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h2o-package

**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>Wed Oct 02 00:15:19 UTC 2019</td>
<td>Apache License (== 2.0)</td>
<td>R (&gt;= 2.13.0), RCurl, jsonlite, statmod, tools, methods, utils</td>
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</table>

This package allows the user to run basic H2O commands using R commands. In order to use it, you must first have H2O running. 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 H2O is running on a cluster, you must provide the IP and port of the remote machine as arguments to the `h2o.init()` call.

H2O supports a number of standard statistical models, such as GLM, K-means, and Random Forest.
For example, to run GLM, call `h2o.glm` with the H2O parsed data and parameters (response variable, error distribution, etc...) as arguments. (The operation will be done on the server associated with the data object where H2O is running, not within the R environment).

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.

If you are using an older version of H2O, use the following porting guide to update your scripts:

Porting Scripts

Author(s)

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References

- H2O.ai Homepage
- H2O Documentation
- H2O on GitHub

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.
.h2o.doRawPOST

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, ...)
```
.h2o.locate

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
**Description**

Map of operations known to H2O

**Usage**

```r
.h2o.primitives
```

**Format**

An object of class `character` of length 39.

---

**Description**

Capabilities endpoints

**Usage**

```r
.h2o.__ALL_CAPABILITIES
```

**Format**

An object of class `character` of length 1.

---

**Description**

Check H2O Server Health

**Usage**

```r
.h2o.__checkConnectionHealth()
```
### .h2o.__CREATE_FRAME

**H2OFrame Manipulation**

**Description**

H2OFrame Manipulation

**Usage**

```
.h2o.__CREATE_FRAME
```

**Format**

An object of class `character` of length 1.

---

### .h2o.__DECRYPTION_SETUP

**Decryption Endpoints**

**Description**

Decryption Endpoints

**Usage**

```
.h2o.__DECRYPTION_SETUP
```

**Format**

An object of class `character` of length 1.

---

### .h2o.__DKV

**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**
\[ \text{.h2o.__EXPORT_FILES(frame)} \]

**Arguments**
- **frame**: H2OFrame

---

**Inspect/Summary Endpoints**

**Description**
Inspect/Summary Endpoints

**Usage**
\[ \text{.h2o.__FRAMES} \]

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

---

**Import/Export Endpoints**

**Description**
Import/Export Endpoints

**Usage**
\[ \text{.h2o.__IMPORT} \]

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

Administrative Endpoints

Description
Administrative Endpoints

Usage
.h2o.__JOBS

Format
An object of class character of length 1.

.h2o.__LOGANDECHO
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.
**Model Builder Endpoint Generator**

**Description**
Model Builder Endpoint Generator

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

**Arguments**
algo  
Canonical identifier of H2O algorithm.

**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.
### .h2o.__RAPIDS

#### Rapids Endpoint

**Description**
Rapids Endpoint

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

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

---

### .h2o.__REST_API_VERSION

#### 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.

---

### .h2o.__W2V_SYNONYMS

#### Word2Vec Endpoints

**Description**
Word2Vec Endpoints

**Usage**
```
.h2o.__W2V_SYNONYMS
```

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

 skip_if_not_developer()

 Description

Used to verify data, x, y and turn into the appropriate things

Usage

 verify_dataxy(data, x, y, autoencoder = FALSE)

Arguments

data H2OFrame
x features
y response
autoencoder autoencoder flag
apply

**Description**

Starting H2O For examples

**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**

```r
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

```r
## Not run:
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

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

#### Arguments

- `x`: An H2OFrame object
- `...`: Further arguments to be passed from or to other methods.

#### Examples

```r
## Not run:
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)
```

---

### as.data.frame.H2OFrame

**Converts parsed H2O data into an R data frame**

#### Description

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

#### Usage

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

Arguments

x   An H2OFrame object.

Details

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

See Also

use.package

Examples

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

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

Arguments
x
An R object.
destination_frame
A string with the desired name for the H2OFrame.
...         arguments passed to method arguments.

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 in-  
stalled and imported data.table and slam packages. Turn on h2o datatable by options("h2o.use.data.table"=TRUE)

References
http://blog.h2o.ai/2016/04/fast-csv-writing-for-r/

See Also
use.package

Examples
## Not run:  
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 <- Matrix::Matrix(m, sparse = 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

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

#### Arguments

- `x`  
  An H2OFrame object

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

#### Examples

```r
## Not run:
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.

Further arguments to be passed from or to other methods.

Examples

## Not run:
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

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

Arguments

x An H2OFrame object

mode Mode to coerce vector to
Examples

```r
## Not run:
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 [http://cs.colby.edu/courses/S11/cs251/labs/lab07/AustraliaSubset.csv](http://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

```r
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

```r
## Not run:
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**

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

**Arguments**

- **x**: An H2OFrame object.

**See Also**

`dim` for the base R method.

**Examples**

```r
## Not run:
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:
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, ...)
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.

Usage

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.

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**

```r
h2o.abs(x)
```

**Arguments**

- **x**
  - An H2OFrame object.

**See Also**

`abs` for the base R implementation.

**Examples**

```r
## Not run:
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.acos

Compute the arc cosine of x

Description

Compute the arc cosine of x

Usage

h2o.acos(x)

Arguments

x An H2OFrame object.

See Also

acos for the base R implementation.

Examples

## Not run:
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
h2o.acos(prostate[,2])
## 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

```r
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", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

save_mapping_frame

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

numIterationWithoutNewExemplar

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

exportCheckpointsDir

Automatically export generated models to this directory.

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
categorical_encoding="Eigen"
agg <- h2o.aggregator(training_frame=df,
                       target_num_exemplars=target_num_exemplars,
                       rel_tol_num_exemplars=rel_tol_num_exemplars,
                       categorical_encoding=categorical_encoding)
## End(Not run)
```

---

**h2o.aic**

Retrieves 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:
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)
```

---

**h2o.all**

*Given a set of logical vectors, are all of the values true?*

**Description**

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.

---

**h2o.anomaly**

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

**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.
h2o.anyFactor  

Description

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

Usage

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  

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

h2o.arrange(x, ...)

Arguments

x  
The H2OFrame input to be sorted.

...  
The column names to sort by.
### h2o.ascharacter

**Convert H2O Data to Characters**

**Description**

Convert H2O Data to Characters

**Usage**

```r
h2o.ascharacter(x)
```

**Arguments**

- `x` An H2OFrame object.

**See Also**

`as.character` for the base R implementation.

### h2o.asfactor

**Convert H2O Data to Factors**

**Description**

Convert H2O Data to Factors

**Usage**

```r
h2o.asfactor(x)
```

**Arguments**

- `x` An H2OFrame object.

**See Also**

`as.factor` for the base R implementation.
h2o.asnumeric

Convert H2O Data to Numerics

Description

Convert H2O Data to Numerics

Usage

h2o.asnumeric(x)

Arguments

x

An H2OFrame object.

See Also

as.numeric for the base R implementation.

h2o.assign

Rename an H2O object.

Description

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

Usage

h2o.assign(data, key)

Arguments

data

An H2OFrame object

key

The key to be associated with the H2O parsed data object
**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**

```r
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.automl

#### Description

The Automatic Machine Learning (AutoML) function automates the supervised machine learning model training process. The current version of AutoML trains and cross-validates a Random Forest, an Extremely-Randomized Forest, a random grid of Gradient Boosting Machines (GBMs), a random grid of Deep Neural Nets, and then trains a Stacked Ensemble using all of the models.

#### Usage

```r
h2o.automl(x, y, training_frame, validation_frame = NULL,
leaderboard_frame = NULL, 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 = 3600, max_runtime_secs_per_model = NULL,
max_models = NULL, stopping_metric = c("AUTO", "deviance", "logloss",
"MSE", "RMSE", "MAE", "RMSLE", "AUC", "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,
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", "mean_per_class_error"), export_checkpoints_dir = NULL,
verbosity = NULL)
```

#### 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 metalearning algorithm in Stacked Ensembles (instead of relying on cross-validated predicted values); Optional.

**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**  
Maximum allowed runtime in seconds for the entire model training process. Use 0 to disable. Defaults to 3600 secs (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.

**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”, “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 based on the training frame ID.

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".

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.

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", "logloss", "mean_per_class_error", "RMSE", "MSE". For regression choose between "mean_residual_deviance", "RMSE", "MSE", "MAE", and "MSLE". 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 "debug", "info", "warn". Defaults to NULL (disable live log).
**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
**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.

**h2o.bottomN**  
_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**

```r
h2o.bottomN(x, column, nPercent)
```

**Arguments**

- `x`: an H2OFrame
- `column`: a column name or column index to grab the top N percent value from
- `nPercent`: 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
h2o.cbind  

*Combine H2O Datasets by Columns*

**Description**

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

**Usage**

