted model object for which prediction is desired.
- newdata: An H2OFrame object in which to look for variables with which to predict.
- ...: additional arguments to pass on.

**Value**

Returns an H2OFrame object with probabilities and default predictions.

---

### h2o.predict_json

**H2O Prediction from R without having H2O running**

**Description**

Provides the method h2o.predict with which you can predict a MOJO or POJO Jar model from R.

**Usage**

h2o.predict_json(model, json, genmodelpath, labels, classpath, javaoptions)
Arguments

- **model**: String with file name of MOJO or POJO Jar
- **json**: JSON String with inputs to model
- **genmodelpath**: (Optional) path name to h2o-genmodel.jar, if not set defaults to same dir as MOJO
- **labels**: (Optional) if TRUE then show output labels in result
- **classpath**: (Optional) Extra items for the class path of where to look for Java classes, e.g., h2o-genmodel.jar
- **javaoptions**: (Optional) Java options string, default if "-Xmx4g"

Value

Returns an object with the prediction result

Examples

```r
## Not run:
library(h2o)
h2o.predict_json("~/GBM_model_python_1473313897851_6.zip", "{"C7":1}")
h2o.predict_json("~/GBM_model_python_1473313897851_6.zip", "{"C7":1}", c(".", "lib"))
## End(Not run)
```

h2o.print

**Print An H2OFrame**

Description

Print An H2OFrame

Usage

```
h2o.print(x, n = 6L)
```

Arguments

- **x**: An H2OFrame object
- **n**: An (Optional) A single integer. If positive, number of rows in x to return. If negative, all but the n first/last number of rows in x. Anything bigger than 20 rows will require asking the server (first 20 rows are cached on the client).

Examples

```r
## Not run:
library()
h2o.init()
iris <- h2o.importFile(f)
h2o.print(iris["species"], n = 15)
## End(Not run)
```
h2o.prod

Return the product of all the values present in its arguments.

Description

Return the product of all the values present in its arguments.

Usage

h2o.prod(x)

Arguments

x

An H2OFrame object.

See Also

prod for the base R implementation.

Examples

## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.prod(iris["petal_len"])
## End(Not run)

h2o.proj_archetypes

Convert Archetypes to Features from H2O GLRM Model

Description

Project each archetype in an H2O GLRM model into the corresponding feature space from the H2O training frame.

Usage

h2o.proj_archetypes(object, data, reverse_transform = FALSE)

Arguments

object

An H2ODimReductionModel object that represents the model containing archetypes to be projected.

data

An H2OFrame object representing the training data for the H2O GLRM model.

reverse_transform

(Optional) A logical value indicating whether to reverse the transformation from model-building by re-scaling columns and adding back the offset to each column of the projected archetypes.
Value

Returns an H2OFrame object containing the projection of the archetypes down into the original feature space, where each row is one archetype.

See Also

h2o.glrm for making an H2ODimReductionModel.

Examples

```r
## Not run:
library(h2o)
```
```
h2o.init()
```
```
iris_hf <- as.h2o(iris)
iris_glrm <- h2o.glrm(training_frame = iris_hf, k = 4, loss = "Quadratic",
                     multi_loss = "Categorical", max_iterations = 1000)
iris_parch <- h2o.proj_archetypes(iris_glrm, iris_hf)
head(iris_parch)
```
```
## End(Not run)
```
Arguments

- **x** (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.
- **y** The name or column index of the response variable in the data. The response must be either a binary categorical/factor variable or a numeric variable with values -1/1 (for compatibility with SVMlight format).
- **training_frame** Id of the training data frame.
- **model_id** Destination id for this model; auto-generated if not specified.
- **validation_frame** Id of the validation data frame.
- **ignore_const_cols** Logical. Ignore constant columns. Defaults to TRUE.
- **hyper_param** Penalty parameter C of the error term Defaults to 1.
- **kernel_type** Type of used kernel Must be one of: "gaussian". Defaults to gaussian.
- **gamma** Coefficient of the kernel (currently RBF gamma for gaussian kernel, -1 means 1/#features) Defaults to -1.
- **rank_ratio** Desired rank of the ICF matrix expressed as an ration of number of input rows (-1 means use sqrt(#rows)). Defaults to -1.
- **positive_weight** Weight of positive (+1) class of observations Defaults to 1.
- **negative_weight** Weight of positive (-1) class of observations Defaults to 1.
- **disable_training_metrics** Logical. Disable calculating training metrics (expensive on large datasets) De-faults to TRUE.
- **sv_threshold** Threshold for accepting a candidate observation into the set of support vectors Defaults to 0.0001.
- **fact_threshold** Convergence threshold of the Incomplete Cholesky Factorization (ICF) Defaults to 1e-05.
- **feasible_threshold** Convergence threshold for primal-dual residuals in the IPM iteration Defaults to 0.001.
- **surrogate_gap_threshold** Feasibility criterion of the surrogate duality gap (eta) Defaults to 0.001.
- **mu_factor** Increasing factor mu Defaults to 10.
- **max_iterations** Maximum number of iteration of the algorithm Defaults to 200.
- **seed** Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

Examples

```r
## Not run:
library(h2o)
h2o.init()

# Import the splice dataset
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/splice/splice.svm"
```
splice <- h2o.importFile(f)

# Train the Support Vector Machine model
svm_model <- h2o.psvm(gamma = 0.01, rank_ratio = 0.1,
                      y = "C1", training_frame = splice,
                      disable_training_metrics = FALSE)

## End(Not run)

---

**h2o.quantile**

**Quantiles of H2O Frames.**

**Description**

Obtain and display quantiles for H2O parsed data.

**Usage**

```r
h2o.quantile(
  x, 
  probs = c(0.001, 0.01, 0.1, 0.25, 0.333, 0.5, 0.667, 0.75, 0.9, 0.99, 0.999),
  combine_method = c("interpolate", "average", "avg", "low", "high"),
  weights_column = NULL,
  ...
)
```

## S3 method for class 'H2OFrame'

```r
quantile(
  x, 
  probs = c(0.001, 0.01, 0.1, 0.25, 0.333, 0.5, 0.667, 0.75, 0.9, 0.99, 0.999),
  combine_method = c("interpolate", "average", "avg", "low", "high"),
  weights_column = NULL,
  ...
)
```

**Arguments**

- **x**
  - An H2OFrame object with a single numeric column.
- **probs**
  - Numeric vector of probabilities with values in [0,1].
- **combine_method**
  - How to combine quantiles for even sample sizes. Default is to do linear interpolation. E.g., If method is "lo", then it will take the lo value of the quantile. Abbreviations for average, low, and high are acceptable (avg, lo, hi).
- **weights_column**
  - (Optional) String name of the observation weights column in x or an H2OFrame object with a single numeric column of observation weights.
- **...**
  - Further arguments passed to or from other methods.

**Details**

Value

A vector describing the percentiles at the given cutoffs for the H2OFrame object.

Examples

```r
## Not run:
# Request quantiles for an H2O parsed data set:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
# Request quantiles for a subset of columns in an H2O parsed data set
quantile(prostate[, 3])
for(i in 1:ncol(prostate))
  quantile(prostate[, i])
## End(Not run)
```

---

### h2o.r2

**Retrieve the R2 value**

**Description**

Retrieves the R2 value from an H2O model. Will return R^2 for GLM Models and will return NaN otherwise. If "train", "valid", and "xval" parameters are FALSE (default), then the training R2 value is returned. If more than one parameter is set to TRUE, then a named vector of R2s are returned, where the names are "train", "valid" or "xval".

**Usage**

```r
h2o.r2(object, train = FALSE, valid = FALSE, xval = FALSE)
```

**Arguments**

- `object`: An H2OModel object.
- `train`: Retrieve the training R2
- `valid`: Retrieve the validation set R2 if a validation set was passed in during model build time.
- `xval`: Retrieve the cross-validation R2

**Examples**

```r
## Not run:
library(h2o)

h <- h2o.init()
fr <- as.h2o(iris)
m <- h2o.glm(x = 2:5, y = 1, training_frame = fr)
h2o.r2(m)
## End(Not run)
```
Description

Builds a Random Forest model on an H2OFrame.

Usage

h2o.randomForest(
  x,
  y,
  training_frame,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
  keep_cross_validation_models = TRUE,
  keep_cross_validation_predictions = FALSE,
  keep_cross_validation_fold_assignment = FALSE,
  score_each_iteration = FALSE,
  score_tree_interval = 0,
  fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
  fold_column = NULL,
  ignore_const_cols = TRUE,
  offset_column = NULL,
  weights_column = NULL,
  balance_classes = FALSE,
  class_sampling_factors = NULL,
  max_after_balance_size = 5,
  max_hit_ratio_k = 0,
  ntree = 50,
  max_depth = 20,
  min_rows = 1,
  nbins = 20,
  nbins_top_level = 1024,
  nbins_cats = 1024,
  r2_stopping = Inf,
  stopping_rounds = 0,
  stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing"),
  stopping_tolerance = 0.001,
  max_runtime_secs = 0,
  seed = -1,
  build_tree_one_node = FALSE,
  mtries = -1,
  sample_rate = 0.632,
  sample_rate_per_class = NULL,
  binomial_double_trees = FALSE,
  checkpoint = NULL,
  col_sample_rate_change_per_level = 1,


Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.

y The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

training_frame Id of the training data frame.

model_id Destination id for this model; auto-generated if not specified.

validation_frame Id of the validation data frame.

nfolds Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.

keep_cross_validation_models Logical. Whether to keep the cross-validation models. Defaults to TRUE.

keep_cross_validation_predictions Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.

keep_cross_validation_fold_assignment Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.

score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.

cscore_tree_interval Score the model after every so many trees. Disabled if set to 0. Defaults to 0.

fold_assignment Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.

fold_column Column with cross-validation fold index assignment per observation.
ignore_const_cols  Logical. Ignore constant columns. Defaults to TRUE.
offset_column  Offset column. This argument is deprecated and has no use for Random Forest.
weights_column  Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

balance_classes  Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.

class_sampling_factors  Desired over/under-sampling ratios per class (in lexicographic order). If not specified, sampling factors will be automatically computed to obtain class balance during training. Requires balance_classes.

max_after_balance_size  Maximum relative size of the training data after balancing class counts (can be less than 1.0). Requires balance_classes. Defaults to 5.0.

max_hit_ratio_k  This argument is deprecated and has no use. Max. number (top K) of predictions to use for hit ratio computation (for multi-class only, 0 to disable).

ntrees  Number of trees. Defaults to 50.
max_depth  Maximum tree depth (0 for unlimited). Defaults to 20.
min_rows  Fewest allowed (weighted) observations in a leaf. Defaults to 1.

nbins  For numerical columns (real/int), build a histogram of (at least) this many bins, then split at the best point Defaults to 20.

nbins_top_level  For numerical columns (real/int), build a histogram of (at most) this many bins at the root level, then decrease by factor of two per level Defaults to 1024.

nbins_cats  For categorical columns (factors), build a histogram of this many bins, then split at the best point. Higher values can lead to more overfitting. Defaults to 1024.

r2_stopping  r2_stopping is no longer supported and will be ignored if set - please use stopping_rounds, stopping_metric and stopping_tolerance instead. Previous version of H2O would stop making trees when the R^2 metric equals or exceeds this Defaults to 1.797693135e+308.

stopping_rounds  Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable) Defaults to 0.

stopping_metric  Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anomaly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.
stopping_tolerance
Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much) Defaults to 0.001.

max_runtime_secs
Maximum allowed runtime in seconds for model training. Use 0 to disable.
Defaults to 0.

seed
Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

build_tree_one_node
Logical. Run on one node only; no network overhead but fewer cpus used.
Suitable for small datasets. Defaults to FALSE.

mtries
Number of variables randomly sampled as candidates at each split. If set to -1, defaults to \sqrt{p} for classification and \frac{p}{3} for regression (where p is the # of predictors Defaults to -1.

sample_rate
Row sample rate per tree (from 0.0 to 1.0) Defaults to 0.632.

sample_rate_per_class
A list of row sample rates per class (relative fraction for each class, from 0.0 to 1.0), for each tree

binomial_double_trees
Logical. For binary classification: Build 2x as many trees (one per class) - can lead to higher accuracy. Defaults to FALSE.

checkpoint
Model checkpoint to resume training with.

col_sample_rate_change_per_level
Relative change of the column sampling rate for every level (must be > 0.0 and <= 2.0) Defaults to 1.

col_sample_rate_per_tree
Column sample rate per tree (from 0.0 to 1.0) Defaults to 1.

min_split_improvement
Minimum relative improvement in squared error reduction for a split to happen
Defaults to 1e-05.

histogram_type
What type of histogram to use for finding optimal split points Must be one of: "AUTO", "UniformAdaptive", "Random", "QuantilesGlobal", "RoundRobin". Defaults to AUTO.

categorical_encoding
Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited". Defaults to AUTO.

calibrate_model
Logical. Use Platt Scaling to calculate calibrated class probabilities. Calibration can provide more accurate estimates of class probabilities. Defaults to FALSE.

calibration_frame
Calibration frame for Platt Scaling

distribution
Distribution. This argument is deprecated and has no use for Random Forest.

custom_metric_func
Reference to custom evaluation function, format: 'language:keyName=funcName'

export_checkpoints_dir
Automatically export generated models to this directory.
h2o.range

Returns a vector containing the minimum and maximum of all the given arguments.

Description

Returns a vector containing the minimum and maximum of all the given arguments.

Usage

h2o.range(x, na.rm = FALSE, finite = FALSE)
Arguments

- **x**: An H2OFrame object.
- **na.rm**: logical, indicating whether missing values should be removed.
- **finite**: logical, indicating if all non-finite elements should be omitted.

See Also

- `range` for the base R implementation.

Examples

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.range(iris["petal_len"], na.rm = TRUE, finite = TRUE)
## End(Not run)
```

Description

This function will add a new column rank where the ranking is produced as follows: 1. sorts the H2OFrame by columns specified by `group_by_cols` and `sort_cols` in the directions specified by the ascending for the `sort_cols`. The sort directions for the `group_by_cols` are ascending only. 2. A new rank column is added to the frame which will contain a rank assignment performed next. The user can choose to assign a name to this new column. The default name is `New_Rank_column`. 3. For each groupby groups, a rank is assigned to the row starting from 1, 2, ..., to the end of that group. 4. If `sort_cols_sorted` is `TRUE`, a final sort on the frame will be performed frame according to the `sort_cols` and the sort directions in ascending. If `sort_cols_sorted` is `FALSE` (by default), the frame from step 3 will be returned as is with no extra sort. This may provide a small speedup if desired.
Usage

h2o.rank_within_group_by(
    x,
    group_by_cols,
    sort_cols,
    ascending = NULL,
    new_col_name = "New_Rank_column",
    sort_cols_sorted = FALSE
)

Arguments

x

The H2OFrame input to be sorted.

group_by_cols

e a list of column names or indices to form the groupby groups

sort_cols

e a list of column names or indices for sorting

ascending

e a list of Boolean to determine if ascending sort (set to TRUE) is needed for each

column in sort_cols (optional). Default is ascending sort for all. To perform
descending sort, set value to FALSE

new_col_name

e new column name for the newly added rank column if specified (optional). De-
default name is New_Rank_column.

sort_cols_sorted

Boolean to determine if the final returned frame is to be sorted according to the
sort_cols and sort directions in ascending. Default is FALSE.

The following example is generated by Nidhi Mehta.

If the input frame is train:

ID Group_by_column num data Column_to_arrange_by num_1 fdata 12 1 2941.552
1 3 -3177.9077 1 12 1 2941.552 1 5 -13311.8247 1 12 2 -22722.174 1 3 -
3177.9077 1 12 2 -22722.174 1 5 -13311.8247 1 13 3 -12776.884 1 5 -18421.6171
0 13 3 -12776.884 1 4 28080.1607 0 13 1 -6049.830 1 5 -18421.6171 0 13 1 -
6049.830 1 4 28080.1607 0 15 3 -16995.346 1 1 -9781.6373 0 16 1 -10003.593
0 3 -61284.6900 0 16 3 26052.495 1 3 -61284.6900 0 16 3 -22905.288 0 3 -
61284.6900 0 17 2 -13465.496 1 2 12094.4851 1 17 -13465.496 1 3 -11772.1338
1 17 2 -13465.496 1 3 -415.1114 0 17 2 -3329.619 1 2 12094.4851 1 17 2 -
3329.619 1 3 -11772.1338 1 17 -11772.1338 1 17 2 -3329.619 1 3 -415.1114 0

If the following commands are issued: rankedF1 <- h2o.rank_within_group_by(train,
c("Group_by_column"), c("Column_to_arrange_by"), c(TRUE)) h2o.summary(rankedF1)

The returned frame rankedF1 will look like this: ID Group_by_column num data Column_to_arrange_by num_1 fdata.1 New_Rank_column 12 1 2941.552
1 3 -3177.9077 1 11 1 -10003.593 0 3 -61284.6900 0 2 13 1 -6049.830 0
4 28080.1607 0 3 12 1 2941.552 1 5 -13311.8247 1 4 13 1 -6049.830 0 5 -
18421.6171 0 5 17 2 -13465.496 0 2 12094.4851 1 17 2 -3329.619 0 2
12094.4851 1 2 12 2 -22722.174 1 3 -3177.9077 1 3 17 2 -13465.496 0 3 -
11772.1338 1 4 17 2 -13465.496 0 3 -415.1114 0 5 17 2 -3329.619 0 3 -
11772.1338 1 6 17 2 -3329.619 0 3 -415.1114 0 7 12 2 -22722.174 1 5 -
13311.8247 1 8 15 3 -16995.346 1 1 -9781.6373 0 1 16 3 26052.495 0 3 -
61284.6900 0 2 16 3 -22905.288 1 3 -61284.6900 0 3 13 3 -12776.884 1 4
28080.1607 0 4 13 3 -12776.884 1 5 -18421.6171 0 5

If the following commands are issued: rankedF1 <- h2o.rank_within_group_by(train,
c("Group_by_column"), c("Column_to_arrange_by"), c(TRUE), sort_cols_sorted=TRUE) h2o.summary(rankedF1)
The returned frame will be sorted according to sortCols and hence look like this instead:

<table>
<thead>
<tr>
<th>ID</th>
<th>Group_by_column</th>
<th>num</th>
<th>fdata</th>
<th>Column_to_arrange_by</th>
<th>num_1</th>
<th>-16995.346</th>
<th>1 1 172 -13465.496</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2</td>
<td>12094.4851</td>
<td>1 1</td>
<td>17 2</td>
<td>-3329.619</td>
<td>0 2</td>
<td>12094.4851</td>
<td>1 2 12 1 2941.552 1 3</td>
</tr>
<tr>
<td>-3177.9077</td>
<td>1</td>
<td>2</td>
<td>-22722.174</td>
<td>1</td>
<td>3</td>
<td>-3177.9077</td>
<td>1 3</td>
</tr>
<tr>
<td>0 2 16 3</td>
<td>26052.495 0 3</td>
<td>-61284.690 0 2 16 3</td>
<td>22905.288 1 3</td>
<td>-61284.690 0 3 17 2</td>
<td>-13465.496 0 3</td>
<td>-11772.1338 1 4 17 2</td>
<td>-13465.496 0 3</td>
</tr>
</tbody>
</table>

## Examples

