Package 'mlr3cluster'

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Title Cluster Extension for 'mlr3'

Version 0.3.0

Description Extends the 'mlr3' package with cluster analysis.

License LGPL-3

URL https://mlr3cluster.mlr-org.com, https://github.com/mlr-org/mlr3cluster

BugReports https://github.com/mlr-org/mlr3cluster/issues

Depends mlr3 (>= 1.5.0), R (>= 3.4.0)

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Suggests apcluster, clue, ClusterR (>= 1.3.1), clustMixType (>= 0.4.0), dbscan (>= 1.2.1), e1071, kernlab, LPCM, mclust, mirai (>= 2.4.1), mlbench, protoclust, RWeka, stream (>= 2.0.0), testthat (>= 3.3.0)

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Collate 'LearnerClust.R' 'zzz.R' 'LearnerClustAffinityPropagation.R' 'LearnerClustAgnes.R' 'LearnerClustBICO.R' 'LearnerClustBIRCH.R' 'LearnerClustCLARA.R' 'LearnerClustCMeans.R' 'LearnerClustCobweb.R' 'LearnerClustDBSCAN.R' 'LearnerClustDBSCANfpc.R' 'LearnerClustDiana.R' 'LearnerClustEM.R' 'LearnerClustFanny.R' 'LearnerClustFarthestFirst.R' 'LearnerClustFeatureless.R' 'LearnerClustHDBSCAN.R' 'LearnerClustHclust.R' 'LearnerClustKKMeans.R' 'LearnerClustKMeans.R' 'LearnerClustKProto.R' 'LearnerClustMclust.R' 'LearnerClustMeanShift.R' 'LearnerClustMiniBatchKMeans.R' 'LearnerClustOPTICS.R' 'LearnerClustPAM.R' 'LearnerClustProtoclust.R' 'LearnerClustSimpleKMeans.R'

'LearnerClustSpectral.R' 'LearnerClustXMeans.R'
'MeasureClust.R' 'measures.R' 'MeasureClustInternal.R'
'PredictionClust.R' 'PredictionDataClust.R' 'TaskClust.R'
'TaskClust_ruspini.R' 'TaskClust_usarrest.R'
'as_prediction_clust.R' 'as_task_clust.R' 'bibentries.R'
'helper.R'

NeedsCompilation no

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Contents

`mlr3cluster-package` *mlr3cluster: Cluster Extension for 'mlr3'*

Description

Extends the 'mlr3' package with cluster analysis.

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See Also

Useful links:

- https://mlr3cluster.mlr-org.com
- https://github.com/mlr-org/mlr3cluster
- Report bugs at https://github.com/mlr-org/mlr3cluster/issues

`as_prediction_clust` *Convert to a Cluster Prediction*

Description

Convert object to a PredictionClust.

Usage

```
as_prediction_clust(x, ...)

## S3 method for class 'PredictionClust'
as_prediction_clust(x, ...)

## S3 method for class 'data.frame'
as_prediction_clust(x, ...)
```

Arguments

`x`	(any) Object to convert.
`...`	(any) Additional arguments.

Value

PredictionClust.

Examples

```
# create a prediction object
task = tsk("usarrests")
learner = lrn("clust.cmeans", predict_type = "prob")
learner$train(task)
p = learner$predict(task)

# convert to a data.table
tab = as.data.table(p)

# convert back to a Prediction
as_prediction_clust(tab)

# split data.table into a 3 data.tables based on UrbanPop
f = cut(task$data(rows = tab$row_ids)$UrbanPop, 3)
tabs = split(tab, f)

# convert back to list of predictions
preds = lapply(tabs, as_prediction_clust)
```

```
# calculate performance in each group
sapply(preds, function(p) p$score(task = task))
```

`as_task_clust` *Convert to a Cluster Task*

Description

Convert object to a TaskClust. This is a S3 generic, specialized for at least the following objects:

1. TaskClust: ensure the identity.
2. `data.frame()` and mlr3::DataBackend: provides an alternative to calling constructor of TaskClust.