```
h2o.cbind(...)```

**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**

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

**Arguments**

```
x  An H2OFrame object.
```
h2o.centroid_stats

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)

See Also
ceiling for the base R implementation.
**Arguments**

- **object**: An `H2OClusteringModel` object.
- **train**: Retrieve the training centroid statistics
- **valid**: Retrieve the validation centroid statistics
- **xval**: Retrieve the cross-validation centroid statistics

**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)
```

**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**
```r
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**
```r
h2o.clusterStatus()
```

**See Also**
- `H2OConnection`, `h2o.init`

**Examples**
```r
## 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
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

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
h2o.coef(object)

Arguments
- object: an H2OModel object.
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**

```r
h2o.coef_norm(object)
```

**Arguments**
- `object`  
an H2OModel object.

h2o.colnames  
*Return column names of an H2OFrame*

**Description**
Return column names of an H2OFrame

**Usage**

```r
h2o.colnames(x)
```

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

**See Also**
- `colnames` for the base R implementation.
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)
- ... Ignored

Value

A list of column indices that correspond to "type"

Examples

```r
## 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)
```

Compute weighted gram matrix.

Usage

h2o.computeGram(X, weights = "", use_all_factor_levels = FALSE, standardize = TRUE, skip_missing = FALSE)
Arguments
- \( X \) an \texttt{H2OModel} corresponding to H2O framel.
- \texttt{weights} character corresponding to name of weight vector in frame.
- \texttt{use_all_factor_levels} logical flag telling h2o whether or not to skip first level of categorical variables during one-hot encoding.
- \texttt{standardize} logical flag telling h2o whether or not to standardize data
- \texttt{skip_missing} logical flag telling h2o whether skip rows with missing data or impute them with mean

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

**Usage**

```r
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)
```

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

**Details**
The \texttt{H2OModelMetrics} version of this function will only take \texttt{H2OBinomialMetrics} or \texttt{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.

See Also

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

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")
h2o.confusionMatrix(model, prostate)
# Generating a ModelMetrics object
perf <- h2o.performance(model, prostate)
h2o.confusionMatrix(perf)

## End(Not run)
insecure  (Optional) Set this to TRUE to disable SSL certificate checking.
username (Optional) Username to login with.
password  (Optional) Password to login with.
cookies   (Optional) Vector(or 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

```r
## 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

```r
h2o.cor(x, y = NULL, na.rm = FALSE, use)
cor(x, ...)
```

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
- **...** Further arguments to be passed down from other methods.
h2o.cos

Examples

## Not run:
h2o.init()
prostate_path <- system.file("extdata", "prostate.csv", package = "h2o")
prostate <- h2o.uploadFile(path = prostate_path)
cor(prostate$AGE)

## End(Not run)

h2o.cos

Compute the cosine of x

Description

Compute the cosine of x

Usage

h2o.cos(x)

Arguments

x

An H2OFrame object.

See Also

cos for the base R implementation.

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

cosh for the base R implementation.
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)

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.
**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**

```r
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.
- `integer_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.
- `binary_ones_fraction`  The fraction of values in a binary column that are set to 1.
time_fraction The fraction of randomly created date/time columns.
string_fraction The fraction of randomly created string columns.
missing_fraction The fraction of total entries in the data frame that are set to NA.
response_factors If has_response = TRUE, then this is the number of factor levels in the response column.
has_response A logical value indicating whether an additional response column should be prepended to the final H2O data frame. If set to TRUE, the total number of columns will be cols+1.
seed A seed used to generate random values when randomize = TRUE.
seed_for_column_types A seed used to generate random column types when randomize = TRUE.

Value

Returns an H2OFrame object.

Examples

## Not run:
library(h2o)
h2o.init()
hf <- h2o.createFrame(rows = 1000, cols = 100, categorical_fraction = 0.1,
  factors = 5, integer_fraction = 0.5, integer_range = 1,
  has_response = TRUE)
head(hf)
summary(hf)

hf <- h2o.createFrame(rows = 100, cols = 10, randomize = FALSE, value = 5,
  categorical_fraction = 0, integer_fraction = 0)
summary(hf)

## End(Not run)

h2o.cross_validation_fold_assignment

Retrieves the cross-validation fold assignment

Description

Retrieve the cross-validation fold assignment

Usage

h2o.cross_validation_fold_assignment(object)

Arguments

object An H2OModel object.
**h2o.cross_validation_holdout_predictions**

*Retrieve the cross-validation holdout predictions*

**Description**

Retrieve the cross-validation holdout predictions

**Usage**

\[
\text{h2o.cross_validation_holdout_predictions}(\text{object})
\]

**Arguments**

- object: An H2OModel object.

**Value**

Returns a H2OFrame

---

**h2o.cross_validation_models**

*Retrieve the cross-validation models*

**Description**

Retrieve the cross-validation models

**Usage**

\[
\text{h2o.cross_validation_models}(\text{object})
\]

**Arguments**

- object: An H2OModel object.

**Value**

Returns a list of H2OModel objects
Retrieve the cross-validation predictions

Usage

h2o.cross_validation_predictions(object)

Arguments

object An H2OModel object.

Value

Returns a list of H2OFrame objects

Return the cumulative max over a column or across a row

Usage

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

cummax for the base R implementation.
**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).

**See Also**

- `cummin` for the base R implementation.

---

**h2o.cumprod**

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

**Description**

Return the cumulative product over a column or across a row

**Usage**

```r
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**

- `cumprod` for the base R implementation.
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.

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, ...)

## 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
sing "(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 /codeLogical, 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)
```

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

h2o.dayOfWeek(x)
dayOfWeek(x)

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

Arguments

x
An H2OFrame object.

Value

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

See Also

h2o.day, h2o.month

h2o.dct

Compute DCT of an H2OFrame

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
**h2o.ddply**

**Value**

Returns an H2OFrame object.

**Examples**

```r
## 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), 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, 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)
```

---

**h2o.ddply**  
**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.

**Usage**

```r
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

**See Also**

- `ddply` for the plyr library implementation.
Examples

```r
## 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 flowe 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)
```

---

### h2o.deepfeatures

*Feature Generation via H2O Deep Learning or DeepWater Model*

#### Description

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

#### Usage

```r
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 (for DeepLearning, integer) or Name (for DeepWater, String) 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.
- [h2o.deepwater](#) for making H2O DeepWater 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)

#if (h2o.deepwater.available()) {
  # prostate dl = h2o.deepwater(x = 3:9, y = 2, backend="mxnet", training_frame = prostate,
  #    hidden = c(100, 200), epochs = 5)
  # prostate_deepfeatures_layer1 =
  #    h2o.deepfeatures(prostate dl, prostate, layer = "fc1_w")
  # prostate_deepfeatures_layer2 =
  #    h2o.deepfeatures(prostate dl, prostate, layer = "fc2_w")
  # head(prostate_deepfeatures_layer1)
  # head(prostate_deepfeatures_layer2)
#}

## End(Not run)
```