```r
## Not run:
library(h2o)
h2o.init()
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/airlines/allyears2k_headers.zip"
air <- h2o.importFile(f)
group_cols <- c("Distance")
sort_cols <- c("IsArrDelayed", "IsDepDelayed")
sort_directions <- c(TRUE, FALSE)
h2o.rank_within_group_by(x = air, group_by_cols = group_cols,
sort_cols = sort_cols,
ascending = sort_directions,
new_col_name = "New_Rank",
sort_cols_sorted = TRUE)
## End(Not run)
```

---

### h2o.rapids

**Execute a Rapids expression.**

#### Description

Execute a Rapids expression.

#### Usage

`h2o.rapids(expr)`

#### Arguments

- `expr` The rapids expression (ascii string)

#### Examples

```r
## Not run:
h2o.rapids("(setproperty "sys.ai.h2o.algos.evaluate_auto_model_parameters" "true")")
## End(Not run)
```
h2o.rbind  

Combine H2O Datasets by Rows

Description
Takes a sequence of H2O data sets and combines them by rows

Usage
h2o.rbind(...)

Arguments
...
A sequence of H2OFrame arguments. All datasets must exist on the same H2O instance (IP and port) and contain the same number and types of columns.

Value
An H2OFrame object containing the combined ...arguments row-wise.

See Also
cbind for the base R method, rbind().

Examples
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate_rbind <- h2o.rbind(prostate, prostate)
head(prostate_rbind)
dim(prostate)
dim(prostate_rbind)
## End(Not run)

h2o.reconstruct  

Reconstruct Training Data via H2O GLRM Model

Description
Reconstruct the training data and impute missing values from the H2O GLRM model by computing the matrix product of X and Y, and transforming back to the original feature space by minimizing each column’s loss function.

Usage
h2o.reconstruct(object, data, reverse_transform = FALSE)
h2o.relevel

Arguments

**object**  
An H2ODimReductionModel object that represents the model to be used for reconstruction.

**data**  
An H2OFrame object representing the training data for the H2O GLRM model. Used to set the domain of each column in the reconstructed frame.

**reverse_transform**  
(Optional) A logical value indicating whether to reverse the transformation from model-building by re-scaling columns and adding back the offset to each column of the reconstructed frame.

Value

Returns an H2OFrame object containing the approximate reconstruction of the training data;

See Also

h2o.glrm for making an H2ODimReductionModel.

Examples

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
iris_glrm <- h2o.glrm(training_frame = iris_hf, k = 4, transform = "STANDARDIZE",
                      loss = "Quadratic", multi_loss = "Categorical", max_iterations = 1000)
iris_rec <- h2o.reconstruct(iris_glrm, iris_hf, reverse_transform = TRUE)
head(iris_rec)
## End(Not run)
```

---

h2o.relevel  
Reorders levels of an H2O factor, similarly to standard R’s relevel.

Description

The levels of a factor are reordered so that the reference level is at level 0, remaining levels are moved down as needed.

Usage

h2o.relevel(x, y)

Arguments

**x**  
factor column in h2o frame

**y**  
reference level (string)

Value

new reordered factor column
Examples

```r
## Not run:
library(h2o)
h2o.init()

# Convert iris dataset to an H2OFrame
iris_hf <- as.h2o(iris)
# Look at current ordering of the Species column levels
h2o.levels(iris_hf["Species"])
# "setosa"  "versicolor" "virginica"
# Change the reference level to "virginica"
iris_hf["Species"] <- h2o.relevel(x = iris_hf["Species"], y = "virginica")
# Observe new ordering
h2o.levels(iris_hf["Species"])
# "virginica"  "setosa"  "versicolor"

## End(Not run)
```

---

**h2o.removeAll**  
*Remove All Objects on the H2O Cluster*

**Description**

Removes the data from the h2o cluster, but does not remove the local references. Retains frames and vectors specified in retained_elements argument. Retained keys must be keys of models and frames only. For models retained, training and validation frames are retained as well. Cross validation models of a retained model are NOT retained automatically, those must be specified explicitly.

**Usage**

```r
h2o.removeAll(timeout_secs = 0, retained_elements = c())
```

**Arguments**

- `timeout_secs`  
  Timeout in seconds. Default is no timeout.
- `retained_elements`  
  Frames and vectors to be retained. Other keys provided are ignored.

**See Also**

- `h2o.rm`

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.ls()
h2o.removeAll()
h2o.ls()

## End(Not run)
```
**h2o.removeVecs**  
*Delete Columns from an H2OFrame*

**Description**

Delete the specified columns from the H2OFrame. Returns an H2OFrame without the specified columns.

**Usage**

```
h2o.removeVecs(data, cols)
```

**Arguments**

- **data**  
The H2OFrame.
- **cols**  
The columns to remove.

**h2o.rep_len**  
*Replicate Elements of Vectors or Lists into H2O*

**Description**

`h2o.rep_len` performs just as `rep` does. It replicates the values in `x` in the H2O backend.

**Usage**

```
h2o.rep_len(x, length.out)
```

**Arguments**

- **x**  
an H2O frame
- **length.out**  
non negative integer. The desired length of the output vector.

**Value**

Creates an H2OFrame of the same type as `x`

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.rep_len(iris, length.out = 3)

## End(Not run)
```
**h2o.reset_threshold**

Reset model threshold and return old threshold value.

**Description**

Reset model threshold and return old threshold value.

**Usage**

```
h2o.reset_threshold(object, threshold)
```

**Arguments**

- **object**: An H2OModel object.
- **threshold**: A threshold value from 0 to 1 included.

**Value**

Returns the previous threshold used in the model.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
                       training_frame = prostate, family = "binomial",
                       nfolds = 0, alpha = 0.5, lambda_search = FALSE)
old_threshold <- h2o.reset_threshold(prostate_glm, 0.9)
## End(Not run)
```

---

**h2o.residual_deviance**

Retrieve the residual deviance

**Description**

If "train", "valid", and "xval" parameters are FALSE (default), then the training residual deviance value is returned. If more than one parameter is set to TRUE, then a named vector of residual deviances are returned, where the names are "train", "valid" or "xval".

**Usage**

```
h2o.residual_deviance(object, train = FALSE, valid = FALSE, xval = FALSE)
```
Arguments

- **object**: An H2OModel or H2OModelMetrics
- **train**: Retrieve the training residual deviance
- **valid**: Retrieve the validation residual deviance
- **xval**: Retrieve the cross-validation residual deviance

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
  training_frame = prostate, family = "binomial",
  nfolds = 0, alpha = 0.5, lambda_search = FALSE)
h2o.residual_deviance(prostate_glm, train = TRUE)
## End(Not run)
```

## h2o.residual_dof

**Retrieve the residual degrees of freedom**

Description

If "train", "valid", and "xval" parameters are FALSE (default), then the training residual degrees of freedom value is returned. If more than one parameter is set to TRUE, then a named vector of residual degrees of freedom are returned, where the names are "train", "valid" or "xval".

Usage

```r
h2o.residual_dof(object, train = FALSE, valid = FALSE, xval = FALSE)
```

Arguments

- **object**: An H2OModel or H2OModelMetrics
- **train**: Retrieve the training residual degrees of freedom
- **valid**: Retrieve the validation residual degrees of freedom
- **xval**: Retrieve the cross-validation residual degrees of freedom

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
```
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
                      training_frame = prostate, family = "binomial",
                      nfolds = 0, alpha = 0.5, lambda_search = FALSE)
h2o.residual_dof(prostate_glm, train = TRUE)

## End(Not run)

---

**h2o.rm**

*Delete Objects In H2O*

**Description**

Remove the h2o Big Data object(s) having the key name(s) from ids.

**Usage**

h2o.rm(ids, cascade = TRUE)

**Arguments**

- **ids** The object or hex key associated with the object to be removed or a vector/list of those things.
- **cascade** Boolean, if set to TRUE (default), the object dependencies (e.g. submodels) are also removed.

**See Also**

h2o.assign, h2o.ls

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
iris <- as.h2o(iris)
model <- h2o.glm(1:4,5,training = iris, family = "multinomial")
h2o.rm(iris)
## End(Not run)
```

---

**h2o.rmse**

*Retrieves Root Mean Squared Error Value*

**Description**

Retrieves the root mean squared error value from an H2OModelMetrics object. If "train", "valid", and "xval" parameters are FALSE (default), then the training RMSE value is returned. If more than one parameter is set to TRUE, then a named vector of RMSEs are returned, where the names are "train", "valid" or "xval".
h2o.rmsle

Retrieve the Root Mean Squared Log Error

Description

Retrieves the root mean squared log error (RMSLE) value from an H2O model. If "train", "valid", and "xval" parameters are FALSE (default), then the training rmsle value is returned. If more than one parameter is set to TRUE, then a named vector of rmsles are returned, where the names are "train", "valid" or "xval".

Usage

h2o.rmsle(object, train = FALSE, valid = FALSE, xval = FALSE)
h2o.round

Arguments

object  An H2OModel object.
train  Retrieve the training rmsle
valid  Retrieve the validation set rmsle if a validation set was passed in during model build time.
xval  Retrieve the cross-validation rmsle

Examples

```r
## Not run:
library(h2o)

h <- h2o.init()
fr <- as.h2o(iris)

m <- h2o.deeplearning(x = 2:5, y = 1, training_frame = fr)

h2o.rmsle(m)
## End(Not run)
```

h2o.round  Round doubles/floats to the given number of decimal places.

Description

Round doubles/floats to the given number of decimal places.

Usage

h2o.round(x, digits = 0)

round(x, digits = 0)

Arguments

x  An H2OFrame object.
digits  Number of decimal places to round doubles/floats. Rounding to a negative number of decimal places is

See Also

Round for the base R implementation, round().
Examples

```r
## Not run:
library(h2o)
h2o.init()

f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/coxph_test/heart.csv"
heart <- h2o.importFile(f)

h2o.round(heart["age"], digits = 3)
## End(Not run)
```

h2o.rstrip
Strip set from right

Description

Return a copy of the target column with trailing characters removed. The set argument is a string specifying the set of characters to be removed. If omitted, the set argument defaults to removing whitespace.

Usage

```r
h2o.rstrip(x, set = " ")
```

Arguments

- `x` The column whose strings should be rstrip-ed.
- `set` string of characters to be removed

Examples

```r
## Not run:
library(h2o)
h2o.init()

string_to_rstrip <- as.h2o("1234567890")
rstrip_string <- h2o.rstrip(string_to_rstrip, "890") #Remove "890"

## End(Not run)
```

h2o.runif
Produce a Vector of Random Uniform Numbers

Description

Creates a vector of random uniform numbers equal in length to the length of the specified H2O dataset.

Usage

```r
h2o.runif(x, seed = -1)
```
Arguments

- **x**: An H2OFrame object.
- **seed**: A random seed used to generate draws from the uniform distribution.

Value

A vector of random, uniformly distributed numbers. The elements are between 0 and 1.

Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(path = prostate_path)
s <- h2o.runif(prostate)
summary(s)

prostate_train <- prostate[s <= 0.8,]
prostate_test <- prostate[s > 0.8,]
nrow(prostate_train) + nrow(prostate_test)
## End(Not run)
```

---

### h2o.saveGrid

**Saves an existing Grid of models into a given folder.**

**Description**

Returns a reference to the saved Grid.

**Usage**

```r
h2o.saveGrid(grid_directory, grid_id)
```

**Arguments**

- **grid_directory**: A character string containing the path to the folder for the grid to be saved to.
- **grid_id**: A character string with identification of the grid to be saved.

**Value**

Returns an object that is a subclass of `H2OGrid`.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
iris <- as.h2o(iris)
ntrees_opts = c(1, 5)
```
learn_rate_opts = c(0.1, 0.01)
size_of_hyper_space = length(ntrees_opts) * length(learn_rate_opts)

hyper_parameters = list(ntrees = ntrees_opts, learn_rate = learn_rate_opts)

baseline_grid <- h2o.grid(algorithm = "gbm",
                         grid_id = "gbm_grid_test",
x = 1:4,
y = 5,
training_frame = iris,
hyper_params = hyper_parameters)

grid_path <- h2o.saveGrid(grid_directory = tempdir(), grid_id = baseline_grid@grid_id)

h2o.removeAll()
grid <- h2o.loadGrid(grid_path)

### End(Not run)

---

### h2o.saveModel

Save an H2O Model Object to Disk

**Description**

Save an H2OModel to disk. (Note that ensemble binary models can be saved.)

**Usage**

h2o.saveModel(object, path = "", force = FALSE)

**Arguments**

- **object**: an H2OModel object.
- **path**: string indicating the directory the model will be written to.
- **force**: logical, indicates how to deal with files that already exist.

**Details**

In the case of existing files force = TRUE will overwrite the file. Otherwise, the operation will fail. The owner of the file saved is the user by which H2O cluster was executed.

**See Also**

h2o.loadModel for loading a model to H2O from disk

**Examples**

```r
## Not run:
# library(h2o)
# h2o.init()
# prostate <- h2o.importFile(path = paste("https://raw.github.com",
#     "h2oai/h2o-2/master/smalldata/logreg/prostate.csv", sep = "/"))
# prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
```
h2o.saveModelDetails

# training_frame = prostate, family = "binomial", alpha = 0.5)
# h2o.saveModel(object = prostate_glm, path = "/Users/UserName/Desktop", force = TRUE)
## End(Not run)

h2o.saveModelDetails  Save an H2O Model Details

Description
Save Model Details of an H2O Model in JSON Format

Usage
h2o.saveModelDetails(object, path = "", force = FALSE)

Arguments

object an H2OModel object.
path string indicating the directory the model details will be written to.
force logical, indicates how to deal with files that already exist.

Details
Model Details will download as a JSON file. In the case of existing files force = TRUE will overwrite the file. Otherwise, the operation will fail.

Examples
## Not run:
# library(h2o)
# h2o.init()
# prostate <- h2o.uploadFile(path = system.file("extdata", "prostate.csv", package = "h2o"))
# prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
# training_frame = prostate, family = "binomial", alpha = 0.5)
# h2o.saveModelDetails(object = prostate_glm, path = "/Users/UserName/Desktop", force = TRUE)
## End(Not run)

h2o.saveMojo  Deprecated - use h2o.save_mojo instead. Save an H2O Model Object as Mojo to Disk

Description
Save an MOJO (Model Object, Optimized) to disk.

Usage
h2o.saveMojo(object, path = "", force = FALSE)
Arguments

object an H2OModel object.
path string indicating the directory the model will be written to.
force logical, indicates how to deal with files that already exist.

Details

MOJO will download as a zip file. In the case of existing files force = TRUE will overwrite the file. Otherwise, the operation will fail.

See Also

h2o.saveModel for saving a model to disk as a binary object.

Examples

```r
## Not run:
# library(h2o)
# h2o.init()
# prostate <- h2o.uploadFile(path = system.file("extdata", "prostate.csv", package="h2o"))
# prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
# training_frame = prostate, family = "binomial", alpha = 0.5)
# h2o.saveMojo(object = prostate_glm, path = "/Users/UserName/Desktop", force = TRUE)
## End(Not run)
```

---

h2o.save_mojo

Save an H2O Model Object as Mojo to Disk

Description

Save an MOJO (Model Object, Optimized) to disk.