Usage

```
as_task_clust(x, ...)

## S3 method for class 'TaskClust'
as_task_clust(x, clone = FALSE, ...)

## S3 method for class 'data.frame'
as_task_clust(x, id = deparse1(substitute(x)), ...)

## S3 method for class 'DataBackend'
as_task_clust(x, id = deparse1(substitute(x)), ...)

## S3 method for class 'formula'
as_task_clust(x, data, id = deparse1(substitute(data)), ...)
```

Arguments

`x`	(any) Object to convert.
`...`	(any) Additional arguments.
`clone`	(`logical(1)`) If `TRUE`, ensures that the returned object is not the same as the input `x`.
`id`	(`character(1)`) Id for the new task. Defaults to the (deparsed and substituted) name of the data argument.
`data`	(`data.frame()`) Data frame containing all columns specified in formula `x`.

Value

TaskClust.

Examples

```
as_task_clust(datasets::USArrests)
```

`LearnerClust` *Cluster Learner*

Description

This Learner specializes mlr3::Learner for cluster problems:

- `task_type` is set to `"clust"`.
- Creates mlr3::Predictions of class PredictionClust.
- Possible values for `predict_types` are:
  - `"partition"`: Integer indicating the cluster membership.
  - `"prob"`: Probability for belonging to each cluster.

Predefined learners can be found in the mlr3misc::Dictionary mlr3::mlr_learners.

Super class

`mlr3::Learner` -> `LearnerClust`

Public fields

`assignments` (`NULL` | `vector()`)
: Cluster assignments from learned model.

`save_assignments` (`logical(1)`)
: Should assignments for 'train' data be saved in the learner? Default is `TRUE`.

Methods

Public methods:

- `LearnerClust$new()`
- `LearnerClust$reset()`
- `LearnerClust$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClust$new(
  id,
  param_set = ps(),
  predict_types = "partition",
  feature_types = character(),
  properties = character(),
  packages = character(),
  label = NA_character_,
  man = NA_character_
)
```

Arguments:

`id (character(1))`
Identifier for the new instance.

`param_set (paradox::ParamSet)`
Set of hyperparameters.

`predict_types (character())`
Supported predict types. Must be a subset of `mlr_reflections$learner_predict_types`.

`feature_types (character())`
Feature types the learner operates on. Must be a subset of `mlr_reflections$task_feature_types`.

`properties (character())`
Set of properties of the mlr3::Learner. Must be a subset of `mlr_reflections$learner_properties`. The following properties are currently standardized and understood by learners in **mlr3**:

- `"missings"`: The learner can handle missing values in the data.
- `"weights"`: The learner supports observation weights.
- `"importance"`: The learner supports extraction of importance scores, i.e. comes with an `$importance()` extractor function (see section on optional extractors in mlr3::Learner).
- `"selected_features"`: The learner supports extraction of the set of selected features, i.e. comes with a `$selected_features()` extractor function (see section on optional extractors in mlr3::Learner).
- `"oob_error"`: The learner supports extraction of estimated out of bag error, i.e. comes with a `oob_error()` extractor function (see section on optional extractors in mlr3::Learner).

`packages (character())`
Set of required packages. A warning is signaled by the constructor if at least one of the packages is not installed, but loaded (not attached) later on-demand via `requireNamespace()`.

`label (character(1))`
Label for the new instance.

`man (character(1))`
String in the format `[pkg]::[topic]` pointing to a manual page for this object. The referenced help package can be opened via method `$help()`.

Method `reset()`**:** Reset `assignments` field before calling parent's `reset()`.

Usage:

```
LearnerClust$reset()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClust$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Examples

```
library(mlr3)
library(mlr3cluster)
ids = mlr_learners$keys("^clust")
ids
```

```
# get a specific learner from mlr_learners:
learner = lrn("clust.kmeans")
print(learner)
```

`MeasureClust` *Cluster Measure*

Description

This measure specializes mlr3::Measure for cluster analysis:

- `task_type` is set to `"clust"`.
- Possible values for `predict_type` are `"partition"` and `"prob"`.