h2o.deeplearning

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,
```
h2o.deeplearning

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, 
regression_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", 
"MAE", "RMSELE", "AUC", "lift_top_group", "misclassification", "AUCPR", 
"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, 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.

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.


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_distribution**

**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.

**loss**

**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", "lift_top_group", "misclassification", "AUCPR", "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.

**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: "Uniform", "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). 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, or 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. Defaults to FALSE. #Experimental
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.deepwater
  Build a Deep Learning model using multiple native GPU backends

Description
  Builds a deep neural network on an H2OFrame containing various data sources.

Usage
  h2o.deepwater(x, y, training_frame, model_id = NULL, checkpoint = NULL,
  autoencoder = FALSE, validation_frame = NULL, nfolds = 0,
  balance_classes = FALSE, max_after_balance_size = 5,
  class_sampling_factors = NULL, 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, offset_column = NULL, weights_column = NULL,
  score_each_iteration = FALSE, categorical_encoding = c("AUTO",
  "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen",
  "LabelEncoder", "SortByResponse", "EnumLimited"),
  overwrite_with_best_model = TRUE, epochs = 10,
train_samples_per_iteration = -2, target_ratio_comm_to_comp = 0.05,
seed = -1, standardize = TRUE, learning_rate = 0.001,
learning_rate_annealing = 1e-06, momentum_start = 0.9,
momentum_ramp = 10000, momentum_stable = 0.9,
distribution = c("AUTO", "bernoulli", "multinomial", "gaussian",
"poisson", "gamma", "tweedie", "laplace", "quantile", "huber"),
score_interval = 5, score_training_samples = 10000,
score_validation_samples = 0, score_duty_cycle = 0.1,
classification_stop = 0, regression_stop = 0, stopping_rounds = 5,
stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE",
"MAE", "RMSLE", "AUC", "lift_top_group", "misclassification", "AUCPR",
"mean_per_class_error", "custom", "custom_increasing"),
stopping_tolerance = 0, max_runtime_secs = 0,
ignore_const_cols = TRUE, shuffle_training_data = TRUE,
mini_batch_size = 32, clip_gradient = 10, network = c("auto",
"user", "lenet", "alexnet", "vgg", "googlenet", "inception_bn",
"resnet"), backend = c("mxnet", "caffe", "tensorflow"),
image_shape = c(0, 0), channels = 3, sparse = FALSE, gpu = TRUE,
device_id = c(0), cache_data = TRUE,
network_definition_file = NULL, network_parameters_file = NULL,
mean_image_file = NULL, export_native_parameters_prefix = NULL,
activation = c("Rectifier", "Tanh"), hidden = NULL,
input_dropout_ratio = 0, hidden_dropout_ratios = NULL,
problem_type = c("auto", "image", "dataset"),
extport_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.
checkpoint  Model checkpoint to resume training with.
autoencoder  Logical. Auto-Encoder. Defaults to FALSE.
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.
balance_classes  Logical. Balance training data class counts via over/under-sampling (for imbalanced data). Defaults to FALSE.
 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.
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.
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.

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.

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

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

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

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).

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

learning_rate
Learning rate (higher => less stable, lower => slower convergence). Defaults to 0.001.
learning_rate_annealing
Learning rate annealing: rate / (1 + rate_annealing * samples). Defaults to 1e-06.
momentum_start
Initial momentum at the beginning of training (try 0.5). Defaults to 0.9.
momentum_ramp
Number of training samples for which momentum increases. Defaults to 10000.
momentum_stable
Final momentum after the ramp is over (try 0.99). Defaults to 0.9.
distribution
Distribution function Must be one of: "AUTO", "bernoulli", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber". Defaults to AUTO.
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 0.
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", "lift_top_group", "misclassification", "AUCPR", "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.
max_runtime_secs
Maximum allowed runtime in seconds for model training. Use 0 to disable. Defaults to 0.
ignore_const_cols
Logical. Ignore constant columns. Defaults to TRUE.
shuffle_training_data
Logical. Enable global shuffling of training data. Defaults to TRUE.
mini_batch_size
Mini-batch size (smaller leads to better fit, larger can speed up and generalize better). Defaults to 32.
clip_gradient
Clip gradients once their absolute value is larger than this value. Defaults to 10.

backend Deep Learning Backend. Must be one of: "mxnet", "caffe", "tensorflow". Defaults to mxnet.

image_shape Width and height of image. Defaults to c(0, 0).

channels Number of (color) channels. Defaults to 3.

sparse Logical. Sparse data handling (more efficient for data with lots of 0 values). Defaults to FALSE.

gpu Logical. Whether to use a GPU (if available). Defaults to TRUE.

device_id Device IDs (which GPUs to use). Defaults to c(0).

cache_data Logical. Whether to cache the data in memory (automatically disabled if data size is too large). Defaults to TRUE.

network_definition_file Path of file containing network definition (graph, architecture).

network_parameters_file Path of file containing network (initial) parameters (weights, biases).

mean_image_file Path of file containing the mean image data for data normalization.

export_native_parameters_prefix Path (prefix) where to export the native model parameters after every iteration.

activation Activation function. Only used if no user-defined network architecture file is provided, and only for problem_type=dataset. Must be one of: "Rectifier", "Tanh".

hidden Hidden layer sizes (e.g. [200, 200]). Only used if no user-defined network architecture file is provided, and only for problem_type=dataset.

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.

problem_type Problem type, auto-detected by default. If set to image, the H2OFrame must contain a string column containing the path (URI or URL) to the images in the first column. If set to text, the H2OFrame must contain a string column containing the text in the first column. If set to dataset, Deep Water behaves just like any other H2O Model and builds a model on the provided H2OFrame (non-String columns). Must be one of: "auto", "image", "dataset". Defaults to auto.

export_checkpoints_dir Automatically export generated models to this directory.
**h2o.deepwater.available**

_Determines whether Deep Water is available_

**Description**

Ask the H2O server whether a Deep Water model can be built. (Depends on availability of native backends.) Returns TRUE if a Deep Water model can be built, or FALSE otherwise.

**Usage**

```r
h2o.deepwater.available(h2oRestApiVersion = .h2o.__REST_API_VERSION)
```

**Arguments**

- `h2oRestApiVersion`
  
  (Optional) Specific version of the REST API to use.

---

**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.

---

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.
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.

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:
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
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
## 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
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.
h2o.download_mojo

## 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)

---

**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()
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

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

## 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, get_jar = FALSE )  # save only the POJO to the current working directory, NOT RUN
h2o.download_pojo(my_model, get_jar = TRUE)  # save the current working directory

## 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**

```r
## Not run:
library(h2o)
h2o.init()
buys <- as.h2o(c("no", "no", "yes", "yes", "no", "yes", "no", "yes", "yes", "no"))
buys_entropy <- h2o.entropy(buys)
## End(Not run)
```

---

h2o.exp

**Description**

Compute the exponential function of x

**Usage**

```
h2o.exp(x)
```

**Arguments**

- `x` An H2OFrame object.

**See Also**

- `exp` for the base R implementation.
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)

Arguments

data An H2OFrame object.

path The path to write the file to. Must include the directory and also filename if exporting to a single file. May be prefaced with hdfs:// or s3n://. Each row of data appears as line of the file.

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

sep The field separator character. Values on each line of the file will be separated by this character (default ",").

compression How to compress the exported dataset

parts integer, number of part files to export to. Default is to write to a single file. Large data can be exported to multiple ‘part’ files, where each part file contains subset of the data. User can specify the maximum number of part files or use value -1 to indicate that H2O should itself determine the optimal number of files. Parameter path will be considered to be a path to a directory if export to multiple part files is desired. Part files conform to naming scheme ’part-m-?????’.

Details

In the case of existing files force = TRUE will overwrite the file. Otherwise, the operation will fail.

Examples

```r
## 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)
```
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.

h2o.fillna  fillNA

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

Usage
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()
fr_with_nas = h2o.createFrame(categorical_fraction = 0.0, missing_fraction = 0.7, rows = 6, cols = 2, seed = 123)
fr <- h2o.fillna(fr_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

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.
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

h2o.find_row_by_threshold(object, threshold)

Arguments

object H2OBinomialMetrics
threshold number between 0 and 1

h2o.find_threshold_by_max_metric

Find the threshold, give the max metric

Description

Find the threshold, give the max metric

Usage

h2o.find_threshold_by_max_metric(object, metric)

Arguments

object H2OBinomialMetrics
metric "F1," for example
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

h2o.floor(x)

Arguments

x
An H2OFrame object.

See Also

floor for the base R implementation.

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.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".

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

## 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)
h2o.gbm(x, y, training_frame, model_id = NULL, validation_frame = NULL, nfold = 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, nbins_top_level = 1024, nbins_cats = 1024, r2_stopping = Inf, stopping_rounds = 0, stopping_metric = c("AUTO", "deviance", "logloss", "MSE", "RMSE", "MAE", "RMSLE", "AUC", "lift_top_group", "misclassification", "AUCPR", "mean_per_class_error", "custom", "custom_increasing"), stopping_tolerance = 0.001, max_runtime_secs = 0, seed = -1, build_tree_one_node = FALSE, learn_rate = 0.1, learn_rate_annealing = 1, distribution = c("AUTO", "bernoulli", "quasibinomial", "multinomial", "gaussian", "poisson", "gamma", "tweedie", "laplace", "quantile", "huber", "custom"), quantile_alpha = 0.5, tweedie_power = 1.5, huber_alpha = 0.9, checkpoint = NULL, sample_rate = 1, sample_rate_per_class = NULL, col_sample_rate = 1, col_sample_rate_change_per_level = 1, col_sample_rate_per_tree = 1, min_split_improvement = 1e-05, histogram_type = c("AUTO", "UniformAdaptive", "Random", "QuantilesGlobal", "RoundRobin"), max_abs_leafnode_pred = Inf, pred_noise_bandwidth = 0, categorical_encoding = c("AUTO", "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder", "SortByResponse", "EnumLimited"), calibrate_model = FALSE, calibration_frame = NULL, custom_metric_func = NULL, custom_distribution_func = NULL, export_checkpoints_dir = NULL, monotone_constraints = NULL, check_constant_response = TRUE, 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.

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

ntrees
Number of trees. Defaults to 50.

max_depth
Maximum tree depth. 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.
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 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", "lift_top_group", "misclassification", "AUCPR", "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.

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
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)

# 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.getAutoML

Get an R object that is a subclass of H2OAutoML

Description

Get an R object that is a subclass of H2OAutoML
Usage

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

## Not run:
library(h2o)
h2o.init()
votes_path <- system.file("extdata", "housevotes.csv", package = "h2o")
votes_hf <- h2o.uploadFile(path = votes_path, header = TRUE)
aml <- h2o.automl(y = "Class", project_name="aml_housevotes", training_frame = votes_hf, max_runtime_secs = 30)
automl_retrieved <- h2o.getAutoML("aml_housevotes")
## End(Not run)

---

**h2o.getConnection**

*Retrieve an H2O Connection*

**Description**

Attempt to recover an h2o connection.

**Usage**

h2o.getConnection()

**Value**

Returns an H2OConnection object.

---

**h2o.getFrame**

*Get an R Reference to an H2O Dataset, that will NOT be GC’d by default*

**Description**

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

**Usage**

h2o.getFrame(id)
**h2o.getFutureModel**

**Arguments**

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

**Description**

Get future model

**Usage**