Usage

h2o.save_mojo(object, path = ",", force = FALSE)

Arguments

object an H2OModel object.
path string indicating the directory the model will be written to.
force logical, indicates how to deal with files that already exist.

Details

MOJO will download as a zip file. In the case of existing files force = TRUE will overwrite the file. Otherwise, the operation will fail.

See Also

h2o.saveModel for saving a model to disk as a binary object.
h2o.save_to_hive

Save contents of this data frame into a Hive table

Examples

```r
## Not run:
# library(h2o)
# h2o.init()
# prostate <- h2o.uploadFile(path = system.file("extdata", "prostate.csv", package="h2o"))
# prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
# training_frame = prostate, family = "binomial", alpha = 0.5)
# h2o.save_mojo(object = prostate_glm, path = "/Users/UserName/Desktop", force = TRUE)
## End(Not run)
```

Description

For example, h2o.save_to_hive(data_frame, "jdbc:hive2://host:10000/database", "table_name") h2o.save_to_hive(data_frame, "jdbc:hive2://host:10000/", "database.table_name", format = "parquet")

Usage

```r
h2o.save_to_hive(
  data,
  jdbc_url,
  table_name,
  format = "csv",
  table_path = NULL,
  tmp_path = NULL
)
```

Arguments

- `data`: A H2O Frame object to be saved.
- `jdbc_url`: Hive JDBC connection URL.
- `table_name`: Table name into which to store the data. The table must not exist as it will be created.
- `format`: Storage format of created Hive table. (default csv, can be csv or parquet)
- `table_path`: If specified, the table will be created as an external table and this is where the data
- `tmp_path`: Path where to store temporary data.
h2o.scale

Scaling and Centering of an H2OFrame

Description

Centers and/or scales the columns of an H2O dataset.

Usage

h2o.scale(x, center = TRUE, scale = TRUE, inplace = FALSE)

Arguments

x             An H2OFrame object.
center        either a logical value or numeric vector of length equal to the number of
c              columns of x.
scale         either a logical value or numeric vector of length equal to the number of
c              columns of x.
inplace       a logical values indicating whether directly overwrite original data (disabled
              by default). Exposed for backwards compatibility (prior versions of this func-
              tions were always doing an inplace update).

Examples

## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
summary(iris_hf)

# Scale and center all the numeric columns in iris data set
iris_scaled <- h2o.scale(iris_hf[, 1:4])

## End(Not run)

h2o.scoreHistory

Retrieve Model Score History

Description

Retrieve Model Score History

Usage

h2o.scoreHistory(object)

Arguments

object       An H2OModel object.
Examples

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
cars["economy_20mpg"] <- as.factor(cars["economy_20mpg"])
predictors <- c("displacement", "power", "weight", "acceleration", "year")
response <- "economy_20mpg"
cars_split <- h2o.splitFrame(data = cars, ratios = 0.8, seed = 1234)
train <- cars_split[[1]]
valid <- cars_split[[2]]
cars_gbm <- h2o.gbm(x = predictors, y = response,
                   training_frame = train,
                   validation_frame = valid,
                   seed = 1234)
h2o.scoreHistory(cars_gbm)
## End(Not run)
```

---

**h2o.scoreHistoryGAM**  
Retrieve GLM Model Score History buried in GAM model

**Description**

Retrieve GLM Model Score History buried in GAM model

**Usage**

```r
h2o.scoreHistoryGAM(object)
```

**Arguments**

- `object`  
  An H2OModel object.

---

**h2o.sd**  
Standard Deviation of a column of data.

**Description**

Obtain the standard deviation of a column of data.

**Usage**

```r
h2o.sd(x, na.rm = FALSE)
```

```r
sd(x, na.rm = FALSE)
```
Arguments

- **x**: An H2OFrame object.
- **na.rm**: logical. Should missing values be removed?

See Also

- `h2o.var` for variance, and `sd` for the base R implementation.

Examples

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
sd(prostate$AGE)

## End(Not run)
```

---

### h2o.sdev

Retrieves the standard deviations of principal components.

**Description**

Retrieve the standard deviations of principal components.

**Usage**

```r
h2o.sdev(object)
```

**Arguments**

- **object**: An H2ODimReductionModel object.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
predictors <- c("displacement", "power", "weight", "acceleration", "year")
cars_pca <- h2o.prcomp(cars, transform = "STANDARDIZE",
                      k = 3, x = predictors, seed = 12345)
h2o.sdev(cars_pca)

## End(Not run)
```
h2o.setLevels  Set Levels of H2O Factor Column

Description
Works on a single categorical vector. New domains must be aligned with the old domains. This call has SIDE EFFECTS and mutates the column in place (change of the levels will also affect all the frames that are referencing this column). If you want to make a copy of the column instead, use parameter in.place = FALSE.

Usage
h2o.setLevels(x, levels, in.place = TRUE)

Arguments
x A single categorical column.
levels A character vector specifying the new levels. The number of new levels must match the number of old levels.
in.place Indicates whether new domain will be directly applied to the column (in place change) or if a copy of the column will be created with the given domain levels.

Examples
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
new_levels <- c("setosa", "versicolor", "caroliniana")
iris_hf$Species <- h2o.setLevels(iris_hf$Species, new_levels, in.place = FALSE)
h2o.levels(iris_hf$Species)
## End(Not run)

h2o.setTimezone  Set the Time Zone on the H2O cluster

Description
Set the Time Zone on the H2O cluster

Usage
h2o.setTimezone(tz)

Arguments
tz The desired timezone.
h2o.show_progress

Examples

## Not run:
library(h2o)
h2o.init()

h2o.setTimezone("America/Juneau")
h2o.getTimezone()

## End(Not run)

h2o.set_s3_credentials

Creates a new Amazon S3 client internally with specified credentials.

Description

There are no validations done to the credentials. Incorrect credentials are thus revealed with first S3 import call.

Usage

h2o.set_s3_credentials(secretKeyId, secretAccessKey, sessionToken = NULL)

Arguments

secretKeyId Amazon S3 Secret Key ID (provided by Amazon)
secretAccessKey Amazon S3 Secret Access Key (provided by Amazon)
sessionToken Amazon Session Token (optional, only when using AWS Temporary Credentials)

h2o.show_progress Enable Progress Bar

Description

Enable Progress Bar

Usage

h2o.show_progress()
Examples

```r
## Not run:
library(h2o)
h2o.init()
h2o.no_progress()

iris <- h2o.importFile(f)
iris["class"] <- as.factor(iris["class"])
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
splits <- h2o.splitFrame(iris, ratios = 0.8, seed = 1234)
train <- splits[[1]]
valid <- splits[[2]]
h2o.show_progress()

iris_km <- h2o.kmeans(x = predictors,
                     training_frame = train,
                     validation_frame = valid,
                     k = 10, estimate_k = TRUE,
                     standardize = FALSE, seed = 1234)

## End(Not run)
```

---

### h2o.shutdown

#### Shut Down H2O Instance

**Description**

Shut down the specified instance. All data will be lost.

**Usage**

```r
h2o.shutdown(prompt = TRUE)
```

**Arguments**

- `prompt` A logical value indicating whether to prompt the user before shutting down the H2O server.

**Details**

This method checks if H2O is running at the specified IP address and port, and if it is, shuts down that H2O instance.

**WARNING**

All data, models, and other values stored on the server will be lost! Only call this function if you and all other clients connected to the H2O server are finished and have saved your work.

**Note**

Users must call `h2o.shutdown` explicitly in order to shut down the local H2O instance started by R. If R is closed before H2O, then an attempt will be made to automatically shut down H2O. This only applies to local instances started with `h2o.init`, not remote H2O servers.
See Also

h2o.init

Examples

# Don't run automatically to prevent accidentally shutting down a cluster
## Not run:
library(h2o)
h2o.init()
h2o.shutdown()
## End(Not run)

h2o.signif Round doubles/floats to the given number of significant digits.

Description

Round doubles/floats to the given number of significant digits.

Usage

h2o.signif(x, digits = 6)

signif(x, digits = 6)

Arguments

x An H2OFrame object.
digits Number of significant digits to round doubles/floats.

See Also

Round for the base R implementation, signif().

Examples

## Not run:
library(h2o)
h2o.init()

f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/coxph_test/heart.csv"
heart <- h2o.importFile(f)

h2o.signif(heart["age"], digits = 3)
## End(Not run)
h2o.sin

Compute the sine of x

Description
Compute the sine of x

Usage
h2o.sin(x)

Arguments
x An H2OFrame object.

See Also
Trig for the base R implementation, sin().

Examples
## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.sin(frame)
## End(Not run)

---

h2o.skewness

Skewness of a column

Description
Obtain the skewness of a column of a parsed H2O data object.

Usage
h2o.skewness(x, ..., na.rm = TRUE)

skewness.H2OFrame(x, ..., na.rm = TRUE)

Arguments
x An H2OFrame object.
...
na.rm A logical value indicating whether NA or missing values should be stripped before the computation.
Value

Returns a list containing the skewness for each column (NaN for non-numeric columns).

Examples

```r
## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.skewness(prostate$AGE)

## End(Not run)
```

---

**h2o.splitFrame**  
*Split an H2O Data Set*

**Description**

Split an existing H2O data set according to user-specified ratios. The number of subsets is always 1 more than the number of given ratios. Note that this does not give an exact split. H2O is designed to be efficient on big data using a probabilistic splitting method rather than an exact split. For example, when specifying a split of 0.75/0.25, H2O will produce a test/train split with an expected value of 0.75/0.25 rather than exactly 0.75/0.25. On small datasets, the sizes of the resulting splits will deviate from the expected value more than on big data, where they will be very close to exact.

**Usage**

```r
h2o.splitFrame(data, ratios = 0.75, destination_frames, seed = -1)
```

**Arguments**

- `data`: An H2OFrame object representing the data set to split.
- `ratios`: A numeric value or array indicating the ratio of total rows contained in each split. Must total up to less than 1.
- `destination_frames`: An array of frame IDs equal to the number of ratios specified plus one.
- `seed`: Random seed.

**Value**

Returns a list of split H2OFrame’s

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
iris_split <- h2o.splitFrame(iris_hf, ratios = c(0.2, 0.5))
head(iris_split[[1]])
```
h2o.sqrt

Compute the square root of x

Description

Compute the square root of x

Usage

h2o.sqrt(x)

Arguments

x
An H2OFrame object.

See Also

MathFun for the base R implementation, sqrt().

Examples

## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.sqrt(frame)
## End(Not run)

h2o.stackedEnsemble

Builds a Stacked Ensemble

Description

Build a stacked ensemble (aka. Super Learner) using the H2O base learning algorithms specified by the user.
Usage

```r
h2o.stackedEnsemble(
  x,  
  y, 
  training_frame, 
  model_id = NULL, 
  validation_frame = NULL, 
  blending_frame = NULL, 
  base_models = list(), 
  metalearner_algorithm = c("AUTO", "deeplearning", "drf", "gbm", "glm", "naivebayes", "xgboost"), 
  metalearner_nfolds = 0, 
  metalearner_fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"), 
  metalearner_fold_column = NULL, 
  metalearner_params = NULL, 
  max_runtime_secs = 0, 
  weights_column = NULL, 
  offset_column = NULL, 
  seed = -1, 
  score_training_samples = 10000, 
  keep_levelone_frame = FALSE, 
  export_checkpoints_dir = NULL
)
```

Arguments

- **x** (Optional). A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used. Training frame is used only to compute ensemble training metrics.

- **y** The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.

- **training_frame** Id of the training data frame.

- **model_id** Destination id for this model; auto-generated if not specified.

- **validation_frame** Id of the validation data frame.

- **blending_frame** Frame used to compute the predictions that serve as the training frame for the metalearner (triggers blending mode if provided)

- **base_models** List of models or grids (or their ids) to ensemble/stack together. Grids are expanded to individual models. If not using blending frame, then models must have been cross-validated using nfolds > 1, and folds must be identical across models.

- **metalearner_algorithm** Type of algorithm to use as the metalearner. Options include 'AUTO' (GLM with non negative weights; if validation_frame is present, a lambda search is performed), 'deeplearning' (Deep Learning with default parameters), 'drf' (Random Forest with default parameters), 'gbm' (GBM with default parameters), 'glm' (GLM with default parameters), 'naivebayes' (NaiveBayes with default parameters), or 'xgboost' (if available, XGBoost with default parameters). Must
be one of: "AUTO", "deeplearning", "drf", "gbm", "glm", "naivebayes", "xgboost". Defaults to AUTO.

**metalearnernfolds**
Number of folds for K-fold cross-validation of the metalearner algorithm (0 to disable or >= 2). Defaults to 0.

**metalearnernfoldassignment**
Cross-validation fold assignment scheme for metalearner cross-validation. Defaults to AUTO (which is currently set to Random). The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified".

**metalearnernfoldcolumn**
Column with cross-validation fold index assignment per observation for cross-validation of the metalearner.

**metalearnernparams**
Parameters for metalearner algorithm

**max_runtime_secs**
Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

**weights_column**
Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

**offset_column**
Offset column. This will be added to the combination of columns before applying the link function.

**seed**
Seed for random numbers; passed through to the metalearner algorithm. Defaults to -1 (time-based random number).

**score_training_samples**
Specify the number of training set samples for scoring. The value must be >= 0. To use all training samples, enter 0. Defaults to 10000.

**keep_levelone_frame**
Logical. Keep level one frame used for metalearner training. Defaults to FALSE.

**export_checkpoints_dir**
Automatically export generated models to this directory.

### Examples

```r
## Not run:
library(h2o)
h2o.init()

# Import a sample binary outcome train/test set
train <- h2o.importFile("https://s3.amazonaws.com/erin-data/higgs/higgs_train_10k.csv")
test <- h2o.importFile("https://s3.amazonaws.com/erin-data/higgs/higgs_test_5k.csv")

# Identify predictors and response
y <- "response"
x <- setdiff(names(train), y)
```
# For binary classification, response should be a factor
train[, y] <- as.factor(train[, y])
test[, y] <- as.factor(test[, y])

# Number of CV folds
nfolds <- 5

# Train & Cross-validate a GBM
my_gbm <- h2o.gbm(x = x,
                   y = y,
                   training_frame = train,
                   distribution = "bernoulli",
                   ntrees = 10,
                   max_depth = 3,
                   min_rows = 2,
                   learn_rate = 0.2,
                   nfolds = nfolds,
                   fold_assignment = "Modulo",
                   keep_cross_validation_predictions = TRUE,
                   seed = 1)

# Train & Cross-validate a RF
my_rf <- h2o.randomForest(x = x,
                           y = y,
                           training_frame = train,
                           ntrees = 50,
                           nfolds = nfolds,
                           fold_assignment = "Modulo",
                           keep_cross_validation_predictions = TRUE,
                           seed = 1)

# Train a stacked ensemble using the GBM and RF above
ensemble <- h2o.stackedEnsemble(x = x,
                                 y = y,
                                 training_frame = train,
                                 model_id = "my_ensemble_binomial",
                                 base_models = list(my_gbm, my_rf))

## End(Not run)

---

**h2o.startLogging**  
*Start Writing H2O R Logs*

**Description**

Begin logging H2O R POST commands and error responses to local disk. Used primarily for debugging purposes.

**Usage**

h2o.startLogging(file)

**Arguments**

- `file`  
a character string name for the file, automatically generated
h2o.std_coef_plot

See Also

h2o.stopLogging, h2o.clearLog, h2o.openLog

Examples

## Not run:
library(h2o)
h2o.init()
h2o.startLogging()
australia_path = system.file("extdata", "australia.csv", package = "h2o")
australia = h2o.importFile(path = australia_path)
h2o.stopLogging()

## End(Not run)

---

h2o.std_coef_plot

Plot Standardized Coefficient Magnitudes

Description

Plot a GLM model’s standardized coefficient magnitudes.

Usage

h2o.std_coef_plot(model, num_of_features = NULL)

Arguments

model
A trained generalized linear model

num_of_features
The number of features to be shown in the plot

See Also

h2o.varimp_plot for variable importances plot of random forest, GBM, deep learning.

Examples

## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
prostate_glm <- h2o.glm(y = "CAPSULE", x = c("AGE", "RACE", "PSA", "DCAPS"),
training_frame = prostate, family = "binomial",
nfolds = 0, alpha = 0.5, lambda_search = FALSE)
h2o.std_coef_plot(prostate_glm)

## End(Not run)
h2o.stopLogging  Stop Writing H2O R Logs

Description

Halt logging of H2O R POST commands and error responses to local disk. Used primarily for debugging purposes.

Usage

h2o.stopLogging()

See Also

h2o.startLogging, h2o.clearLog, h2o.openLog

Examples

## Not run:
library(h2o)
h2o.init()
h2o.startLogging()
australia_path = system.file("extdata", "australia.csv", package = "h2o")
australia = h2o.importFile(path = australia_path)
h2o.stopLogging()
## End(Not run)

h2o.str  Display the structure of an H2OFrame object

Description

Display the structure of an H2OFrame object

Usage

h2o.str(object, ..., cols = TRUE)

Arguments

object  An H2OFrame.

...  Further arguments to be passed from or to other methods.

cols  Print the per-column str for the H2OFrame
Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.str(frame, cols = FALSE)

## End(Not run)
```

### h2o.stringdist

*Compute element-wise string distances between two H2OFrames*

**Description**

Compute element-wise string distances between two H2OFrames. Both frames need to have the same shape (N x M) and only contain string/factor columns. Return a matrix (H2OFrame) of shape N x M.

**Usage**

```r
h2o.stringdist(
x,
y,
method = c("lv", "lcs", "qgram", "jaccard", "jw", "soundex"),
compare_empty = TRUE
)
```

**Arguments**

- **x**: An H2OFrame
- **y**: A comparison H2OFrame
- **method**: A string identifier indicating what string distance measure to use. Must be one of: "lv" - Levenshtein distance "lcs" - Longest common substring distance "qgram" - q-gram distance "jaccard" - Jaccard distance between q-gram profiles "jw" - Jaro, or Jaro-Winker distance "soundex" - Distance based on soundex encoding
- **compare_empty**: if set to FALSE, empty strings will be handled as NaNs

**Examples**

```r
## Not run:
h2o.init()
x <- as.h2o(c("Martha", "Dwayne", "Dixon"))
y <- as.character(as.h2o(c("Marhta", "Duane", "Dicksonx")))
h2o.stringdist(x, y, method = "jw")

## End(Not run)
```
**String Split**

**Description**

String Split

**Usage**

```r
h2o.strsplit(x, split)
```

**Arguments**

- `x`: The column whose strings must be split.
- `split`: The pattern to split on.

**Value**

An H2OFrame where each column is the outcome of the string split.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
string_to_split <- as.h2o("Split at every character.")
split_string <- h2o.strsplit(string_to_split, "")
## End(Not run)
```

---

**String Substitute**

**Description**

Creates a copy of the target column in which each string has the first occurrence of the regex pattern replaced with the replacement substring.

**Usage**

```r
h2o.sub(pattern, replacement, x, ignore.case = FALSE)
```

**Arguments**

- `pattern`: The pattern to replace.
- `replacement`: The replacement pattern.
- `x`: The column on which to operate.
- `ignore.case`: Case sensitive or not
## Examples

```r
## Not run:
library(h2o)
h2o.init()
string_to_sub <- as.h2o("r tutorial")
sub_string <- h2o.sub("r ", "H2O ", string_to_sub)

## End(Not run)
```

---

### Summary

**h2o.substring**

**Substring**

**Description**

Returns a copy of the target column that is a substring at the specified start and stop indices, inclusive. If the stop index is not specified, then the substring extends to the end of the original string. If start is longer than the number of characters in the original string, or is greater than stop, an empty string is returned. Negative start is coerced to 0.

**Usage**

```r
h2o.substring(x, start, stop = "[]")
h2o.substr(x, start, stop = "[]")
```

**Arguments**

- `x`: The column on which to operate.
- `start`: The index of the first element to be included in the substring.
- `stop`: Optional, The index of the last element to be included in the substring.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
string_to_substring <- as.h2o("1234567890")
substr <- h2o.substring(string_to_substring, 2)  # Get substring from second index onwards

## End(Not run)
```
h2o.summary

Summarizes the columns of an H2OFrame.

Description

A method for the summary generic. Summarizes the columns of an H2O data frame or subset of columns and rows using vector notation (e.g. dataset[row, col]).

h2o.sum

Compute the frame’s sum by-column (or by-row).

Description

Compute the frame’s sum by-column (or by-row).

Usage

h2o.sum(x, na.rm = FALSE, axis = 0, return_frame = FALSE)

Arguments

x
An H2OFrame object.

na.rm
logical. indicating whether missing values should be removed.

axis
An int that indicates whether to do down a column (0) or across a row (1). For row or column sums, the return_frame parameter must be TRUE.

return_frame
A boolean that indicates whether to return an H2O frame or one single aggregated value. Default is FALSE.

See Also

sum for the base R implementation.

Examples

## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.sum(frame["C1"], na.rm = TRUE, axis = 0, return_frame = TRUE)
## End(Not run)
h2o.summary

Usage

h2o.summary(object, factors = 6L, exact_quantiles = FALSE, ...)

## S3 method for class 'H2OFrame'
summary(object, factors, exact_quantiles, ...)

Arguments

object An H2OFrame object.
factors The number of factors to return in the summary. Default is the top 6.
exact_quantiles Compute exact quantiles or use approximation. Default is to use approximation.
... Further arguments passed to or from other methods.

Details

By default it uses approximated version of quantiles computation, however, user can modify this
behavior by setting up exact_quantiles argument to true.

Value

A table displaying the minimum, 1st quartile, median, mean, 3rd quartile and maximum for each
numeric column, and the levels and category counts of the levels in each categorical column.

Examples

## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(path = prostate_path)
summary(prostate)
summary(prostate$GLEASON)
summary(prostate[, 4:6])
summary(prostate, exact_quantiles = TRUE)

## End(Not run)

h2o.svd

Singular value decomposition of an H2O data frame using the power method

Description

Singular value decomposition of an H2O data frame using the power method
Usage

h2o.svd(
    training_frame,
    x,
    destination_key,
    model_id = NULL,
    validation_frame = NULL,
    ignore_const_cols = TRUE,
    score_each_iteration = FALSE,
    transform = c("NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE"),
    svd_method = c("GramSVD", "Power", "Randomized"),
    nv = 1,
    max_iterations = 1000,
    seed = -1,
    keep_u = TRUE,
    u_name = NULL,
    use_all_factor_levels = TRUE,
    max_runtime_secs = 0,
    export_checkpoints_dir = NULL
)

Arguments

training_frame  Id of the training data frame.
x               A vector containing the character names of the predictors in the model.
destination_key (Optional) The unique key assigned to the resulting model. Automatically generated if none is provided.
model_id        Destination id for this model; auto-generated if not specified.
validation_frame Id of the validation data frame.
ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.
score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.
transform       Transformation of training data Must be one of: "NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE". Defaults to NONE.
svd_method      Method for computing SVD (Caution: Randomized is currently experimental and unstable) Must be one of: "GramSVD", "Power", "Randomized". Defaults to GramSVD.
nv               Number of right singular vectors Defaults to 1.
max_iterations  Maximum iterations Defaults to 1000.
seed            Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).
keep_u          Logical. Save left singular vectors? Defaults to TRUE.
u_name          Frame key to save left singular vectors
**h2o.table**

`use_all_factor_levels`  
Logical. Whether first factor level is included in each categorical expansion  
Defaults to TRUE.

`max_runtime_secs`  
Maximum allowed runtime in seconds for model training. Use 0 to disable.  
Defaults to 0.

`export_checkpoints_dir`  
Automatically export generated models to this directory.

**Value**

an object of class `H2ODimReductionModel`.

**References**


**Examples**

```r
## Not run:
library(h2o)
h2o.init()
australia_path <- system.file("extdata", "australia.csv", package = "h2o")
australia <- h2o.uploadFile(path = australia_path)
h2o.svd(training_frame = australia, nv = 8)
## End(Not run)
```

**Description**

Uses the cross-classifying factors to build a table of counts at each combination of factor levels.

**Usage**

```r
h2o.table(x, y = NULL, dense = TRUE)
```

```r
table.H2OFrame(x, y = NULL, dense = TRUE)
```

**Arguments**

`x`  
An H2OFrame object with at most two columns.

`y`  
An H2OFrame similar to `x`, or `NULL`.

`dense`  
A logical for dense representation, which lists only non-zero counts, 1 combination per row. Set to `FALSE` to expand counts across all combinations.

**Value**

Returns a tabulated H2OFrame object.
Examples

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
summary(prostate)

# Counts of the ages of all patients
head(h2o.table(prostate[, 3]))
h2o.table(prostate[, 3])

# Two-way table of ages (rows) and race (cols) of all patients
head(h2o.table(prostate[, c(3, 4)]))
h2o.table(prostate[, c(3, 4)])

## End(Not run)
```

---

**h2o.tabulate**

Tabulation between Two Columns of an H2OFrame

**Description**

Simple Co-Occurrence based tabulation of X vs Y, where X and Y are two Vecs in a given dataset. Uses histogram of given resolution in X and Y. Handles numerical/categorical data and missing values. Supports observation weights.

**Usage**

```r
h2o.tabulate(data, x, y, weights_column = NULL, nbins_x = 50, nbins_y = 50)
```

**Arguments**

- `data`:
  - An H2OFrame object.
- `x`:
  - predictor column
- `y`:
  - response column
- `weights_column`:
  - (optional) observation weights column
- `nbins_x`:
  - number of bins for predictor column
- `nbins_y`:
  - number of bins for response column

**Value**

Returns two TwoDimTables of 3 columns each:
- `count_table`: X Y counts
- `response_table`: X meanY counts
Examples

```r
## Not run:
library(h2o)
h2o.init()
df <- as.h2o(iris)
tab <- h2o.tabulate(data = df, x = "Sepal.Length", y = "Petal.Width",
                   weights_column = NULL, nbins_x = 10, nbins_y = 10)
plot(tab)
## End(Not run)
```

---

**h2o.tan**

*Compute the tangent of x*

Description

Compute the tangent of x

Usage

```r
h2o.tan(x)
```

Arguments

- `x`  
  An H2OFrame object.

See Also

- `Trig` for the base R implementation, `tan()`.

Examples

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
                          categorical_fraction = 0.0,
                          missing_fraction = 0.7,
                          seed = 123)

h2o.tan(frame)
## End(Not run)
```
h2o.tanh

*Compute the hyperbolic tangent of x*

**Description**

Compute the hyperbolic tangent of x

**Usage**

h2o.tanh(x)

**Arguments**

- **x**
  
  An H2OFrame object.

**See Also**

Hyperbolic for the base R implementation, tanh().

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.tanh(frame)
## End(Not run)
```

h2o.targetencoder

*Transformation of a categorical variable with a mean value of the target variable*

**Description**

Transformation of a categorical variable with a mean value of the target variable

**Usage**

h2o.targetencoder(
  x,  
  y,  
  training_frame,  
  model_id = NULL,  
  fold_column = NULL,  
  blending = FALSE,  
  k = 10,  
)
f = 20,
data_leakage_handling = c("None", "KFold", "LeaveOneOut"),
noise_level = 0.01,
seed = -1
)

Arguments

x (Optional) A vector containing the names or indices of the predictor variables to
use in building the model. If x is missing, then all columns except y are used.

y The name or column index of the response variable in the data. The response
must be either a numeric or a categorical/factor variable. If the response is
numeric, then a regression model will be trained, otherwise it will train a classi-
fication model.

training_frame Id of the training data frame.
model_id Destination id for this model; auto-generated if not specified.
fold_column Column with cross-validation fold index assignment per observation.
blending Logical. Blending enabled/disabled Defaults to FALSE.
k Inflection point. Used for blending (if enabled). Blending is to be enabled sepa-
rately using the 'blending' parameter. Defaults to 10.
f Smoothing. Used for blending (if enabled). Blending is to be enabled separately
using the 'blending' parameter. Defaults to 20.
data_leakage_handling Data leakage handling strategy. Must be one of: "None", "KFold", "LeaveOne-
Out". Defaults to None.
noise_level Noise level Defaults to 0.01.
seed Seed for random numbers (affects certain parts of the algo that are stochastic
and those might or might not be enabled by default). Defaults to -1 (time-based
random number).

Examples

```r
# Not run:
library(h2o)
h2o.init()
#Import the titanic dataset
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/gbm_test/titanic.csv"
titanic <- h2o.importFile(f)

# Set response as a factor
response <- "survived"
titanic[response] <- as.factor(titanic[response])

# Split the dataset into train and test
splits <- h2o.splitFrame(data = titanic, ratios = .8, seed = 1234)
train <- splits[[1]]
test <- splits[[2]]

# Choose which columns to encode
encode_columns <- c("home.dest", "cabin", "embarked")

# Train a TE model
```

te_model <- h2o.targetencoder(x = encode_columns, 
    y = response, 
    training_frame = train, 
    fold_column = "pclass", 
    data_leakage_handling = "KFold")

# New target encoded train and test sets 
train_te <- h2o.transform(te_model, train) 
test_te <- h2o.transform(te_model, test)

## End(Not run)

### h2o.target_encode_apply

**Apply Target Encoding Map to Frame**

**Description**


**Usage**

h2o.target_encode_apply(
    data, 
    x, 
    y, 
    target_encode_map, 
    holdout_type, 
    fold_column = NULL, 
    blended_avg = TRUE, 
    noise_level = NULL, 
    seed = -1 
)

**Arguments**

- **data**: An H2OFrame object with which to apply the target encoding map.
- **x**: A list containing the names or indices of the variables to encode. A target encoding column will be created for each element in the list. Items in the list can be multiple columns. For example, if `x = list(c("A"), c("B", "C"))`, then the resulting frame will have a target encoding column for A and a target encoding column for B & C (in this case, we group by two columns).
- **y**: The name or column index of the response variable in the data. The response variable can be either numeric or binary.
- **target_encode_map**: A list of H2OFrame objects that is the results of the h2o.target_encode_create function.
- **holdout_type**: The holdout type used. Must be one of: "LeaveOneOut", "KFold", "None".
**h2o.target_encode_create**

Create Target Encoding Map

---

**Description**

Creates a target encoding map based on group-by columns (`x`) and a numeric or binary target column (`y`). Computing target encoding for high cardinality categorical columns can improve performance of supervised learning models. A Target Encoding tutorial is available here: https://github.com/h2oai/h2o-tutorials/blob/master/best-practices/categorical-predictors/target_encoding.md.

**fold_column** (Optional) The name or column index of the fold column in the data. Defaults to NULL (no 'fold_column'). Only required if 'holdout_type' = "KFold".

**blended_avg** Logical. (Optional) Whether to perform blended average.

**noise_level** (Optional) The amount of random noise added to the target encoding. This helps prevent overfitting. Defaults to 0.01 * range of y.

**seed** (Optional) A random seed used to generate draws from the uniform distribution for random noise. Defaults to -1.

**Value**

Returns an H2OFrame object containing the target encoding per record.

**See Also**

h2o.target_encode_create for creating the target encoding map

**Examples**

```r
## Not run:
library(h2o)
h2o.init()

data <- h2o.importFile(path = "https://s3.amazonaws.com/h2o-public-test-data/smalldata/demos/bank-additional-full.csv")
splits <- h2o.splitFrame(data, seed = 1234)
train <- splits[[1]]
test <- splits[[2]]
mapping <- h2o.target_encode_create(data = train, x = list(c("job"), c("job", "marital")),
y = "age")

# Apply mapping to the training dataset
train_encode <- h2o.target_encode_apply(data = train, x = list(c("job"), c("job", "marital")),
y = "age", mapping, holdout_type = "LeaveOneOut")

# Apply mapping to a test dataset
test_encode <- h2o.target_encode_apply(data = test, x = list(c("job"), c("job", "marital")),
y = "age", target_encode_map = mapping,
holdout_type = "None")

## End(Not run)
```
Usage

```r
h2o.target_encode_create(data, x, y, fold_column = NULL)
```

Arguments

data: An H2OFrame object with which to create the target encoding map.

x: A list containing the names or indices of the variables to encode. A target encoding map will be created for each element in the list. Items in the list can be multiple columns. For example, if `x = list(c("A"), c("B", "C"))`, then there will be one mapping frame for A and one mapping frame for B & C (in this case, we group by two columns).

y: The name or column index of the response variable in the data. The response variable can be either numeric or binary.

fold_column: (Optional) The name or column index of the fold column in the data. Defaults to NULL (no 'fold_column').

Value

Returns a list of H2OFrame objects containing the target encoding mapping for each column in 'x'.

See Also

`h2o.target_encode_apply` for applying the target encoding mapping to a frame.

Examples

```r
## Not run:
library(h2o)
h2o.init()

# Get Target Encoding Map on bank-additional-full data with numeric response
data <- h2o.importFile(
  path = "https://s3.amazonaws.com/h2o-public-test-data/smalldata/demos/bank-additional-full.csv")
mapping_age <- h2o.target_encode_create(data = data, x = list(c("job"), c("job", "marital")),
  y = "age")
head(mapping_age)

# Get Target Encoding Map on bank-additional-full data with binary response
mapping_y <- h2o.target_encode_create(data = data, x = list(c("job"), c("job", "marital")),
  y = "y")
head(mapping_y)

## End(Not run)
```

---

`h2o.target_encode_fit`  
*Deprecated API. Please use `h2o.targetencoder` model instead.*

Description

Create Target Encoding Map
Usage

h2o.target_encode_fit(frame, x, y, fold_column = NULL)

Arguments

- **frame**: An H2OFrame object with which to create the target encoding map.
- **x**: List of categorical column names or indices that we want apply target encoding to. Case when item in the list is a list of multiple columns itself is not supported for now.
- **y**: The name or column index of the response variable in the frame.
- **fold_column**: (Optional) The name or column index of the fold column in the frame.

Details

This is an API for a new target encoding implemented in JAVA. Creates a target encoding map based on group-by columns ('x') and binary target column ('y'). Computing target encoding for high cardinality categorical columns can improve performance of supervised learning models.