```
h2o.getFutureModel(object, verbose = FALSE)
```

**Arguments**

- object  
  H2OModel

- verbose  
  Print model progress to console. Default is FALSE

---

**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)

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

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)
**h2o.getModel**

> Get an R reference to an H2O model

**Arguments**

\[ x \]  
An H2OFrame

**Value**

The id of the H2OFrame

---

**Description**

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

**Usage**

\[ h2o.getModel(model_id) \]

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

---

**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**

Usage example:

```
airlines.data <- h2o.importFile(path = '/path/to/airlines_train.csv')
gbm.model = h2o.gbm(x=c("Origin", "Dest", "Distance"),y="IsDepDelayed",training_frame=airlines.data ,model_id="gbm_trees_model")
tree <- h2o.getModelTree(gbm.model, 1, 1);
```
**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.

---

**h2o.getTimezone**  
*Get the Time Zone on the H2O cluster Returns a string*

**Description**

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
h2o.getVersion

Description
Get h2o version

Usage
h2o.getVersion()

h2o.giniCoef

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**
```
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, ignore_const_cols = TRUE,  
score_each_iteration = FALSE, offset_column = NULL,  
weights_column = NULL, family = c("gaussian", "binomial",  
"quasibinomial", "ordinal", "multinomial", "poisson", "gamma", "tweedie",  
"negativbinomial"), 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", "ologit"), prior = -1, lambda_min_ratio = -1,  
beta_constraints = NULL, max_active_predictors = -1,  
interactions = NULL, interaction_pairs = NULL, obj_reg = -1,  
export_checkpoints_dir = NULL, 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.
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
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.
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.

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.

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

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/re1-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

## 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(
  path="https://s3.amazonaws.com/h2o-public-test-data/smalldata/demos/bank-additional-full.csv"
)
predictors = 1:20
target="y"

glm = h2o.glm(x=predictors, 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**

h2o.glrm(training_frame, cols = NULL, model_id = NULL,
validation_frame = NULL, ignore_const_cols = TRUE,
score_each_iteration = FALSE, transform = c("NONE", "STANDARDIZE", "NORMALIZE", "DEMEAN", "DESCALE"),
k = 1, loss = c("Quadratic", "Absolute", "Huber", "Poisson", "Hinge",

...

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.
loading_name 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 Initialization mode Must be one of: "Random", "SVD", "PlusPlus", "User". Defaults to PlusPlus.
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
## 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)
h2o.grep

Search for matches to an argument pattern

Description

Searches for matches to argument 'pattern' within each element of a string column.

Usage

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

## 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)
```

**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.
- `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.
- `search_criteria`: (Optional) List of control parameters for smarter hyperparameter search. The default strategy 'Cartesian' covers the entire space of hyperparameter combinations. Specify the 'RandomDiscrete' strategy to get random search of all the combinations of your hyperparameters. RandomDiscrete should be usually combined with at least one early stopping criterion, max_models and/or max_runtime_secs, e.g. `list(strategy = "RandomDiscrete", max_models = 42, max_runtime_secs = 14400)` or `list(strategy = "RandomDiscrete", stopping_metric = "AUTO", stopping_tolerance = 0.0001, stopping_rounds = 10)` or `list(strategy = "RandomDiscrete", stopping_metric = "misclassification", stopping_rounds = 10)`.

**Details**

Launch grid search with given algorithm and parameters.
Examples

## 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)

---

h2o.group_by

Group and Apply by Column

Description

Performs a group by and apply similar to ddply.

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 handling 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

---

### 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**

```r
## 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, ...)  
## S3 method for class 'H2OFrame'
head(x, n = 6L, ...)  
h2o.tail(x, n = 6L, ...)  
## S3 method for class 'H2OFrame'
tail(x, n = 6L, ...)

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.

...  
Ignored.

Value

An H2OFrame containing the first or last n rows 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)
head(australia, 10)
tail(australia, 10)

## 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.
breaks 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(-50,213.2123,9324834)
plot A logical value indicating whether or not a plot should be generated (default is TRUE).

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)

Arguments

object An H2OModel object.
train Retrieve the training Hit Ratio
valid Retrieve the validation Hit Ratio
xval Retrieve the cross-validation Hit Ratio
**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
h2o.hour(x)
hour(x)
```

```r
## S3 method for class 'H2OFrame'
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`

---

**h2o.ifelse**

*H2O Apply Conditional Statement*

**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.
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:
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)
```
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.

pattern
(Optional) Character string containing a regular expression to match file(s) in the folder.

progressBar
(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"

Details

h2o.importFile is a parallelized reader and pulls information from the server from a location specified by the client. The path is a server-side path. This is a fast, scalable, highly optimized way to read data. H2O pulls the data from a data store and initiates the data transfer as a read operation. Unlike the import function, which is a parallelized reader, h2o.uploadFile is a push from the client to the server. The specified path must be a client-side path. This is not scalable and is only intended for smaller data sizes. The client pushes the data from a local filesystem (for example, on your machine where R is running) to H2O. For big-data operations, you don’t want the data stored on or flowing through the client.

h2o.importFolder imports an entire directory of files. If the given path is relative, then it will be relative to the start location of the H2O instance. The default behavior is to pass-through to the parse phase automatically.

h2o.importHDFS is deprecated. Instead, use h2o.importFile.
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.

**Usage**

```r
h2o.import_hive_table(database, table, partitions = NULL, allow_multi_format = FALSE)
```

**Arguments**

- `database` Name of Hive database (default database will be used by default)
- `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")))`
**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**

```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)

# 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>:<path_to_h2o_jar>:lib\water.H2OApp` Also see h2o.import_sql_table. Currently supported SQL databases are MySQL, PostgreSQL, MariaDB, Hive, Oracle and Microsoft SQL Server.
Usage

`h2o.import_sql_table` Import SQL Table into H2O

**Description**

Imports SQL table into an H2O cluster. Assumes that the SQL table is not being updated and is stable. Runs multiple SELECT SQL queries concurrently for parallel ingestion. 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_select. Currently supported SQL databases are MySQL, PostgreSQL, MariaDB, Hive, Oracle and Microsoft SQL Server.

**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

```r
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)
```

h2o.init

Initialize and Connect to H2O

Description
Attempts to start and/or connect to and H2O instance.

Usage
```
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_, 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 \texttt{h2o} R library resources directory \texttt{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.

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.

username (Optional) Username to login with.

password (Optional) Password to login with.

cookies (Optional) Vector(or list) of cookies to add to request.

context_path (Optional) The last part of connection URL: http://<ip>:<port>/context_path

ignore_config (Optional) A logical value indicating whether a search for a \texttt{.h2oconfig} file should be conducted or not. Default value is FALSE.

extra_classpath (Optional) A vector of paths to libraries to be added to the Java classpath when H2O is started from R.

jvm_custom_args (Optional) A character list of custom arguments for the JVM where new H2O instance is going to run, if started. Ignored when connecting to an existing instance.
bind_to_localhost

(Optional) A logical flag indicating whether access to the H2O instance should be restricted to the local machine (default) or if it can be reached from other computers on the network. Only applicable when H2O is started from R.

Details

By default, this method first checks if an H2O instance is connectible. If it cannot connect and \texttt{start = TRUE} with \texttt{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 (\texttt{system.file("java", "h2o.ja}}) 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 \texttt{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. \texttt{h2o.shutdown} for shutting down from R.

Examples

```r
## Not run:
# Try to connect to a local H2O instance that is already running.
# If not found, start a local H2O instance from R with the default settings.
# h2o.init()

# Try to connect to a local H2O instance.
# If not found, raise an error.
# h2o.init(startH2O = FALSE)

# Try to connect to a local H2O instance that is already running.
# If not found, start a local H2O instance from R with 5 gigabytes of memory.
# h2o.init(max_mem_size = "5g")

# Try to connect to a local H2O instance that is already running.
# If not found, start a local H2O instance from R that uses 5 gigabytes of memory.
# h2o.init(max_mem_size = "5g")

## End(Not run)
```
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)

irismiss <- h2o.insertMissingValues(iris_hf, fraction = 0.25)
head(irismiss)
summary(irismiss)
## 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**

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

# Create some random data
myframe <- 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
myframe[,5] <- as.factor(myframe[,5])
head(myframe, 20)

# Create pairwise interactions
pairwise <- h2o.interaction(myframe,
    factors = list(c(1, 2), c("C2", "C3", "C4")),
    pairwise = TRUE)
```

head(pairwise, 20)
h2o.levels(pairwise, 2)

# Create 5-th order interaction
higherorder <- h2o.interaction(myframe, destination_frame = 'higherorder', 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(myframe[,5], 20)
trim_integer_levels <- h2o.interaction(myframe, factors = 'C5', pairwise = FALSE, max_factors = 3, min_occurrence = 2)
head(trim_integer_levels, 20)

# Put all together
myframe <- h2o.cbind(myframe, pairwise, higherorder, trim_integer_levels)
myframe
head(myframe, 20)
summary(myframe)

## End(Not run)

---

**h2o.isax**

**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**

http://www.cs.ucr.edu/~eamonn/iSAX_2.0.pdf
http://www.cs.ucr.edu/~eamonn/SAX.pdf
**h2o.ischaracter**  
*Check if character*

**Description**  
Check if character

**Usage**  
`h2o.ischaracter(x)`

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

**See Also**  
`is.character` for the base R implementation.

---

**h2o.isfactor**  
*Check if factor*

**Description**  
Check if factor

**Usage**  
`h2o.isfactor(x)`

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

**See Also**  
`is.factor` for the base R implementation.
h2o.isnumeric  Check if numeric

Description
Check if numeric

Usage
h2o.isnumeric(x)

Arguments
x  An H2OFrame object.

See Also
is.numeric for the base R implementation.

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, 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)

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. 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.
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)

```r
## S4 method for signature 'Keyed'
h2o.keyof(object)

## S4 method for signature 'H2OModel'
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.

---

**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.
h2o.kmeans

**Usage**

```r
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)
```

**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", "Sort-ByResponse", "EnumLimited". Defaults to AUTO.

export_checkpoints_dir  Automatically export generated models to this directory.

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

```r
## 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.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)
```

```r
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:
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

```r
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

```r
## Not run:
iris_hf <- as.h2o(iris)
h2o.levels(iris_hf, 5) # returns "setosa" "versicolor" "virginica"
## End(Not run)
```
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>h2o.listTimezones</code></td>
<td>List all of the Time Zones Acceptable by the H2O cluster.</td>
</tr>
<tr>
<td><code>h2o.list_all_extensions</code></td>
<td>List all H2O registered extensions</td>
</tr>
<tr>
<td><code>h2o.list_api_extensions</code></td>
<td>List registered API extensions</td>
</tr>
<tr>
<td><code>h2o.list_core_extensions</code></td>
<td>List registered core extensions</td>
</tr>
</tbody>
</table>

**Description**

- `h2o.listTimezones`: List all of the Time Zones Acceptable by the H2O cluster.
- `h2o.list_all_extensions`: List all H2O registered extensions
- `h2o.list_api_extensions`: List registered API extensions
- `h2o.list_core_extensions`: List registered core extensions

**Usage**

- `h2o.listTimezones()`
- `h2o.list_all_extensions()`
- `h2o.list_api_extensions()`
- `h2o.list_core_extensions()`
**h2o.list_jobs**

*Return list of jobs performed by the H2O cluster*

**Description**

Return list of jobs performed by the H2O cluster

**Usage**

`h2o.list_jobs()`

**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**

```r
## 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.

h2o.log10

Compute the log10 of x

Description

Compute the log10 of x

Usage

h2o.log10(x)

Arguments

x  An H2OFrame object.

See Also

log10 for the base R implementation.
**h2o.log1p**

*Compute the log1p of x*

**Description**

Compute the log1p of x

**Usage**

\[ h2o.log1p(x) \]

**Arguments**

\[ x \]

An H2OFrame object.

**See Also**

log1p for the base R implementation.

---

**h2o.log2**

*Compute the log2 of x*

**Description**

Compute the log2 of x

**Usage**

\[ h2o.log2(x) \]

**Arguments**

\[ x \]

An H2OFrame object.

**See Also**

log2 for the base R implementation.
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
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

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

## 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

h2o.makeGLMModel(model, beta)

Arguments

- model: a new 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
h2o.make_metrics(predicted, actuals, domain = NULL, distribution = NULL)

Arguments
- **predicted**: An H2OFrame containing predictions
- **actuals**: An H2OFrame containing actual values
- **domain**: Vector with response factors for classification.
- **distribution**: Distribution for regression.

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)
```

h2o.match

Value Matching in H2O

Description
match and %in% return values similar to the base R generic functions.

Usage
h2o.match(x, table, nomatch = 0, incomparables = NULL)
match.H2OFrame(x, table, nomatch = 0, incomparables = NULL)
x %in% table
**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.

**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**

- `max` for the base R implementation.
**h2o.mean**

Compute the frame’s mean by-column (or by-row).

**Description**

Compute the frame’s mean by-column (or by-row).

**Usage**

```r
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. Otherwise, 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**

`mean`, `rowMeans`, or `colMeans` for the base R implementation

**Examples**

```r
## Not run:
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)
```
h2o.mean_per_class_error

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

**Retrieve the Mean Residual Deviance value**

**Description**

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**

```r
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**

```r
h2o.median(x, na.rm = TRUE)
```

**Examples**

```r
## 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

h2o.melt(x, id_vars, value_vars = NA_character_, 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
**h2o.merge**

 Merge Two H2O Data Frames

**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**

```r
## Not run:
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.sensitivity(object, thresholds)`
- `h2o.fallout(object, thresholds)`
- `h2o.missrate(object, thresholds)`
- `h2o.specificity(object, thresholds)`

**Arguments**
- `object`  
  An H2OModelMetrics object of the correct type.
h2o.min

Returns the minima of the input values.

**Description**

Returns the minima of the input values.

**Usage**

\[ h2o.min(x, na.rm = FALSE) \]
h2o.mojo_predict_csv

Arguments

- x: An H2OFrame object.
- na.rm: logical. indicating whether missing values should be removed.

See Also

min for the base R implementation.

h2o.mktime

Compute msec since the Unix Epoch

Description

Compute msec since the Unix Epoch

Usage

h2o.mktime(year = 1970, month = 0, day = 0, hour = 0, minute = 0,
second = 0, msec = 0)

Arguments

- year: Defaults to 1970
- month: zero based (months are 0 to 11)
- day: zero based (days are 0 to 30)
- hour: hour
- minute: minute
- second: second
- msec: msec

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

h2o.mojo_predict_csv(input_csv_path, mojo_zip_path,
output_csv_path = NULL, genmodel_jar_path = NULL, classpath = NULL,
java_options = NULL, verbose = F, setInvNumNA = F)
**h2o.mojo_predict_df**

**Arguments**

- `input_csv_path`: Path to input CSV file.
- `mojo_zip_path`: Path to MOJO zip downloaded from H2O.
- `output_csv_path`: 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`: 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.

**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.

Value

Returns a data.frame containing computed predictions

---

### h2o.month

**Convert Milliseconds to Months in H2O Datasets**

**Description**

Converts the entries of an H2OFrame object from milliseconds to months (on a 1 to 12 scale).

**Usage**

```r
h2o.month(x)
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**

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

**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**

```r
h2o.nacnt(x)
```

**Arguments**

- `x` An H2OFrame object.