Value

Returns an object containing the target encoding mapping for each column in 'x'.

See Also

h2o.target_encode_transform for applying the target encoding mapping to a frame.

---

**Deprecated API. Please use h2o.targetencoder model instead.**

Transform Frame by Target Encoding Map

Description

This is an API for a new target encoding implemented in JAVA. Applies a target encoding map to an H2OFrame object. Computing target encoding for high cardinality categorical columns can improve performance of supervised learning models.

Usage

h2o.target_encode_transform(
    frame,
    x,
    y,
    target_encode_map,
    holdout_type,
    fold_column = NULL,
    blended_avg = TRUE,
    inflection_point = 10,
    smoothing = 20,
h2o.target_encode_transform

noise = -1,
seed = -1
)

Arguments

frame
An H2OFrame object with which to apply the target encoding map.

x
List of categorical column names or indices that we want to apply target encoding to. Case when item in the list is a list of multiple columns itself is not supported for now.

y
The name or column index of the response variable in the frame.

target_encode_map
An object that is a result of the calling h2o.target_encode_fit function.

holdout_type
Supported options:
1) "kfold" - encodings for a fold are generated based on out-of-fold data.
2) "loo" - leave one out. Current row’s response value is subtracted from the pre-calculated per-level frequencies.
3) "none" - we do not holdout anything. Using whole frame for training

fold_column
(Optional) The name or column index of the fold column in the frame.

blended_avg
Logical. (Optional) Whether to perform blended average. Defaults to TRUE

inflection_point
(Optional) Parameter for blending. Used to calculate 'lambda'. Determines half of the minimal sample size for which we completely trust the estimate based on the sample in the particular level of categorical variable. Default value is 10.

smoothing
(Optional) Parameter for blending. Used to calculate ‘lambda’. Controls the rate of transition between the particular level’s posterior probability and the prior probability. For smoothing values approaching infinity it becomes a hard threshold between the posterior and the prior probability. Default value is 20.

noise
(Optional) The amount of random noise added to the target encoding. This helps prevent overfitting. Defaults to 0.01 * range of y.

seed
(Optional) A random seed used to generate draws from the uniform distribution for random noise. Defaults to -1.

Value

Returns an H2OFrame object containing the target encoding per record.

See Also

h2o.target_encode_fit for creating the target encoding map
**h2o.tf_idf**

*Computes TF-IDF values for each word in given documents.*

**Description**

Computes TF-IDF values for each word in given documents.

**Usage**

```r
h2o.tf_idf(
  frame,
  document_id_col,
  text_col,
  preprocess = TRUE,
  case_sensitive = TRUE
)
```

**Arguments**

- `frame`: documents or words frame for which TF-IDF values should be computed.
- `document_id_col`: index or name of a column containing document IDs.
- `text_col`: index or name of a column containing documents if `preprocess = TRUE` or words if `preprocess = FALSE`.
- `preprocess`: whether input text data should be pre-processed. Defaults to `TRUE`.
- `case_sensitive`: whether input data should be treated as case sensitive. Defaults to `TRUE`.

**Value**

resulting frame with TF-IDF values. Row format: documentID, word, TF, IDF, TF-IDF

---

**h2o.toFrame**

*Convert a word2vec model into an H2OFrame*

**Description**

Converts a given word2vec model into an H2OFrame. The frame represents learned word embeddings.

**Usage**

```r
h2o.toFrame(word2vec)
```

**Arguments**

- `word2vec`: A word2vec model.
Examples

```r
# Build a dummy word2vec model
data <- as.character(as.h2o(c("a", "b", "a")))
w2v_model <- h2o.word2vec(data, sent_sample_rate = 0, min_word_freq = 0, epochs = 1, vec_size = 2)

# Transform words to vectors and return average vector for each sentence
h2o.toFrame(w2v_model) # -> Frame made of 2 rows and 2 columns
```

h2o.tokenize

Tokenize String

Description
h2o.tokenize is similar to h2o.strsplit, the difference between them is that h2o.tokenize will store the tokenized text into a single column making it easier for additional processing (filtering stop words, word2vec algo, ...).

Usage

```r
h2o.tokenize(x, split)
```

Arguments

- `x`: The column or columns whose strings to tokenize.
- `split`: The regular expression to split on.

Value
An H2OFrame with a single column representing the tokenized Strings. Original rows of the input DF are separated by NA.

Examples

```r
# Not run:
library(h2o)
h2o.init()

string_to_tokenize <- as.h2o("Split at every character and tokenize.")
tokenize_string <- h2o.tokenize(as.character(string_to_tokenize), "")
```

## Not run:
h2o.init()

# Build a dummy word2vec model
data <- as.character(as.h2o(c("a", "b", "a")))
w2v_model <- h2o.word2vec(data, sent_sample_rate = 0, min_word_freq = 0, epochs = 1, vec_size = 2)

# Transform words to vectors and return average vector for each sentence
h2o.toFrame(w2v_model) # -> Frame made of 2 rows and 2 columns

## End(Not run)
h2o.tolower  

Convert strings to lowercase

Description
Convert strings to lowercase

Usage
h2o.tolower(x)

Arguments
x  An H2OFrame object whose strings should be lower cased

Value
An H2OFrame with all entries in lowercase format

Examples
## Not run:
library(h2o)
h2o.init()
string_to_lower <- as.h2o("ABCDE")
lowered_string <- h2o.tolower(string_to_lower)
## End(Not run)

h2o.topN  

H2O topN

Description
Extract the top N percent of values of a column and return it in a H2OFrame.

Usage
h2o.topN(x, column, nPercent)

Arguments
x  an H2OFrame

column  is a column name or column index to grab the top N percent value from

nPercent  is a top percentage value to grab

Value
An H2OFrame with 2 columns. The first column is the original row indices, second column contains the topN values
Examples

```r
## Not run:
library(h2o)
h2o.init()

dataset <- h2o.importFile(f)
frameNames <- names(dataset)
nPercent <- c(1, 2, 3, 4)
nP <- nPercent[sample(1:length(nPercent), 1, replace = FALSE)]
colIndex <- sample(1:length(frameNames), 1, replace = FALSE)
h2o.topN(dataset, frameNames[colIndex], nP)

## End(Not run)
```

h2o.totss

Get the total sum of squares.

Description

If "train", "valid", and "xval" parameters are FALSE (default), then the training totss value is returned. If more than one parameter is set to TRUE, then a named vector of totss' are returned, where the names are "train", "valid" or "xval".

Usage

```r
h2o.totss(object, train = FALSE, valid = FALSE, xval = FALSE)
```

Arguments

- `object`: An `H2OClusteringModel` object.
- `train`: Retrieve the training total sum of squares
- `valid`: Retrieve the validation total sum of squares
- `xval`: Retrieve the cross-validation total sum of squares

Examples

```r
## Not run:
library(h2o)
h2o.init()

predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.totss(km, train = TRUE)

## End(Not run)
```
h2o.tot_withinss

Get the total within cluster sum of squares.

Description

If "train", "valid", and "xval" parameters are FALSE (default), then the training tot_withinss value is returned. If more than one parameter is set to TRUE, then a named vector of tot_withinss' are returned, where the names are "train", "valid" or "xval".

Usage

h2o.tot_withinss(object, train = FALSE, valid = FALSE, xval = FALSE)

Arguments

object An H2OClusteringModel object.
train Retrieve the training total within cluster sum of squares
valid Retrieve the validation total within cluster sum of squares
xval Retrieve the cross-validation total within cluster sum of squares

Examples

## Not run:
library(h2o)
h2o.init()
predictors <- c("sepal_len", "sepal_wid", "petal_len", "petal_wid")
km <- h2o.kmeans(x = predictors, training_frame = fr, k = 3, nfolds = 3)
h2o.tot_withinss(km, train = TRUE)
## End(Not run)

h2o.toupper

Convert strings to uppercase

Description

Convert strings to uppercase

Usage

h2o.toupper(x)

Arguments

x An H2OFrame object whose strings should be upper cased

Value

An H2OFrame with all entries in uppercase format
## Description

Provides a set of functions to train a group of models on different segments (subpopulations) of the training set.

## Usage

```r
h2o.train_segments(
  algorithm, 
  segment_columns, 
  segment_models_id, 
  parallelism = 1, 
  ...
)
```

## Arguments

- **algorithm**
  - Name of algorithm to use in training segment models (gbm, randomForest, kmeans, glm, deepLearning, naivebayes, psvm, xgboost, pca, svd, targetencoder, aggregator, word2vec, coxph, isolationforest, kmeans, stackedensemble, glrm, gam).

- **segment_columns**
  - A list of columns to segment-by. H2O will group the training (and validation) dataset by the segment-by columns and train a separate model for each segment (group of rows).

- **segment_models_id**
  - Identifier for the returned collection of Segment Models. If not specified it will be automatically generated.

- **parallelism**
  - Level of parallelism of bulk model building, it is the maximum number of models each H2O node will be building in parallel, defaults to 1.

- **...**
  - Use to pass along training_frame parameter, x, y, and all non-default parameter values to the algorithm Look at the specific algorithm - h2o.gbm, h2o.glm, h2o.kmeans, h2o.deepLearning - for available parameters.

## Details

Start Segmented-Data bulk Model Training for a given algorithm and parameters.
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
models <- h2o.train_segments(algorithm = "gbm",
    segment_columns = "Species",
    x = c(1:3), y = 4,
    training_frame = iris_hf,
    ntrees = 5,
    max_depth = 4)
as.data.frame(models)
## End(Not run)

---

### h2o.transform

Use H2O Transformation model and apply the underlying transformation

---

**Description**

Use H2O Transformation model and apply the underlying transformation

**Usage**

```r
h2o.transform(model, ...)
```

**Arguments**

- `model` A trained model representing the transformation strategy
- `...` Transformation model-specific parameters

**Value**

Returns an H2OFrame object with data transformed.

---

### h2o.transform,H2OTargetEncoderModel-method

Applies target encoding to a given dataset

---

**Description**

Applies target encoding to a given dataset
**Usage**

```r
## S4 method for signature 'H2OTargetEncoderModel'
h2o.transform(
  model,
  data,
  data_leakage_handling = NULL,
  use_blending = NULL,
  inflection_point = -1,
  smoothing = -1,
  noise = -1,
  seed = -1
)
```

**Arguments**

- `model`: A trained model representing the transformation strategy
- `data`: An H2OFrame with data to be transformed
- `data_leakage_handling`: Handling of data leakage. Available options are: ```"None", "LeaveOneOut", "KFold"``` . Defaults to ```"None"```.
- `use_blending`: Use blending during the transformation. Respects model settings when not set.
- `inflection_point`: Blending parameter. Only effective when blending is enabled. By default, model settings are respected, if not overridden by this setting.
- `smoothing`: Blending parameter. Only effective when blending is enabled. By default, model settings are respected, if not overridden by this setting.
- `noise`: An amount of random noise added to the encoding. This helps prevent overfitting. Defaults to 0.01 * range of response.
- `seed`: A random seed used to generate draws from the uniform distribution for random noise. Defaults to -1.

**Value**

Returns an H2OFrame object with data transformed.

---

h2o.transform,H2OWordEmbeddingModel-method

Transform words (or sequences of words) to vectors using a word2vec model.

**Description**

Transform words (or sequences of words) to vectors using a word2vec model.

**Usage**

```r
## S4 method for signature 'H2OWordEmbeddingModel'
h2o.transform(model, words, aggregate_method = c("NONE", "AVERAGE"))
```
Arguments

model A word2vec model.
words An H2OFrame made of a single column containing source words.
aggregate_method Specifies how to aggregate sequences of words. If method is ‘NONE’ then no aggregation is performed and each input word is mapped to a single word-vector. If method is ‘AVERAGE’ then input is treated as sequences of words delimited by NA. Each word of a sequences is internally mapped to a vector and vectors belonging to the same sentence are averaged and returned in the result.

Examples

```r
## Not run:
h2o.init()

# Build a simple word2vec model
data <- as.character(as.h2o(c("a", "b", "a")))
w2v_model <- h2o.word2vec(data, sent_sample_rate = 0, min_word_freq = 0, epochs = 1, vec_size = 2)

# Transform words to vectors without aggregation
sentences <- as.character(as.h2o(c("b", "c", "a", NA, "b")))
h2o.transform(w2v_model, sentences) # -> 5 rows total, 2 rows NA ("c" is not in the vocabulary)

# Transform words to vectors and return average vector for each sentence
h2o.transform(w2v_model, sentences, aggregate_method = "AVERAGE") # -> 2 rows

## End(Not run)
```

h2o.transform_word2vec

Transform words (or sequences of words) to vectors using a word2vec model.

Description

Transform words (or sequences of words) to vectors using a word2vec model.

Usage

```r
h2o.transform_word2vec(
  word2vec,
  words,
  aggregate_method = c("NONE", "AVERAGE")
)
```

Arguments

word2vec A word2vec model.
words An H2OFrame made of a single column containing source words.
aggregate_method

Specifies how to aggregate sequences of words. If method is ‘NONE’ then no aggregation is performed and each input word is mapped to a single word-vector. If method is ‘AVERAGE’ then input is treated as sequences of words delimited by NA. Each word of a sequences is internally mapped to a vector and vectors belonging to the same sentence are averaged and returned in the result.

Examples

```r
## Not run:
h2o.init()

# Build a dummy word2vec model
data <- as.character(as.h2o(c("a", "b", "a")))
w2v_model <- h2o.word2vec(data, sent_sample_rate = 0, min_word_freq = 0, epochs = 1, vec_size = 2)

# Transform words to vectors without aggregation
sentences <- as.character(as.h2o(c("b", "c", "a", NA, "b")))
h2o.transform(w2v_model, sentences) # -> 5 rows total, 2 rows NA ("c" is not in the vocabulary)

# Transform words to vectors and return average vector for each sentence
h2o.transform(w2v_model, sentences, aggregate_method = "AVERAGE") # -> 2 rows

## End(Not run)
```

---

<h2o.trim Trim Space</h2>

**Description**

Trim Space

**Usage**

```r
h2o.trim(x)
```

**Arguments**

- `x` The column whose strings should be trimmed.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
string_to_trim <- as.h2o("r tutorial")
trim_string <- h2o.trim(string_to_trim)

## End(Not run)
```
h2o.trunc

Truncate values in x toward 0

Description

trunc takes a single numeric argument x and returns a numeric vector containing the integers formed by truncating the values in x toward 0.

Usage

h2o.trunc(x)

Arguments

x

An H2OFrame object.

See Also

Round for the base R implementation, trunc().

Examples

## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
h2o.trunc(frame["C1"])
## End(Not run)

h2o.unique

H2O Unique

Description

Extract unique values in the column.

Usage

h2o.unique(x, include_nas = FALSE)

Arguments

x

An H2OFrame object.

include_nas

If set to TRUE, NAs are included. FALSE (turned off) by default.
h2o.upload_model

Upload a binary model from the provided local path to the H2O cluster. (H2O model can be saved in a binary form either by saveModel() or by download_model() function.)

Description

Upload a binary model from the provided local path to the H2O cluster. (H2O model can be saved in a binary form either by saveModel() or by download_model() function.)

Usage

h2o.upload_model(path)

Arguments

path A path on the machine this python session is currently connected to, specifying the location of the model to upload.

Value

Returns a new H2OModel object.

See Also

h2o.saveModel, h2o.download_model

Examples

## Not run:
library(h2o)
h2o.init()

iris <- h2o.importFile(f)
h2o.unique(iris["class"])

## End(Not run)
h2o.upload_mojo

Imports a MOJO from a local filesystem, creating a Generic model with it.

Description

Usage example:        mojo_model <- h2o.upload_mojo(model_file_path = "/path/to/local/mojo.zip")
predictions <- h2o.predict(mojo_model, dataset)

Usage

h2o.upload_mojo(mojo_local_file_path)

Arguments

mojo_local_file_path
  Filesystem path to the model imported

Value

Returns H2O Generic Model embedding given MOJO model

Examples

```r
## Not run:

# Import default Iris dataset as H2O frame
data <- as.h2o(iris)

# Train a very simple GBM model
original_model <- h2o.gbm(x = features, y = "Species", training_frame = data)

# Download the trained GBM model as MOJO (temporary directory used in this example)
mojo_original_name <- h2o.download_mojo(model = original_model, path = tempdir())
mojo_original_path <- paste0(tempdir(), "/", mojo_original_name)

# Upload the MOJO from local filesystem and obtain a Generic model
mojo_model <- h2o.upload_mojo(mojo_original_path)

# Perform scoring with the generic model
predictions <- h2o.predict(mojo_model, data)

## End(Not run)
```
**h2o.var**

Variance of a column or covariance of columns.

**Description**

Compute the variance or covariance matrix of one or two H2OFrames.

**Usage**

```r
h2o.var(x, y = NULL, na.rm = FALSE, use)
var(x, y = NULL, na.rm = FALSE, use)
```

**Arguments**

- `x` An H2OFrame object.
- `y` NULL (default) or an H2OFrame. The default is equivalent to `y = x`.
- `na.rm` logical. Should missing values be removed?
- `use` An optional character string indicating how to handle missing values. This must be one of the following: "everything" - outputs NaNs whenever one of its contributing observations is missing "all.obs" - presence of missing observations will throw an error "complete.obs" - discards missing values along with all observations in their rows so that only complete observations are used.

**See Also**

cor for the base R implementation, var(). h2o.sd for standard deviation.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
var(prostate$AGE)
## End(Not run)
```

---

**h2o.varimp**

Retrieve the variable importance.