**Value**

Returns a list containing the count of NAs per column

**Examples**

```r
## Not run:
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,
```

```r```
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)

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.
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).
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 clas-
    sification problems. Must be one of: "AUTO", "Random", "Modulo", "Strati-
    fied". 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. De-
    fault 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 im-
                      balanced 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 bal-
                        ance 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.

Value
an object of class H2OBinomialModel if the response has two categorical levels, and H2OMultinomialModel
otherwise.

Examples
## 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.

Description

Remove Rows With NAs

Usage

h2o.na_omit(object, ...)

Arguments

object H2OFrame object
...
... Ignored

Value

Returns an H2OFrame object containing non-NA rows.

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**

`ncol` for the base R implementation.

---

**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.
h2o.no_progress Disable Progress Bar

Description
Disable Progress Bar

Usage
h2o.no_progress()

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.

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
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**

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

h2o.num_iterations

Retrieve the number of iterations.

**Description**

Retrieve the number of iterations.

**Usage**

h2o.num_iterations(object)

**Arguments**

- **object**: An H2OClusteringModel object.
- **...**: further arguments to be passed on (currently unimplemented)
**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**

\[
\text{h2o.num_valid_substrings}(x, \text{path})
\]

**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**

\[
\text{h2o.openLog}(\text{type})
\]

**Arguments**

- **type**
  Currently unimplemented.

**See Also**

- `h2o.startLogging`, `h2o.stopLogging`, `h2o.clearLog`

**Examples**

```r
## 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**

```r
h2o.parseRaw(data, pattern = "", destination_frame = "", header = NA,
             sep = ",", 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)
```

**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.

- **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 `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
h2o.parseSetup

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)

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
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)

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.

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,
                   ntree = 10,
                   max_depth = 5,
                   learn_rate = 0.1)
h2o.partialPlot(object = prostate_gbm, data = prostate, cols = c("AGE", "RACE"))
## 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
```r
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.hex
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
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

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_SYMMMATRIX", "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

test name: 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

max_iterations

use_all_factor_levels

compute_metrics

impute_missing

seed

max_runtime_secs

export_checkpoints_dir

Value

an object of class H2ODimReductionModel.

References


See Also

h2o.svd, h2o.glrm

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_json

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

## Not run:
library(h2o)
h2o.predict_json(ifelse(test = TRUE, '/quotesingle.Var~/GBM_model_python_1473313897851_6.zip', '/quotesingle.Var~/GBM_model_python_1473313897851_6.zip'), ifelse(test = TRUE, '{"C7":1}', '{"C7":1}'), c('.', 'lib'))

## End(Not run)
h2o.print

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

h2o.prod

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.
**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**

```r
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)
```
h2o.pr_auc

Retrieve the pr_auc

Description

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

Usage

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

Arguments

object
An H2OBinomialMetrics object.

train
Retrieve the training pr_auc

valid
Retrieve the validation pr_auc

xval
Retrieve the cross-validation pr_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

## 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.pr_auc(perf)

## End(Not run)

h2o.psvm

Trains a Support Vector Machine model on an H2O dataset

Description

Alpha version. Supports only binomial classification problems.
h2o.psvm(x, y, training_frame, model_id = NULL,
validation_frame = NULL, ignore_const_cols = TRUE, hyper_param = 1,
kernel_type = c("gaussian"), gamma = -1, rank_ratio = -1,
positive_weight = 1, negative_weight = 1,
disable_training_metrics = TRUE, sv_threshold = 1e-04,
fact_threshold = 1e-05, feasible_threshold = 0.001,
surrogate_gap_threshold = 0.001, mu_factor = 10,
max_iterations = 200, 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 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) Defaults 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).
h2o.quantile

Quantiles of H2O Frames.

Description

Obtain and display quantiles for H2O parsed data.

Usage

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, ...)  

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.

Details


Value

A vector describing the percentiles at the given cutoffs for the H2OFrame object.

Examples

## 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)
```

---

**h2o.randomForest**  
*Build a Random Forest model*

**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, ntrees = 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",
        "lift_top_group", "misclassification", "AUCPR", "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 = 0.6320000291,
    sample_rate_per_class = NULL, binomial_double_trees = FALSE,
    checkpoint = NULL, col_sample_rate_change_per_level = 1,
    col_sample_rate_per_tree = 1, min_split_improvement = 1e-05,
    histogram_type = c("AUTO", "UniformAdaptive", "Random",
        "QuantilesGlobal", "RoundRobin"), categorical_encoding = c("AUTO",
        "Enum", "OneHotInternal", "OneHotExplicit", "Binary", "Eigen",
        "LabelEncoder", "SortByResponse", "EnumLimited"),
    calibrate_model = FALSE, calibration_frame = NULL,
    distribution = c("AUTO", "bernoulli", "multinomial", "gaussian",
        "poisson", "gamma", "tweedie", "laplace", "quantile", "huber"),
    custom_metric_func = NULL, export_checkpoints_dir = NULL,
    check_constant_response = TRUE, 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 classi-

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 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**

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

**ntrees**

Number of trees. Defaults to 50.

**max_depth**

Maximum tree depth. 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 anomolay_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", "lift_top_group", "misclassification", "AUCPR", "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 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 0.6320000291.

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", "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.

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.

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.

verbose

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

**Value**

Creates a H2OModel object of the right type.

**See Also**

predict.H2OModel for prediction

---

### h2o.range

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.
This function will add a new column rank where the ranking is produced as follows: 1. sorts the H2OFrame by columns sorted in by columns specified in 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
a list of column names or indices to form the groupby groups

sort_cols
a list of column names or indices for sorting

ascending
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
new column name for the newly added rank column if specified (optional). 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 14 28080.1607 0 15 3 -16995.346 1 11 -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 2 -13465.496 1 3 -415.1114 0 17 2 -3329.619 1 2 12094.4851 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 16 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 -18421.6171 0 2 13 1 -6049.830 0 5 -18421.6171 0 5 -18421.6171 0 2 12094.4851 1 17 2 -13465.496 1 3 -3177.9077 1 3 16 1 -10003.593 0 3 -61284.6900 0 2 16 3 26052.495 0 3 -61284.6900 0 2 16 3 -22905.288 0 3 -61284.6900 0 13 3 -12776.884 1 4 28080.1607 0 4 13 3 -12776.884 1 5 -18421.6171 0 5 -18421.6171 0 5 -18421.6171 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), sort_cols_sorted=TRUE)
h2o.summary(rankedF1)
```

The returned frame will be sorted according to sortCols and hence look like this instead:

```
ID Group_by_column num data Column_to_arrange_by num_1 fdata.1 New_Rank_column 15 3 -16995.346 1 1 -9781.6373 0 1 17 2 -3329.619 0 3 -11772.1338 1 4 17 2 -13465.496 1 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 0 3 -61284.6900 0 13 3 -12776.884 1 4 28080.1607 0 4 13 3 -12776.884 1 5 -18421.6171 0 5 -18421.6171 0 5 -18421.6171 0
```

### h2o.rbind

**Combine H2O Datasets by Rows**

#### Description

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

#### Usage

```
h2o.rbind(...)```
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)

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;

Examples
```r
## 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)
```
See Also

h2o.glrm for making an H2ODimReductionModel.

Examples

## 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

ew reordered factor column

Examples

## 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"
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
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
## 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)
**h2o.rep_len**

**Replicate Elements of Vectors or Lists into H2O**

**Arguments**
- **data**
  The H2OFrame.
- **cols**
  The columns to remove.

**Description**

h2o.rep_len performs just as rep does. It replicates the values in x in the H2O backend.

**Usage**

```r
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

**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**

```r
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
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

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

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
**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".

**Usage**

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

**Arguments**

- **object**: An H2OModelMetrics object of the correct type.
- **train**: Retrieve the training RMSE
- **valid**: Retrieve the validation RMSE
- **xval**: Retrieve the cross-validation RMSE

**Details**

This function only supports H2OBinomialMetrics, H2OMultinomialMetrics, and H2ORegressionMetrics objects.

**See Also**

h2o.auc for AUC, h2o.mse for RMSE, 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.rmse(perf)
## End(Not run)
```
h2o.round

Description
Round doubles/floats to the given number of decimal places.

Usage
h2o.round(x, digits = 0)
round(x, digits = 0)
h2o.rstrip

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.

---

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

h2o.rstrip(x, set = " ")

Arguments

- x: The column whose strings should be rstrip-ed.
- set: string of characters to be removed

Examples

## 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

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.saveModel  
Save an H2O Model Object to Disk

Description

Save an H2OModel to disk. (Note that ensemble binary models can be saved.)

Usage

```r
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.