**Description**

Retrieve the variable importance.

**Usage**

```r
h2o.varimp(object)
```
**h2o.varimp_plot**

**Arguments**

object  An H2OModel object.

**Examples**

## Not run:
library(h2o)
h2o.init()

f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/prostate/prostate_complete.csv.zip"
pros <- h2o.importFile(f)
response <- "GLEASON"
predictors <- c("ID", "AGE", "CAPSULE", "DCAPS", "PSA", "VOL", "DPROS")
model <- h2o.glm(x = predictors, y = response, training_frame = pros)
h2o.varimp(model)

## End(Not run)

---

**h2o.varimp_plot**  
Plot Variable Importances

**Description**

Plot Variable Importances

**Usage**

h2o.varimp_plot(model, num_of_features = NULL)

**Arguments**

model  A trained model (accepts a trained random forest, GBM, or deep learning model, will use h2o.std_coef_plot for a trained GLM

num_of_features  The number of features shown in the plot (default is 10 or all if less than 10).

**See Also**

h2o.std_coef_plot for GLM.

**Examples**

## Not run:
library(h2o)
h2o.init()

prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.importFile(prostate_path)
prostate[, 2] <- as.factor(prostate[, 2])
model <- h2o.gbm(x = 3:9, y = 2, training_frame = prostate, distribution = "bernoulli")
h2o.varimp_plot(model)

# for deep learning set the variable_importance parameter to TRUE
iris_hf <- as.h2o(iris)
iris_dl <- h2o.deeplearning(x = 1:4, y = 5, training_frame = iris_hf, variable_importances = TRUE)
h2o.varimp_plot(iris_dl)

## End(Not run)

h2o.varsplits

Retrieve per-variable split information for a given Isolation Forest model. Output will include:
- **count** - The number of times a variable was used to make a split.
- **aggregated_split_ratios** - The split ratio is defined as \( \frac{\text{abs}(\#\text{left_observations} - \#\text{right_observations})}{\#\text{before_split}} \). Even splits (\#\text{left_observations} approx the same as \#\text{right_observations}) contribute less to the total aggregated split ratio value for the given feature; highly imbalanced splits (eg. \#\text{left_observations} » \#\text{right_observations}) contribute more.
- **aggregated_split_depths** - The sum of all depths of a variable used to make a split. (If a variable is used on level \text{N} of a tree, then it contributes with \text{N} to the total aggregate.)

**Description**

Retrieve per-variable split information for a given Isolation Forest model. Output will include:
- **count** - The number of times a variable was used to make a split.
- **aggregated_split_ratios** - The split ratio is defined as \( \frac{\text{abs}(\#\text{left_observations} - \#\text{right_observations})}{\#\text{before_split}} \). Even splits (\#\text{left_observations} approx the same as \#\text{right_observations}) contribute less to the total aggregated split ratio value for the given feature; highly imbalanced splits (eg. \#\text{left_observations} » \#\text{right_observations}) contribute more.
- **aggregated_split_depths** - The sum of all depths of a variable used to make a split. (If a variable is used on level \text{N} of a tree, then it contributes with \text{N} to the total aggregate.)

**Usage**

h2o.varsplits(object)

**Arguments**

- **object**
  - An Isolation Forest model represented by H2OModel object.

---

h2o.week

Convert Milliseconds to Week of Week Year in H2O Datasets

**Description**

Converts the entries of an H2OFrame object from milliseconds to weeks of the week year (starting from 1).
Usage

h2o.week(x)

week(x)

## S3 method for class 'H2OFrame'
week(x)

Arguments

x                      An H2OFrame object.

Value

An H2OFrame object containing the entries of x converted to weeks of the week year.

See Also

h2o.month

Examples

## Not run:
library(h2o)
h2o.init()

hdf <- h2o.importFile(f)
h2o.week(hdf["ds9"])

## End(Not run)

---

**h2o.weights**

*Retrieve the respective weight matrix*

Description

Retrieve the respective weight matrix

Usage

h2o.weights(object, matrix_id = 1)

Arguments

object              An H2OModel or H2OModelMetrics
matrix_id           An integer, ranging from 1 to number of layers + 1, that specifies the weight matrix to return.
Examples

```r
## Not run:
library(h2o)
h2o.init()

census <- h2o.importFile(f)
census[, 1] <- as.factor(census[, 1])
dl_model <- h2o.deeplearning(x = c(1:3), y = 4, training_frame = census,
  hidden = c(17, 191),
  epochs = 1,
  balance_classes = FALSE,
  export_weights_and_biases = TRUE)
h2o.weights(dl_model, matrix_id = 1)

## End(Not run)
```

---

### h2o.which

**Which indices are TRUE?**

#### Description

Give the TRUE indices of a logical object, allowing for array indices.

#### Usage

```r
h2o.which(x)
```

#### Arguments

- `x`  
  An H2OFrame object.

#### Value

Returns an H2OFrame object.

#### See Also

* `which` for the base R method.

#### Examples

```r
## Not run:
library(h2o)
h2o.init()

iris_hf <- as.h2o(iris)
h2o.which(iris_hf[, 1] == 4.4)

## End(Not run)
```
get which indice contains the max value?

Description
Get the index of the max value in a column or row

Usage
h2o.which_max(x, na.rm = TRUE, axis = 0)
which.max.H2OFrame(x, na.rm = TRUE, axis = 0)
which.min.H2OFrame(x, na.rm = TRUE, axis = 0)

Arguments
x An H2OFrame object.
na.rm logical. Indicate whether missing values should be removed.
axis integer. Indicate whether to calculate the mean down a column (0) or across a row (1).

Value
Returns an H2OFrame object.

See Also
which.min for the base R method, which.max().

Examples
## Not run:
library(h2o)
h2o.init()

census <- h2o.importFile(f)
census[, 1] <- as.factor(census[, 1])
dl_model <- h2o.deeplearning(x = c(1:3), y = 4, hidden = c(17, 191),
epochs = 1, training_frame = census,
balance_classes = FALSE,
export_weights_and_biases = TRUE)
h2o.which_max(census["PER CAPITA INCOME "], na.rm = FALSE, axis = 0)
## End(Not run)
h2o.which_min

Which index contains the min value?

Description

Get the index of the min value in a column or row

Usage

h2o.which_min(x, na.rm = TRUE, axis = 0)

Arguments

x
An H2OFrame object.

na.rm
logical. Indicate whether missing values should be removed.

axis
integer. Indicate whether to calculate the mean down a column (0) or across a row (1).

Value

Returns an H2OFrame object.

See Also

which.min for the base R method.

Examples

## Not run:
library(h2o)
h2o.init()

census <- h2o.importFile(f)
dl_model <- h2o.deeplearning(x = c(1:3), y = 4, hidden = c(17, 191),
                            epochs = 1, training_frame = census,
                            balance_classes = FALSE,
                            export_weights_and_biases = TRUE)
h2o.which_min(census["PER CAPITA INCOME "], na.rm = FALSE, axis = 0)

## End(Not run)
**h2o.withinss**

Get the Within SS

**Description**

Get the Within SS

**Usage**

h2o.withinss(object)

**Arguments**

- **object**
  - An H2OClusteringModel object.

**h2o.word2vec**

Trains a word2vec model on a String column of an H2O data frame

**Description**

Trains a word2vec model on a String column of an H2O data frame

**Usage**

```
h2o.word2vec(
  training_frame = NULL,
  model_id = NULL,
  min_word_freq = 5,
  word_model = c("SkipGram", "CBOW"),
  norm_model = c("HSM"),
  vec_size = 100,
  window_size = 5,
  sent_sample_rate = 0.001,
  init_learning_rate = 0.025,
  epochs = 5,
  pre_trained = NULL,
  max_runtime_secs = 0,
  export_checkpoints_dir = NULL
)
```

**Arguments**

- **training_frame**
  - Id of the training data frame.
- **model_id**
  - Destination id for this model; auto-generated if not specified.
- **min_word_freq**
  - This will discard words that appear less than <int> times. Defaults to 5.
- **word_model**
  - The word model to use (SkipGram or CBOW) Must be one of: "SkipGram", "CBOW". Defaults to SkipGram.
- **norm_model**
  - Use Hierarchical Softmax Must be one of: "HSM". Defaults to HSM.
vec_size Set size of word vectors Defaults to 100.
window_size Set max skip length between words Defaults to 5.
sent_sample_rate Set threshold for occurrence of words. Those that appear with higher frequency in the training data will be randomly down-sampled; useful range is (0, 1e-5) Defaults to 0.001.
init_learning_rate Set the starting learning rate Defaults to 0.025.
epochs Number of training iterations to run Defaults to 5.
pre_trained Id of a data frame that contains a pre-trained (external) word2vec model
max_runtime_secs Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.
export_checkpoints_dir Automatically export generated models to this directory.

Examples

```r
## Not run:
library(h2o)
h2o.init()

# Import the CraigslistJobTitles dataset
title <- h2o.importFile(
col.names = c("category", "jobtitle"), col.types = c("String", "String"), header = TRUE)

# Build and train the Word2Vec model
title <- h2o.tokenize(title, " ")
vec <- h2o.word2vec(training_frame = title)
h2o.findSynonyms(vec, "teacher", count = 20)
## End(Not run)
```

---

**h2o.xgboost**

*Build an eXtreme Gradient Boosting model*

**Description**

Builds a eXtreme Gradient Boosting model using the native XGBoost backend.

**Usage**

```r
h2o.xgboost(
  x,
  y,
  training_frame,
  model_id = NULL,
  validation_frame = NULL,
  nfolds = 0,
```
keep_cross_validation_models = TRUE,
keep_cross_validation_predictions = FALSE,
keep_cross_validation_fold_assignment = FALSE,
score_each_iteration = FALSE,
fold_assignment = c("AUTO", "Random", "Modulo", "Stratified"),
fold_column = NULL,
ignore_const_cols = TRUE,
offset_column = NULL,
weights_column = NULL,
stopping_rounds = 0,
stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing"),
stopping_tolerance = 0.001,
max_runtime_secs = 0,
seed = -1,
distribution = c("AUTO", "bernoulli", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber"),
tweedie_power = 1.5,
quiet_mode = TRUE,
checkpoint = NULL,
export_checkpoints_dir = NULL,
ntrees = 50,
max_depth = 6,
min_rows = 1,
min_child_weight = 1,
learn_rate = 0.3,
eta = 0.3,
sample_rate = 1,
subsample = 1,
col_sample_rate = 1,
colsample_bylevel = 1,
col_sample_rate_per_tree = 1,
colsample_bytree = 1,
colsample_bynode = 1,
max_abs_leafnode_pred = 0,
max_delta_step = 0,
monotone_constraints = NULL,
score_tree_interval = 0,
min_split_improvement = 0,
gamma = 0,
nthread = -1,
save_matrix_directory = NULL,
build_tree_one_node = FALSE,
calibrate_model = FALSE,
calibration_frame = NULL,
max_bins = 256,
max_leaves = 0,
sample_type = c("uniform", "weighted"),
normalize_type = c("tree", "forest"),
 rate_drop = 0,
one_drop = FALSE,
skip_drop = 0,
tree_method = c("auto", "exact", "approx", "hist"),
grow_policy = c("depthwise", "lossguide"),
booster = c("gbtree", "gblinear", "dart"),
reg_lambda = 1,
reg_alpha = 0,
dmatrix_type = c("auto", "dense", "sparse"),
backend = c("auto", "gpu", "cpu"),
gpu_id = 0,
gainslift_bins = -1,
verbose = FALSE
)

Arguments

x (Optional) A vector containing the names or indices of the predictor variables to use in building the model. If x is missing, then all columns except y are used.
y The name or column index of the response variable in the data. The response must be either a numeric or a categorical/factor variable. If the response is numeric, then a regression model will be trained, otherwise it will train a classification model.
training_frame Id of the training data frame.
model_id Destination id for this model; auto-generated if not specified.
validation_frame Id of the validation data frame.
nfolds Number of folds for K-fold cross-validation (0 to disable or >= 2). Defaults to 0.
keep_cross_validation_models Logical. Whether to keep the cross-validation models. Defaults to TRUE.
keep_cross_validation_predictions Logical. Whether to keep the predictions of the cross-validation models. Defaults to FALSE.
keep_cross_validation_fold_assignment Logical. Whether to keep the cross-validation fold assignment. Defaults to FALSE.
score_each_iteration Logical. Whether to score during each iteration of model training. Defaults to FALSE.
fold_assignment Cross-validation fold assignment scheme, if fold_column is not specified. The 'Stratified' option will stratify the folds based on the response variable, for classification problems. Must be one of: "AUTO", "Random", "Modulo", "Stratified". Defaults to AUTO.
fold_column Column with cross-validation fold index assignment per observation.
ignore_const_cols Logical. Ignore constant columns. Defaults to TRUE.
offset_column Offset column. This will be added to the combination of columns before applying the link function.
weights_column
Column with observation weights. Giving some observation a weight of zero is equivalent to excluding it from the dataset; giving an observation a relative weight of 2 is equivalent to repeating that row twice. Negative weights are not allowed. Note: Weights are per-row observation weights and do not increase the size of the data frame. This is typically the number of times a row is repeated, but non-integer values are supported as well. During training, rows with higher weights matter more, due to the larger loss function pre-factor.

stopping_rounds
Early stopping based on convergence of stopping_metric. Stop if simple moving average of length k of the stopping_metric does not improve for k:=stopping_rounds scoring events (0 to disable) Defaults to 0.

stopping_metric
Metric to use for early stopping (AUTO: logloss for classification, deviance for regression and anonomaly_score for Isolation Forest). Note that custom and custom_increasing can only be used in GBM and DRF with the Python client. Must be one of: "AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "AUCPR", "lift_top_group", "misclassification", "mean_per_class_error", "custom", "custom_increasing". Defaults to AUTO.

stopping_tolerance
Relative tolerance for metric-based stopping criterion (stop if relative improvement is not at least this much) Defaults to 0.001.

max_runtime_secs
Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.

seed
Seed for random numbers (affects certain parts of the algo that are stochastic and those might or might not be enabled by default). Defaults to -1 (time-based random number).

distribution
Distribution function Must be one of: "AUTO", "bernoulli", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber". Defaults to AUTO.

tweedie_power
Tweedie power for Tweedie regression, must be between 1 and 2. Defaults to 1.5.

categorical_encoding
Encoding scheme for categorical features Must be one of: "AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

quiet_mode
Logical. Enable quiet mode Defaults to TRUE.

checkpoint
Model checkpoint to resume training with.

export_checkpoints_dir
Automatically export generated models to this directory.

ntrees
(same as n_estimators) Number of trees. Defaults to 50.

max_depth
Maximum tree depth (0 for unlimited). Defaults to 6.

min_rows
(same as min_child_weight) Fewest allowed (weighted) observations in a leaf. Defaults to 1.

min_child_weight
(same as min_rows) Fewest allowed (weighted) observations in a leaf. Defaults to 1.

learn_rate
(same as eta) Learning rate (from 0.0 to 1.0) Defaults to 0.3.
eta: (same as learn_rate) Learning rate (from 0.0 to 1.0) Defaults to 0.3.
sample_rate: (same as subsample) Row sample rate per tree (from 0.0 to 1.0) Defaults to 1.
subsample: (same as sample_rate) Row sample rate per tree (from 0.0 to 1.0) Defaults to 1.
col_sample_rate: (same as colsample_bytree) Column sample rate (from 0.0 to 1.0) Defaults to 1.
colsample_bylevel: (same as col_sample_rate) Column sample rate (from 0.0 to 1.0) Defaults to 1.
col_sample_rate_per_tree: (same as colsample_bytree) Column sample rate per tree (from 0.0 to 1.0) Defaults to 1.
colsample_bytree: (same as col_sample_rate_per_tree) Column sample rate per tree (from 0.0 to 1.0) Defaults to 1.
colsample_bynode: Column sample rate per tree node (from 0.0 to 1.0) Defaults to 1.
max_abs_leafnode_pred: (same as max_delta_step) Maximum absolute value of a leaf node prediction Defaults to 0.0.
max_delta_step: (same as max_abs_leafnode_pred) Maximum absolute value of a leaf node prediction Defaults to 0.0.
monotone_constraints: A mapping representing monotonic constraints. Use +1 to enforce an increasing constraint and -1 to specify a decreasing constraint.
score_tree_interval: Score the model after every so many trees. Disabled if set to 0. Defaults to 0.
min_split_improvement: (same as gamma) Minimum relative improvement in squared error reduction for a split to happen Defaults to 0.0.
gamma: (same as min_split_improvement) Minimum relative improvement in squared error reduction for a split to happen Defaults to 0.0.
nthread: Number of parallel threads that can be used to run XGBoost. Cannot exceed H2O cluster limits (-nthreads parameter). Defaults to maximum available Defaults to -1.
save_matrix_directory: Directory where to save matrices passed to XGBoost library. Useful for debugging.
build_tree_one_node: Logical. Run on one node only; no network overhead but fewer cpus used. Suitable for small datasets. Defaults to FALSE.
calibrate_model: Logical. Use Platt Scaling to calculate calibrated class probabilities. Calibration can provide more accurate estimates of class probabilities. Defaults to FALSE.
calibration_frame: Calibration frame for Platt Scaling.
max_bins: For tree_method=hist only: maximum number of bins Defaults to 256.
max_leaves: For tree_method=hist only: maximum number of leaves Defaults to 0.
h2o.xgboost

sample_type For booster=dart only: sample_type Must be one of: "uniform", "weighted". Defaults to uniform.
normalize_type For booster=dart only: normalize_type Must be one of: "tree", "forest". Defaults to tree.
rate_drop For booster=dart only: rate_drop (0..1) Defaults to 0.0.
one_drop Logical. For booster=dart only: one_drop Defaults to FALSE.
skip_drop For booster=dart only: skip_drop (0..1) Defaults to 0.0.
tree_method Tree method Must be one of: "auto", "exact", "approx", "hist". Defaults to auto.
grow_policy Grow policy - depthwise is standard GBM, lossguide is LightGBM Must be one of: "depthwise", "lossguide". Defaults to depthwise.
booster Booster type Must be one of: "gbtree", "gblinear", "dart". Defaults to gbtree.
reg_lambda L2 regularization Defaults to 1.0.
reg_alpha L1 regularization Defaults to 0.0.
dmatrix_type Type of DMatrix. For sparse, NAs and 0 are treated equally. Must be one of: "auto", "dense", "sparse". Defaults to auto.
backend Backend. By default (auto), a GPU is used if available. Must be one of: "auto", "gpu", "cpu". Defaults to auto.
gpu_id Which GPU to use. Defaults to 0.
gainslift_bins Gains/Lift table number of bins. 0 means disabled.. Default value -1 means automatic binning. Defaults to -1.
verbose Logical. Print scoring history to the console (Metrics per tree). Defaults to FALSE.

Examples

## Not run:
library(h2o)
h2o.init()

# Import the titanic dataset
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/gbm_test/titanic.csv"
titanic <- h2o.importFile(f)

# Set predictors and response; set response as a factor
titanic['survived'] <- as.factor(titanic['survived'])
predictors <- setdiff(colnames(titanic), colnames(titanic)[2:3])
response <- "survived"

# Split the dataset into train and valid
splits <- h2o.splitFrame(data = titanic, ratios = .8, seed = 1234)
train <- splits[[1]]
valid <- splits[[2]]

# Train the XGB model
titanic_xgb <- h2o.xgboost(x = predictors, y = response,
                          training_frame = train, validation_frame = valid,
                          booster = "dart", normalize_type = "tree",
                          seed = 1234)

## End(Not run)
h2o.xgboost.available  
*Determines whether an XGBoost model can be built*

**Description**

Ask the H2O server whether a XGBoost model can be built. (Depends on availability of native backend.) Returns True if a XGBoost model can be built, or False otherwise.

**Usage**

```r
h2o.xgboost.available()
```

h2o.year  
*Convert Milliseconds to Years in H2O Datasets*

**Description**

Convert the entries of an H2OFrame object from milliseconds to years, indexed starting from 1900.

**Usage**

```r
h2o.year(x)
year(x)
```

```r
## S3 method for class 'H2OFrame'
year(x)
```

**Arguments**

- `x`  
  An H2OFrame object.

**Details**

This method calls the function of the MutableDateTime class in Java.

**Value**

An H2OFrame object containing the entries of `x` converted to years

**See Also**

- `h2o.month`
## Not run:
library(h2o)
h2o.init()

hdf <- h2o.importFile(f)
h2o.year(hdf["ds9"])

## End(Not run)

---

### H2OAutoML-class

The **H2OAutoML** class

### Description

This class represents an H2OAutoML object

### H2OClusteringModel-class

The **H2OClusteringModel** object.

### Description

This virtual class represents a clustering model built by H2O.

### Details

This object has slots for the key, which is a character string that points to the model key existing in the H2O cluster, the data used to build the model (an object of class H2OFrame).

### Slots

- `model_id` A character string specifying the key for the model fit in the H2O cluster's key-value store.
- `algorithm` A character string specifying the algorithm that was used to fit the model.
- `parameters` A list containing the parameter settings that were used to fit the model that differ from the defaults.
- `allparameters` A list containing all parameters used to fit the model.
- `model` A list containing the characteristics of the model returned by the algorithm.
  - `size` The number of points in each cluster.
  - `totss` Total sum of squared error to grand mean.
  - `withinss` A vector of within-cluster sum of squared error.
  - `tot_withinss` Total within-cluster sum of squared error.
  - `betweenss` Between-cluster sum of squared error.
H2OConnection-class

The H2OConnection class.

Description

This class represents a connection to an H2O cluster.

Usage

```
## S4 method for signature 'H2OConnection'
show(object)
```

Arguments

- `object` an H2OConnection object.

Details

Because H2O is not a master-slave architecture, there is no restriction on which H2O node is used to establish the connection between R (the client) and H2O (the server).

A new H2O connection is established via the h2o.init() function, which takes as parameters the ‘ip’ and ‘port’ of the machine running an instance to connect with. The default behavior is to connect with a local instance of H2O at port 54321, or to boot a new local instance if one is not found at port 54321.

Slots

- `ip` A character string specifying the IP address of the H2O cluster.
- `port` A numeric value specifying the port number of the H2O cluster.
- `name` A character value specifying the name of the H2O cluster.
- `proxy` A character specifying the proxy path of the H2O cluster.
- `https` Set this to TRUE to use https instead of http.
- `cacert` Path to a CA bundle file with root and intermediate certificates of trusted CAs.
- `insecure` Set this to TRUE to disable SSL certificate checking.
- `username` Username to login with.
- `password` Password to login with.
- `use_spnego` Set this to TRUE to use SPNEGO authentication.
- `cookies` Cookies to add to request
- `context_path` Context path which is appended to H2O server location.
- `mutable` An H2OConnectionMutableState object to hold the mutable state for the H2O connection.
The H2OConnectionMutableState class

Description

This class represents the mutable aspects of a connection to an H2O cluster.

Slots

- `session_id` A character string specifying the H2O session identifier.
- `key_count` A integer value specifying count for the number of keys generated for the `session_id`.

The H2OCoxPHModel object.

Description

Virtual object representing H2O’s CoxPH Model.

Usage

```r
## S4 method for signature 'H2OCoxPHModel'
show(object)

## S3 method for class 'H2OCoxPHModel'
coef(object, ...)

## S3 method for class 'H2OCoxPHModel'
evaluateAIC(fit, scale, k = 2, ...)

## S3 method for class 'H2OCoxPHModel'
logLik(object, ...)

survfit.H2OCoxPHModel(formula, newdata, ...)

## S3 method for class 'H2OCoxPHModel'
vcov(object, ...)
```

Arguments

- `object` an H2OCoxPHModel object.
- `...` additional arguments to pass on.
- `fit` an H2OCoxPHModel object.
- `scale` optional numeric specifying the scale parameter of the model.
- `k` numeric specifying the weight of the equivalent degrees of freedom.
- `formula` an H2OCoxPHModel object.
- `newdata` an optional H2OFrame or data.frame with the same variable names as those that appear in the H2OCoxPHModel object.
H2OCoxPHModelSummary-class

The H2OCoxPHModelSummary object.

Description

Wrapper object for summary information compatible with survival package.

Usage

```r
## S4 method for signature 'H2OCoxPHModelSummary'
show(object)

## S3 method for class 'H2OCoxPHModelSummary'
coef(object, ...)
```

Arguments

- `object` An H2OCoxPHModelSummary object.
- `...` additional arguments to pass on.

Slots

- `summary` A list containing the a summary compatible with CoxPH summary used in the survival package.

H2OFrame-class

The H2OFrame class

Description

This class represents an H2OFrame object

H2OFrame-Extract

Extract or Replace Parts of an H2OFrame Object

Description

Operators to extract or replace parts of H2OFrame objects.
Usage

```r
## S3 method for class 'H2OFrame'
data[row, col, drop = TRUE]

## S3 method for class 'H2OFrame'
x$name

## S3 method for class 'H2OFrame'
x[[i, exact = TRUE]]

## S3 method for class 'H2OFrame'
x$name

## S3 method for class 'H2OFrame'
x[[i, exact = TRUE]]

## S3 replacement method for class 'H2OFrame'
data[row, col, ...] <- value

## S3 replacement method for class 'H2OFrame'
data$name <- value

## S3 replacement method for class 'H2OFrame'
data[[name]] <- value
```

Arguments

- `data`: object from which to extract element(s) or in which to replace element(s).
- `row`: index specifying row element(s) to extract or replace. Indices are numeric or character vectors or empty (missing) or will be matched to the names.
- `col`: index specifying column element(s) to extract or replace.
- `drop`: Unused
- `x`: An H2OFrame
- `name`: a literal character string or a name (possibly backtick quoted).
- `i`: index
- `exact`: controls possible partial matching of `[[` when extracting a character
- `...`: Further arguments passed to or from other methods.
- `value`: To be assigned

H20Grid-class

_H2O Grid_

Description

A class to contain the information about grid results
Usage

## S4 method for signature 'H2OGrid'
show(object)

Arguments

object an H2OGrid object.

Slots

  grid_id the final identifier of grid
  model_ids list of model IDs which are included in the grid object
  hyper_names list of parameter names used for grid search
  failed_params list of model parameters which caused a failure during model building, it can contain a null value
  failure_details list of detailed messages which correspond to failed parameters field
  failure_stack_traces list of stack traces corresponding to model failures reported by failed_params and failure_details fields
  failed_raw_params list of failed raw parameters
  summary_table table of models built with parameters and metric information.

See Also

  H2OModel for the final model types.

The H2OLeafNode class.

Description

This class represents a single leaf node in an H2O Tree.

Details

  #’ @aliases H2OLeafNode
H2OModel-class

The H2OModel object.

Description

This virtual class represents a model built by H2O.

Usage

## S4 method for signature 'H2OModel'
show(object)

Arguments

object    an H2OModel object.

Details

This object has slots for the key, which is a character string that points to the model key existing in
the H2O cluster, the data used to build the model (an object of class H2OFrame).

Slots

model_id  A character string specifying the key for the model fit in the H2O cluster's key-value
          store.
algorithmA character string specifying the algorithm that were used to fit the model.
parametersA list containing the parameter settings that were used to fit the model that differ
          from the defaults.
allparametersA list containing all parameters used to fit the model.
have_pojoA logical indicating whether export to POJO is supported
have_mjoA logical indicating whether export to MOJO is supported
model    A list containing the characteristics of the model returned by the algorithm.

H2OModelFuture-class

H2O Future Model

Description

A class to contain the information for background model jobs.

Slots

job_key  a character key representing the identification of the job process.
model_id the final identifier for the model

See Also

H2OModel for the final model types.
H2OModelMetrics-class  The H2OModelMetrics Object.

Description
A class for constructing performance measures of H2O models.

Usage

```r
## S4 method for signature 'H2OModelMetrics'
show(object)

## S4 method for signature 'H2OBinomialMetrics'
show(object)

## S4 method for signature 'H2OMultinomialMetrics'
show(object)

## S4 method for signature 'H2OOrdinalMetrics'
show(object)

## S4 method for signature 'H2ORegressionMetrics'
show(object)

## S4 method for signature 'H2OClusteringMetrics'
show(object)

## S4 method for signature 'H2OAutoEncoderMetrics'
show(object)

## S4 method for signature 'H2ODimReductionMetrics'
show(object)
```

Arguments

- `object` An H2OModelMetrics object

H2ONode-class  The H2ONode class.

Description
The H2ONode class.

Usage

```r
## S4 method for signature 'H2ONode'
show(object)
```
**H2OSegmentModels-class**

**Description**
A class to contain the information for segment models.

**Usage**
```r
## S4 method for signature 'H2OSegmentModels'
show(object)
```

**Arguments**
- `object` an H2OModel object.

**Slots**
- `segment_models_id` the identifier for the segment models collections

---

**H2OSegmentModelsFuture-class**

**Description**
A class to contain the information for background segment models jobs.

**Slots**
- `job_key` a character key representing the identification of the job process.
- `segment_models_id` the final identifier for the segment models collections

**See Also**
- `H2OSegmentModels` for the final segment models types.
The H2O Split Node Class

Description
This class represents a single non-terminal node in an H2O Tree.

Slots
- `threshold`: A numeric split threshold, typically when the split column is numerical.
- `left_child`: A `H2ONodeOrNULL` representing the left child node, if a node has one.
- `right_child`: A `H2ONodeOrNULL` representing the right child node, if a node has one.
- `split_feature`: A character representing the name of the column this node splits on.
- `left_levels`: A character representing the levels of a categorical feature heading to the left child of this node. NA for non-categorical split.
- `right_levels`: A character representing the levels of a categorical feature heading to the right child of this node. NA for non-categorical split.
- `na_direction`: A character representing the direction of NA values. LEFT means NA values go to the left child node, RIGHT means NA values go to the right child node.

The H2O Tree Class

Description
This class represents a model of a Tree built by one of H2O’s algorithms (GBM, Random Forest).

Usage
```r
## S4 method for signature 'H2OTree'
show(object)
```

Arguments
- `object`: an `H2OTree` object.

Slots
- `root_node`: A `H2ONode` representing the beginning of the tree behind the model. Allows further tree traversal.
- `left_children`: An integer vector with left child nodes of tree’s nodes
- `right_children`: An integer vector with right child nodes of tree’s nodes
- `node_ids`: An integer representing identification number of a node. Node IDs are generated by H2O.
- `descriptions`: A character vector with descriptions for each node to be found in the tree. Contains split threshold if the split is based on numerical column. For categorical splits, it contains list of categorical levels for transition from the parent node.
model_id A character with the name of the model this tree is related to.

tree_number An integer representing the order in which the tree has been built in the model.

tree_class A character representing name of tree’s class. Number of tree classes equals to the number of levels in categorical response column. As there is exactly one class per categorical level, name of tree’s class equals to the corresponding categorical level of response column. In case of regression and binomial, the name of the categorical level is ignored can be omitted, as there is exactly one tree built in both cases.

thresholds A numeric split thresholds. Split thresholds are not only related to numerical splits, but might be present in case of categorical split as well.

features A character with names of the feature/column used for the split.

levels A character representing categorical levels on split from parent’s node belonging into this node. NULL for root node or non-categorical splits.

nas A character representing if NA values go to the left node or right node. May be NA if node is a leaf.

predictions A numeric representing predictions for each node in the graph.

tree_decision_path A character, plain language rules representation of a trained decision tree.

decision_paths A character representing plain language rules that were used in a particular prediction.

left_cat_split A character list of categorical levels leading to the left child node. Only present when split is categorical, otherwise none.

right_cat_split A character list of categorical levels leading to the right child node. Only present when split is categorical, otherwise none.

---

**housevotes**

*United States Congressional Voting Records 1984*

**Description**

This data set includes votes for each of the U.S. House of Representatives Congressmen on the 16 key votes identified by the CQA. The CQA lists nine different types of votes: voted for, paired for, and announced for (these three simplified to yea), voted against, paired against, and announced against (these three simplified to nay), voted present, voted present to avoid conflict of interest, and did not vote or otherwise make a position known (these three simplified to an unknown disposition).

**Format**

A data frame with 435 rows and 17 columns

**Source**


**References**

iris

Edgar Anderson's Iris Data

Description

Measurements in centimeters of the sepal length and width and petal length and width, respectively, for three species of iris flowers.

Format

A data frame with 150 rows and 5 columns

Source


The data were collected by Anderson, Edgar (1935). The irises of the Gaspe Peninsula, Bulletin of the American Iris Society, 59, 2-5.

is.character

Check if character

Description

Check if character

Usage

is.character(x)

Arguments

x An H2OFrame object

Examples

## Not run:
library(h2o)
h2o.init()

f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/coxph_test/heart.csv"
heart <- h2o.importFile(f)

heart["transplant"] <- as.character(heart["transplant"])
is.character(heart["transplant"])

## End(Not run)
is.factor

Check if factor

Description
Check if factor

Usage
is.factor(x)

Arguments
x An H2OFrame object

is.h2o
Is H2O Frame object

Description
Test if object is H2O Frame.

Usage
is.h2o(x)

Arguments
x An R object.