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.githubusercontent.com/h2oai/h2o-3/master/smalldata/logreg/prostate.csv", sep = "/"))
# 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.saveModelDetails

**Save an H2O Model Details**

**Description**

Save Model Details of an H2O Model in JSON Format

**Usage**

```r
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**

```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.saveModelDetails(object = prostate_glm, path = "/Users/UserName/Desktop", force = TRUE)
## End(Not run)
```
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h2o.scale

h2o.saveMojo

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
## 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.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 columns of x.
- **scale**: either a logical value or numeric vector of length equal to the number of columns of x.
- **inplace**: a logical values indicating whether directly overwrite original data (disabled by default). Exposed for backwards compatibility (prior versions of this functions were always doing an inplace update).

**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 <- h2o.scale(iris_hf[, 1:4])

## End(Not run)
```

---

**h2o.scoreHistory**  
*Retrieve Model Score History*

**Description**

Retrieve Model Score History

**Usage**

```r
h2o.scoreHistory(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)

sd(x, na.rm = FALSE)
```
h2o.setLevels

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

## Not run:
# 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

Retrieve the standard deviations of principal components

Description

Retrieve the standard deviations of principal components

Usage

h2o.sdev(object)

Arguments

object An H2ODimReductionModel object.

---

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

```r
## Not run:
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**

```r
h2o.setTimezone(tz)
```

**Arguments**

- `tz`: The desired timezone.

---

### h2o.set_s3_credentials

*Create 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**

```r
h2o.set_s3_credentials(secretKeyId, secretAccessKey)
```

**Arguments**

- `secretKeyId`: Amazon S3 Secret Key ID (provided by Amazon)
- `secretAccessKey`: Amazon S3 Secret Access Key (provided by Amazon)
### h2o.show_progress

**Enable Progress Bar**

**Description**
Enable Progress Bar

**Usage**

```r
h2o.show_progress()
```

### 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**

- `signif` for the base R implementation.

**h2o.sin**

Compute the sine of x

**Description**

Compute the sine of x

**Usage**

h2o.sin(x)

**Arguments**

- **x**: An H2OFrame object.

**See Also**

- `sin` for the base R implementation.
**h2o.skewness**  
*Skewness of a column*

**Description**
Obtain the skewness of a column of a parsed H2O data object.

**Usage**

```r
h2o.skewness(x, ..., na.rm = TRUE)
skewness.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 skewness for each column (NaN for non-numeric columns).

**Examples**
```r
## Not run:
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)
```
h2o.sqrt

Arguments

- data: An H2OFrame object representing the dataset 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]])
summary(iris_split[[1]])
## End(Not run)
```

h2o.sqrt

*Compute the square root of x*

Description

Compute the square root of x

Usage

```r
h2o.sqrt(x)
```

Arguments

- x: An H2OFrame object.

See Also

- `sqrt` for the base R implementation.
**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", "glm", "gbm", 
  "drf", "deeplearning"), metalearner_nfolds = 0,
  metalearner_fold_assignment = c("AUTO", "Random", "Modulo", 
  "Stratified"), metalearner_fold_column = NULL,
  metalearner_params = NULL, seed = -1, 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 model ids) to ensemble/stack together. 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), 'glm' (GLM with default parameters), 'gbm' (GBM with default parameters), 'drf' (Random Forest with default parameters), or 'deeplearning' (Deep Learning with default parameters). Must be one of: 'AUTO', 'glm', 'gbm', 'drf', 'deeplearning'. Defaults to AUTO.

- **metalearner_nfolds**  
  Number of folds for K-fold cross-validation of the metalearner algorithm (0 to disable or >= 2). Defaults to 0.
metalearn_fold_assignment
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".

metalearn_fold_column
Column with cross-validation fold index assignment per observation for cross-validation of the metalearner.

metalearn_params
Parameters for metalearner algorithm

seed
Seed for random numbers; passed through to the metalearner algorithm. Defaults to -1 (time-based random number).

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

## Not run:
# See example R code here:
# http://docs.h2o.ai/h2o/latest-stable/h2o-docs/data-science/stacked-ensembles.html
## End(Not run)
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()
## End(Not run)
```

---

**h2o.std_coef_plot**  
Plot Standardized Coefficient Magnitudes

**Description**
Plot a GLM model’s standardized coefficient magnitudes.

**Usage**

```r
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**

```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.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 = FALSE)

Arguments

object   An H2OFrame.
...   Further arguments to be passed from or to other methods.
cols   Print the per-column str for the H2OFrame
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

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)
```

h2o.strsplit  

String Split

Description

String Split

Usage

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)
```

---

**h2o.sub**  
*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

```
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)
```
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 = "[]")
```

**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.sum

**Compute the frame’s sum by-column (or by-row).**

**Description**

Compute the frame’s sum by-column (or by-row).

**Usage**

```r
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.

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]).

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)
Singular value decomposition of an H2O data frame using the power method

**Usage**

```r
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
- `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
   N. Halko, P.G. Martinsson, J.A. Tropp. Finding structure with randomness: Probabilistic algorithms

Examples
   ## 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)

h2o.table

Cross Tabulation and Table Creation in H2O

Description
   Uses the cross-classifying factors to build a table of counts at each combination of factor levels.

Usage
   h2o.table(x, y = NULL, dense = TRUE)
   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
h2o.tan

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

- `tan` for the base R implementation.

h2o.tanh

Compute the hyperbolic tangent of x

Description

Compute the hyperbolic tangent of x

Usage

```r
h2o.tanh(x)
```

Arguments

- `x`: An H2OFrame object.

See Also

- `tanh` for the base R implementation.
**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

```r
h2o.targetencoder(x, y, training_frame, blending = FALSE, k = 20, 
f = 10, data_leakage_handling = c("None", "KFold", "LeaveOneOut"), 
model_id = NULL, fold_column = 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.

- **blending**  
  Logical. Blending enabled/disabled Defaults to FALSE.

- **k**  
  Inflection point. Used for blending (if enabled). Blending is to be enabled separately using the `blending` parameter. Defaults to 20.

- **f**  
  Smoothing. Used for blending (if enabled). Blending is to be enabled separately using the `blending` parameter. Defaults to 10.

- **data_leakage_handling**  
  Data leakage handling strategy. Default to None. Must be one of: "None", "KFold", "LeaveOneOut". Defaults to None.

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

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

### Examples

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

# Create a target encoder
# target_encoder <- h2o.targetencoder(training_frame = data, encoded_columns= encoded_columns, 
# target_column = "survived", fold_column = "pclass", data_leakage_handling = "KFold")

# Apply the Target Encoder transformation
# encoded_data <- h2o.transform(target_encoder, data)

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

*Apply Target Encoding Map to Frame*

**Description**


**Usage**

```r
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".
- `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()

# Get Target Encoding Frame on bank-additional-full data with numeric 'y'
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)
```

#### 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.

#### 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)
```

---

**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.

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, 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 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

==Description==
Converts a given word2vec model into an H2OFrame. The frame represents learned word embeddings.

Usage
h2o.toFrame(word2vec)

Arguments

word2vec
A word2vec model.

Examples
## 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.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**

```
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), ")
## 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**

```r
## 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**

```r
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

---

**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
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**

```r
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

h2o.toupper  
*Convert strings to uppercase*

**Description**

Convert strings to uppercase

**Usage**

```r
h2o.toupper(x)
```

**Arguments**

- **x**: An H2OFrame object whose strings should be upper cased

**Value**

An H2OFrame with all entries in uppercase format

**Examples**

```r
## Not run:
library(h2o)
h2o.init()
string_to_upper <- as.h2o("abcde")
upper_string <- h2o.toupper(string_to_upper)
## 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

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

## S4 method for signature 'H2OTargetEncoderModel'
h2o.transform(model, data, 
data_leakage_handling = NULL, use_blending = NULL, 
infection_point = -1, smoothing = -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.
infection_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.
Value

Returns an H2OFrame object with data transformed.

Usage

## 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

## 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 sequence 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
```

**h2o.trim**

*Trim Space*

**Description**

Trim Space
Usage
h2o.trim(x)

Arguments
x The column whose strings should be trimmed.

Examples
## 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
trunc for the base R implementation.

h2o.unique

H2O Unique

Description
Extract unique values in the column.

Usage
h2o.unique(x)

Arguments
x An H2OFrame object.
**Value**

Returns an H2OFrame object.

---

**h2o.upload_mojo**

Imports a MOJO from a local filesystem, creating a Generic model with it.

---

**Description**

Usage example:

```r
mojo_model <- h2o.upload_mojo(model_file_path = "/path/to/local/mojo.zip")
predictions <- h2o.predict(mojo_model, dataset)
```

**Usage**

```r
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

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

var for the base R implementation. h2o.sd for standard deviation.

Examples

## Not run:
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

h2o.varimp(object)

Arguments

object
An H2OModel object.
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 "abs(#left_observations - #right_observations) / #before_split". Even splits (#left_observations approx the same as #right_observations) contribute less to the total aggregated split ratio value for the given feature; highly imbalanced splits (eg. #left_observations » #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 N of a tree, then it contributes with 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 (\#left_observations approx the same as \#right_observations) contribute less to the total aggregated split ratio value for the given feature; highly imbalanced splits (eg. \#left_observations \geq \#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 N of a tree, then it contributes with 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
h2o.weights

Retrieve the respective weight matrix

**Description**

Retrieve the respective weight matrix

**Usage**

```r
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.

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:
h2o.init()
iris_hf <- as.h2o(iris)
h2o.which(iris_hf[, 1] == 4.4)
## End(Not run)
```
**h2o.which_max**  
Which indice contains the max value?