Examples
## Not run:
library(h2o)
h2o.init()

frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)

is.h2o(frame)

## End(Not run)
is.numeric  
**Check if numeric**

### Description
Check if numeric

### Usage
is.numeric(x)

### Arguments
- x  
  An H2OFrame object

---

### Keyed-class  
**Virtual Keyed class**

### Description
Base class for all objects having a persistent representation on backend.

---

### length,H2OTree-method
*Overrides the behavior of length() function on H2OTree class. Returns number of nodes in an H2OTree*

### Description
Overrides the behavior of length() function on H2OTree class. Returns number of nodes in an H2OTree

### Usage
```r
## S4 method for signature 'H2OTree'
length(x)
```

### Arguments
- x  
  An H2OTree to count nodes for.
Logical-or  

**Logical or for H2OFrames**

**Description**
Logical or for H2OFrames

**Usage**
```
\texttt{\textbackslash{\textbackslash}mid\mid}(x, y)
```

**Arguments**
- \texttt{x}: An H2OFrame object
- \texttt{y}: An H2OFrame object

---

**ModelAccessors**  

**Accessor Methods for H2OModel Object**

**Description**
Function accessor methods for various H2O output fields.

**Usage**
```
getParms(object)

## S4 method for signature \texttt\'H2OModel\texttt\'  
getParms(object)

getCenters(object)

getCentersStd(object)

getWithinSS(object)

getTotWithinSS(object)

getBetweenSS(object)

getTotSS(object)

getIterations(object)

getClusterSizes(object)

## S4 method for signature \texttt\'H2OClusteringModel\texttt\'  
getCenters(object)
```
### S4 method for signature 'H2OClusteringModel'
getCentersStd(object)

### S4 method for signature 'H2OClusteringModel'
getWithinSS(object)

### S4 method for signature 'H2OClusteringModel'
getTotWithinSS(object)

### S4 method for signature 'H2OClusteringModel'
getBetweenSS(object)

### S4 method for signature 'H2OClusteringModel'
getTotSS(object)

### S4 method for signature 'H2OClusteringModel'
getIterations(object)

### S4 method for signature 'H2OClusteringModel'
getClusterSizes(object)

#### Arguments
- **object**
  - an `H2OModel` class object.

---

### names.H2OFrame

**Column names of an H2OFrame**

#### Description
Column names of an H2OFrame

#### Usage
```r
### S3 method for class 'H2OFrame'
names(x)
```

#### Arguments
- **x**
  - An H2OFrame

#### Examples
```r
### Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)

names(frame)
```

### End(Not run)
Ops.H2OFrame

S3 Group Generic Functions for H2O

Description

Methods for group generic functions and H2O objects.

Usage

## S3 method for class 'H2OFrame'
Ops(e1, e2)

## S3 method for class 'H2OFrame'
Math(x, ...)

## S3 method for class 'H2OFrame'
Math(x, ...)

## S3 method for class 'H2OFrame'
Math(x, ...)

## S3 method for class 'H2OFrame'
Summary(x, ..., na.rm)

## S3 method for class 'H2OFrame'
!x

## S3 method for class 'H2OFrame'
is.na(x)

## S3 method for class 'H2OFrame'
t(x)

log(x, ...)

log10(x)

log2(x)

log1p(x)

trunc(x, ...)

x %**% y

nrow.H2OFrame(x)

ncol.H2OFrame(x)

## S3 method for class 'H2OFrame'
length(x)
h2o.length(x)

### S3 replacement method for class 'H2OFrame'
names(x) <- value
colnames(x) <- value

Arguments

- **e1**
  - object
- **e2**
  - object
- **x**
  - object
- ... Further arguments passed to or from other methods.
- **na.rm**
  - logical. whether or not missing values should be removed
- **y**
  - object
- **value**
  - To be assigned

---

**plot.H2OModel**  
*Plot an H2O Model*

### Description

Plots training set (and validation set if available) scoring history for an H2O Model

### Usage

```r
## S3 method for class 'H2OModel'
plot(x, timestep = "AUTO", metric = "AUTO", ...)
```

### Arguments

- **x**
  - A fitted `H2OModel` object for which the scoring history plot is desired.
- **timestep**
  - A unit of measurement for the x-axis.
- **metric**
  - A unit of measurement for the y-axis.
- ... additional arguments to pass on.

### Details

This method dispatches on the type of H2O model to select the correct scoring history. The `timestep` and `metric` arguments are restricted to what is available in the scoring history for a particular type of model.

### Value

Returns a scoring history plot.

### See Also

`h2o.deeplearning, h2o.gbm, h2o.glm, h2o.randomForest` for model generation in h2o.
Examples

```r
## Not run:
if (requireNamespace("mlbench", quietly=TRUE)) {
  library(h2o)
  h2o.init()

  df <- as.h2o(mlbench::mlbench.friedman1(10000, 1))
  rng <- h2o.runif(df, seed = 1234)
  train <- df[rng < 0.8,]
  valid <- df[rng >= 0.8,]

  gbm <- h2o.gbm(x = 1:10, y = "y", training_frame = train, validation_frame = valid,
                 ntrees = 500, learn_rate = 0.01, score_each_iteration = TRUE)
  plot(gbm)
  plot(gbm, timestep = "duration", metric = "deviance")
  plot(gbm, timestep = "number_of_trees", metric = "deviance")
  plot(gbm, timestep = "number_of_trees", metric = "rmse")
  plot(gbm, timestep = "number_of_trees", metric = "mae")
}
## End(Not run)
```

Description

Plots the simple co-occurrence based tabulation of X vs Y as a heatmap, where X and Y are two Vecs in a given dataset. This function requires suggested ggplot2 package.

Usage

```r
## S3 method for class 'H2OTabulate'
plot(x, xlab = x$cols[1], ylab = x$cols[2], base_size = 12, ...)
```

Arguments

- **x**: An H2OTabulate object for which the heatmap plot is desired.
- **xlab**: A title for the x-axis. Defaults to what is specified in the given H2OTabulate object.
- **ylab**: A title for the y-axis. Defaults to what is specified in the given H2OTabulate object.
- **base_size**: Base font size for plot.
- **...**: additional arguments to pass on.

Value

Returns a ggplot2-based heatmap of co-occurrence.

See Also

`h2o.tabulate`
predict.H2OAutoML

Predict on an AutoML object

Description

Obtains predictions from an AutoML object.

Usage

## S3 method for class 'H2OAutoML'
predict(object, newdata, ...)

## S3 method for class 'H2OAutoML'
h2o.predict(object, newdata, ...)

Arguments

object a fitted H2OAutoML object for which prediction is desired
newdata An H2OFrame object in which to look for variables with which to predict.
... additional arguments to pass on.

Details

This method generated predictions on the leader model from an AutoML run. The order of the rows in the results is the same as the order in which the data was loaded, even if some rows fail (for example, due to missing values or unseen factor levels).

Value

Returns an H2OFrame object with probabilities and default predictions.
### predict.H2OModel

**Predict on an H2O Model**

**Description**

Obtains predictions from various fitted H2O model objects.

**Usage**

```r
## S3 method for class 'H2OModel'
predict(object, newdata, ...)
```

```r
## S3 method for class 'H2OModel'
h2o.predict(object, newdata, ...)
```

**Arguments**

- `object` a fitted H2OModel object for which prediction is desired
- `newdata` An H2OFrame object in which to look for variables with which to predict.
- `...` additional arguments to pass on.

**Details**

This method dispatches on the type of H2O model to select the correct prediction/scoring algorithm. The order of the rows in the results is the same as the order in which the data was loaded, even if some rows fail (for example, due to missing values or unseen factor levels).

**Value**

Returns an H2OFrame object with probabilities and default predictions.

**See Also**

- `h2o.deeplearning`, `h2o.gbm`, `h2o.glm`, `h2o.randomForest` for model generation in h2o.

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
f <- "https://s3.amazonaws.com/h2o-public-test-data/smalldata/glm_test/insurance.csv"
insurance <- h2o.importFile(f)
predictors <- colnames(insurance)[1:4]
response <- "Claims"
insurance['Group'] <- as.factor(insurance['Group'])
insurance['Age'] <- as.factor(insurance['Age'])
splits <- h2o.splitFrame(data = insurance, ratios = 0.8, seed = 1234)
train <- splits[[1]]
valid <- splits[[2]]
insurance_gbm <- h2o.gbm(x = predictors, y = response,
                         training_frame = train,
```
predict_contributions.H2OModel

Predict feature contributions - SHAP values on an H2O Model (only DRF, GBM and XGBoost models).

Description

Returned H2OFrame has shape (#rows, #features + 1) - there is a feature contribution column for each input feature, the last column is the model bias (same value for each row). The sum of the feature contributions and the bias term is equal to the raw prediction of the model. Raw prediction of tree-based model is the sum of the predictions of the individual trees before the inverse link function is applied to get the actual prediction. For Gaussian distribution the sum of the contributions is equal to the model prediction.

Usage

predict_contributions.H2OModel(object, newdata, ...)

h2o.predict_contributions(object, newdata, ...)

Arguments

object a fitted H2OModel object for which prediction is desired
newdata An H2OFrame object in which to look for variables with which to predict.
... additional arguments to pass on.

Details

Note: Multinomial classification models are currently not supported.

Value

Returns an H2OFrame contain feature contributions for each input row.

See Also

h2o.gbm and h2o.randomForest for model generation in h2o.
predict_leaf_node_assignment.H2OModel

Predict the Leaf Node Assignment on an H2O Model

Description

Obtains leaf node assignment from fitted H2O model objects.

Usage

predict_leaf_node_assignment.H2OModel(
  object,
  newdata,
  type = c("Path", "Node_ID"),
  ...
)

h2o.predict_leaf_node_assignment(
  object,
  newdata,
  type = c("Path", "Node_ID"),
  ...
)

Arguments

object a fitted H2OModel object for which prediction is desired
newdata An H2OFrame object in which to look for variables with which to predict.
type choice of either "Path" when tree paths are to be returned (default); or "Node_ID" when the output
... additional arguments to pass on.

Details

For every row in the test set, return the leaf placements of the row in all the trees in the model. Placements can be represented either by paths to the leaf nodes from the tree root or by H2O’s internal identifiers. The order of the rows in the results is the same as the order in which the data was loaded.

Examples

```
## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate_gbm <- h2o.gbm(3:9, "AGE", prostate)
h2o.predict(prostate_gbm, prostate)
h2o.predict_contributions(prostate_gbm, prostate)
## End(Not run)
```
Value

Returns an H2OFrame object with categorical leaf assignment identifiers for each tree in the model.

See Also

h2o.gbm and h2o.randomForest for model generation in h2o.

Examples

## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
prostate_gbm <- h2o.gbm(3:9, "CAPSULE", prostate)
h2o.predict(prostate_gbm, prostate)
h2o.predict_leaf_node_assignment(prostate_gbm, prostate)
## End(Not run)

print.H2OFrame

Print An H2OFrame

Description

Print An H2OFrame

Usage

## S3 method for class 'H2OFrame'
print(x, n = 6L, m = 200L, ...)

Arguments

x An H2OFrame object

n An (Optional) A single integer. If positive, number of rows in x to return. If negative, all but the n first/last number of rows in x. Anything bigger than 20 rows will require asking the server (first 20 rows are cached on the client).

m An (Optional) A single integer. If positive, number of columns in x to return. If negative, all but the m first/last number of columns in x.

... Further arguments to be passed from or to other methods.

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
print(cars, n = 8)
## End(Not run)
print.H2OTable

Description

This will print a truncated view of the table if there are more than 20 rows.

Usage

## S3 method for class 'H2OTable'
print(x, header = TRUE, ...)

Arguments

x
An H2OTable object

header
A logical value dictating whether or not the table name should be printed.

...  
Further arguments passed to or from other methods.

Value

The original x object

Examples

## Not run:
library(h2o)
h2o.init()

cars <- h2o.importFile(f)
print(cars, header = TRUE)

## End(Not run)

prostate

Prostate Cancer Study

Description

Baseline exam results on prostate cancer patients from Dr. Donn Young at The Ohio State University Comprehensive Cancer Center.

Format

A data frame with 380 rows and 9 columns

Source

### range.H2OFrame

**Range of an H2O Column**

**Description**

Range of an H2O Column

**Usage**

```r
## S3 method for class 'H2OFrame'
range(..., na.rm = TRUE)
```

**Arguments**

- `...`: An H2OFrame object.
- `na.rm`: Ignore missing values

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
frame <- h2o.createFrame(rows = 6, cols = 2,
categorical_fraction = 0.0,
missing_fraction = 0.7,
seed = 123)
range(frame, na.rm = TRUE)
## End(Not run)
```

### scale

**Scaling and Centering of an H2OFrame**

**Description**

Centers and/or scales the columns of an H2O dataset.

**Usage**

```r
## S3 method for class 'H2OFrame'
scale(x, center = TRUE, scale = TRUE)
```

**Arguments**

- `x`: An H2OFrame object.
- `center`: Either a logical value or numeric vector of length equal to the number of columns of `x`.
- `scale`: Either a logical value or numeric vector of length equal to the number of columns of `x`. 
Examples

```r
## Not run:
library(h2o)
h2o.init()
iris_hf <- as.h2o(iris)
summary(iris_hf)

# Scale and center all the numeric columns in iris data set
iris_scaled <- scale(iris_hf[, 1:4])
## End(Not run)
```

show,H2OAutoML-method  Format AutoML object in user-friendly way

Description

Format AutoML object in user-friendly way

Usage

```r
## S4 method for signature 'H2OAutoML'
show(object)
```

Arguments

- `object` an H2OAutoML object.

staged_predict_proba.H2OModel

Predict class probabilities at each stage of an H2O Model

Description

The output structure is analogous to the output of `h2o.predict_leaf_node_assignment`. For each tree t and class c there will be a column Tt.Cc (e.g. T3.C1 for tree 3 and class 1). The value will be the corresponding predicted probability of this class by combining the raw contributions of trees T1.Cc,...,TtCc. Binomial models build the trees just for the first class and values in columns Tx.C1 thus correspond to the the probability p0.

Usage

```r
staged_predict_proba.H2OModel(object, newdata, ...)
h2o.staged_predict_proba(object, newdata, ...)
```

Arguments

- `object` a fitted H2OModel object for which prediction is desired
- `newdata` An H2OFrame object in which to look for variables with which to predict.
- `...` additional arguments to pass on.
Value

Returns an H2OFrame object with predicted probability for each tree in the model.

See Also

h2o.gbm and h2o.randomForest for model generation in h2o.

Examples

## Not run:
library(h2o)
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
prostate$CAPSULE <- as.factor(prostate$CAPSULE)
prostate_gbm <- h2o.gbm(3:9, "CAPSULE", prostate)
h2o.predict(prostate_gbm, prostate)
h2o.staged_predict_proba(prostate_gbm, prostate)

## End(Not run)
**summary,H2OAutoML-method**

*Format AutoML object in user-friendly way*

**Description**

Format AutoML object in user-friendly way

**Usage**

```r
## S4 method for signature 'H2OAutoML'
summary(object)
```

**Arguments**

- `object` an H2OAutoML object.

---

**summary,H2OCoxPHModel-method**

*Summary method for H2OCoxPHModel objects*

**Description**

Summary method for H2OCoxPHModel objects

**Usage**

```r
## S4 method for signature 'H2OCoxPHModel'
summary(object, conf.int = 0.95, scale = 1)
```

**Arguments**

- `object` an H2OCoxPHModel object.
- `conf.int` a specification of the confidence interval.
- `scale` a scale.
Description
Format grid object in user-friendly way

Usage
```r
## S4 method for signature 'H2OGrid'
summary(object, show_stack_traces = FALSE)
```

Arguments
- `object` – an H2OGrid object.
- `show_stack_traces` – a flag to show stack traces for model failures

Description
Print the Model Summary

Usage
```r
## S4 method for signature 'H2OModel'
summary(object, ...)  
```

Arguments
- `object` – An H2OModel object.
- `...` – further arguments to be passed on (currently unimplemented)
use.package

Use optional package

Description
Testing availability of optional package, its version, and extra global default. This function is used internally. It is exported and documented because user can control behavior of the function by global option.

Usage
use.package(
    package,  # character scalar name of a package that we Suggests or Enhances on.
    version = "1.9.8"[package == "data.table"],  # character scalar required version of a package.
    use = getOption("h2o.use.data.table", TRUE)[package == "data.table"]  # logical scalar, extra escape option, to be used as global option.
)

Arguments

package character scalar name of a package that we Suggests or Enhances on.
version character scalar required version of a package.
use logical scalar, extra escape option, to be used as global option.

Details
We use this function to control csv read/write with optional data.table package. Currently data.table is enabled by default for some operations, to disable it set options("h2o.use.data.table"=FALSE). It is possible to control just fread or fwrite with options("h2o.fread"=FALSE, "h2o.fwrite"=FALSE). h2o.fread and h2o.fwrite options are not handled in this function but next to fread and fwrite calls.

See Also
as.h2o.data.frame, as.data.frame.H2OFrame

Examples
op <- options("h2o.use.data.table" = TRUE)
if (use.package("data.table")) {
    cat("optional package data.table 1.9.8+ is available\n")
} else {
    cat("optional package data.table 1.9.8+ is not available\n")
}
options(op)
### Description

The musculoskeletal model, experimental data, settings files, and results for three-dimensional, muscle-actuated simulations at walking speed as described in Hamner and Delp (2013). Simulations were generated using OpenSim 2.4. The data is available from [https://simtk.org/frs/index.php?group_id=603](https://simtk.org/frs/index.php?group_id=603).

### Format

A data frame with 151 rows and 124 columns

### References


### Examples

```r
## Not run:
library(h2o)
h2o.init()
h2o.shutdown(prompt = FALSE)
Sys.sleep(3)
## End(Not run)
```

### Logical and for H2OFrames

#### Description

Logical and for H2OFrames

#### Usage

```
`&&`(x, y)
```

#### Arguments

- `x`: An H2OFrame object
- `y`: An H2OFrame object
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