**Description**  
Get the index of the max value in a column or row

**Usage**  
```r  
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.max` for the base R method.

---

**h2o.which_min**  
Which index contains the min value?

**Description**  
Get the index of the min value in a column or row

**Usage**  
```r  
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).
**h2o.withinss**

Get the Within SS

**Description**

Get the Within SS

**Usage**

```r
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**

```r
h2o.word2vec(training_frame = NULL, model_id = NULL, 
min_word_freq = 5, word_model = c("SkipGram"), 
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: Use the Skip-Gram model. Must be one of: "SkipGram". 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.

---

h2o.xgboost Build an eXtreme Gradient Boosting model

Description
Builds a eXtreme Gradient Boosting model using the native XGBoost backend.

Usage

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", "lift_top_group", "misclassification", "AUCPR",
"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, categorical_encoding = c("AUTO", "Enum",
"OneHotInternal", "OneHotExplicit", "Binary", "Eigen", "LabelEncoder",
"SortByResponse", "EnumLimited"), quiet_mode = TRUE,
export_checkpoints_dir = NULL, ntree = 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, max_abs_leafnode_pred = 0,
max_delta_step = 0, monotone_constraints = NULL,
score_tree_interval = 0, min_split_improvement = 0, gamma = 0,
nthread = -1, max_bins = 256, max_leaves = 0,
min_sum_hessian_in_leaf = 100, min_data_in_leaf = 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, 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 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", "lift_top_group", "misclassification", "AUCPR", "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", "SortByResponse", "EnumLimited". Defaults to AUTO.

quiet_mode
Logical. Enable quiet mode Defaults to TRUE.

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. 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_bylevel) 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.
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.
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.
min_sum_hessian_in_leaf
For tree_method=hist only: the minimum sum of hessian in a leaf to keep splitting Defaults to 100.0.
min_data_in_leaf
For tree_method=hist only: the minimum data in a leaf to keep splitting Defaults to 0.0.
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.
verbose Logical. Print scoring history to the console (Metrics per tree). Defaults to FALSE.

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
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
h2o.year(x)
year(x)

## 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
**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.
The H2OConnection class.

Description

This class represents a connection to an H2O cluster.

Usage

```r
## 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.
- `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.
H2OConnectionMutableState

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: An integer value specifying count for the number of keys generated for the session_id.

H2OCoxPHModel-class

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'
extractAIC(fit, scale, k = 2, ...)

## S3 method for class 'H2OCoxPHModel'
logLik(object, ...)

## S3 method for class 'H2OCoxPHModel'
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 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

## 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

H2OGrid-class

H2O Grid

Description

A class to contain the information about grid results
Usage

```r
## 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.

---

**H2OLeafNode-class**  
*The H2OLeafNode class.*

**Description**

This class represents a single leaf node in an `H2OTree`.

**Details**

```r
# @aliases H2OLeafNode
```
H2OModel-class

The H2OModel object.

Description
This virtual class represents a model built by H2O.

Usage

```r
## 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.
- `algorithm` A character string specifying the algorithm that were 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.
- `have_pojo` A logical indicating whether export to POJO is supported
- `have_mojo` A 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)
```

```r
## S4 method for signature 'H2OBinomialMetrics'
show(object)
```

```r
## S4 method for signature 'H2OMultinomialMetrics'
show(object)
```

```r
## S4 method for signature 'H2OOrdinalMetrics'
show(object)
```

```r
## S4 method for signature 'H2ORegressionMetrics'
show(object)
```

```r
## S4 method for signature 'H2OClusteringMetrics'
show(object)
```

```r
## S4 method for signature 'H2OAutoEncoderMetrics'
show(object)
```

```r
## 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)
```
H2OSplitNode-class

Arguments

object     an H2ONode object.

Slots

id         An integer representing node’s unique identifier. Generated by H2O.
levels     A character representing categorical levels on split from parent’s node belonging into this node. NULL for root node or non-categorical splits.

# @aliases H2ONode

H2OTree-class

The H2OSplitNode class.

Description

This class represents a single non-terminal node in an H2OTree.

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, RIGH means NA values go to the right child node.

H2OTree-class

The H2OTree class.

Description

This class represents a model of a Tree built by one of H2O’s algorithms (GBM, Random Forest).

Usage

## 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.

---

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

Congressional Quarterly Almanac, 98th Congress, 2nd session 1984, Volume XL: Congressional
Quarterly Inc., Washington, D.C., 1985
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
is.factor

Description
Check if factor

Usage
is.factor(x)

Arguments
x An H2OFrame object

is.h2o

Description
Test if object is H2O Frame.

Usage
is.h2o(x)

Arguments
x An R object.

is.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

```
"||"(x, y)
```

Arguments

- `x` An H2OFrame object
- `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 'H2OModel'
getParms(object)

getCenters(object)

getCentersStd(object)

getWithinSS(object)

getTotWithinSS(object)

getBetweenSS(object)

getTotSS(object)

getIterations(object)

getClusterSizes(object)

## S4 method for signature 'H2OClusteringModel'
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.

**Description**

Column names of an **H2OFrame**

**Usage**

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

**Arguments**

x An **H2OFrame**

**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

---

### plot.H2OModel

**Plot an H2O Model**

#### Description

Plots training set (and validation set if available) scoring history for an H2O Model

#### 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
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)
```
**plot.H2OTabulate**

**Plot an H2O Tabulate Heatmap**

**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`

**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)
```
**predict.H2OAutoML**  
*Predict on an AutoML object*

**Description**

Obtains predictions from an AutoML object.

**Usage**

```r
## 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, ...)

## S3 method for class 'H2OModel'
h2o.predict(object, newdata, ...)
```

**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).
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 probabilites and default predictions.

See Also

h2o.deeplearning, h2o.gbm, h2o.glm, h2o.randomForest for model generation in h2o.
predict_leaf_node_assignment.H2OModel

Value

Returns an H2OFrame contain feature contributions for each input row.

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_gbm <- h2o.gbm(3:9, "AGE", prostate)
h2o.predict(prostate_gbm, prostate)
h2o.predict_contributions(prostate_gbm, prostate)
## End(Not run)

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.
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

```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.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

```r
## S3 method for class 'H2OFrame'
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).
- **...**: Further arguments to be passed from or to other methods.
print.H2OTable  

Print method for H2OTable objects

Description

This will print a truncated view of the table if there are more than 20 rows.

Usage

```r
## 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

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

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)
```
**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 \( T_t.C_c \) (e.g. \( T_3.C_1 \) for tree 3 and class 1). The value will be the corresponding predicted probability of this class by combining the raw contributions of trees \( T_1.C_1, \ldots, T_t.C_c \). Binomial models build the trees just for the first class and values in columns \( T_1.C_1, \ldots, T_t.C_c \) thus correspond to the probability \( p_0 \).

**Usage**

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

```r
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**

```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.predict(prostate_gbm, prostate)
h2o.staged_predict_proba(prostate_gbm, prostate)
## End(Not run)
```
str.H2OFrame  

Display the structure of an H2OFrame object

Description

Display the structure of an H2OFrame object

Usage

```r
## S3 method for class 'H2OFrame'
str(object, ..., cols = FALSE)
```

Arguments

- **object**: An H2OFrame.
- **...**: Further arguments to be passed from or to other methods.
- **cols**: Print the per-column str for the H2OFrame

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.
Format grid object in user-friendly way

### 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

---

Print the Model Summary

### 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, version = "1.9.8"[package == "data.table"],
             use = getOption("h2o.use.data.table", FALSE)[package == "data.table"])

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 disabled by default, to enable it set options("h2o.use.data.table"=TRUE). 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)
Muscular Actuations for Walking Subject

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/project/xml/downloads.xml?group_id=603.

Format

A data frame with 151 rows and 124 columns

References


Shutdown H2O cluster after examples run

Description

Shutdown H2O cluster after examples run

Examples

```r
## Not run:
library(h2o)
h2o.init()
h2o.shutdown(prompt = FALSE)
Sys.sleep(3)

## End(Not run)
```

Logical and for H2OFrame

Description

Logical and for H2OFrame

Usage

`"&&"(x, y)`

Arguments

- `x`: An H2OFrame object
- `y`: An H2OFrame object
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