Predefined measures can be found in the mlr3misc::Dictionary mlr3::mlr_measures.

Super class

`mlr3::Measure` -> `MeasureClust`

Methods

Public methods:

- `MeasureClust$new()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
MeasureClust$new(
  id,
  range,
  minimize = NA,
  aggregator = NULL,
  properties = character(),
  predict_type = "partition",
  task_properties = character(),
  packages = character(),
  label = NA_character_,
  man = NA_character_
)
```

Arguments:

`id (character(1))`
: Identifier for the new instance.

`range (numeric(2))`
: Feasible range for this measure as `c(lower_bound, upper_bound)`. Both bounds may be infinite.

`minimize (logical(1))`
: Set to `TRUE` if good predictions correspond to small values, and to `FALSE` if good predictions correspond to large values. If set to `NA` (default), tuning this measure is not possible.

`aggregator (function(x) | NULL)`
: Function to aggregate individual performance scores `x` where `x` is a numeric vector. If `NULL`, defaults to `mean()`.

`properties (character())`
: Properties of the measure. Must be a subset of mlr_reflections$measure_properties. Supported by `mlr3`:
- `"requires_task"` (requires the complete mlr3::Task),
- `"requires_learner"` (requires the trained mlr3::Learner),
- `"requires_train_set"` (requires the training indices from the mlr3::Resampling), and
- `"na_score"` (the measure is expected to occasionally return `NA` or `NaN`).

`predict_type (character(1))`
: Required predict type of the mlr3::Learner. Possible values are stored in mlr_reflections$learner_predict_types.

`task_properties (character())`
: Required task properties, see mlr3::Task.

`packages (character())`
: Set of required packages. A warning is signaled by the constructor if at least one of the packages is not installed, but loaded (not attached) later on-demand via `requireNamespace()`.

`label (character(1))`
: Label for the new instance.

`man (character(1))`
: String in the format `[pkg]::[topic]` pointing to a manual page for this object. The referenced help package can be opened via method `$help()`.

See Also

Example cluster measures: `clust.dunn`

`mlr_learners_clust.agnes`

Agglomerative Nesting Clustering Learner

Description

Agglomerative hierarchical clustering. Calls `cluster::agnes()` from package **cluster**.

The predict method uses `stats::cutree()` which cuts the tree resulting from hierarchical clustering into specified number of groups (see parameter `k`). The default number for `k` is 2.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.agnes")
lrn("clust.agnes")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **cluster**

Parameters

Id	Type	Default	Levels	Range
metric	character	euclidean	euclidean, manhattan	-
stand	logical	FALSE	TRUE, FALSE	-
method	character	average	average, single, complete, ward, weighted, flexible, gaverage	-
trace.lev	integer	0		$[0, \infty)$
k	integer	2		$[1, \infty)$
par.method	untyped	-		-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustAgnes`

Methods

Public methods:

- `LearnerClustAgnes$new()`
- `LearnerClustAgnes$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustAgnes$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustAgnes$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Kaufman, Leonard, Rousseeuw, J P (2009). *Finding groups in data: an introduction to cluster analysis*. John Wiley & Sons.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara, mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc, mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust, mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.agnes")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.ap` *Affinity Propagation Clustering Learner*

Description

Affinity Propagation clustering. Calls `apcluster::apcluster()` from package **apcluster**.

Note that `apcluster::apcluster()` doesn't have a default for the similarity function. The predict method computes the closest cluster exemplar to find the cluster memberships for new data. The code is taken from StackOverflow answer by the `apcluster` package maintainer.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.ap")
lrn("clust.ap")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **apcluster**

Parameters

Id	Type	Default	Levels	Range
s	untyped	-		-
p	untyped	NA_real_		-
q	numeric	NA		$[0, 1]$
maxits	integer	1000		$[1, \infty)$
convits	integer	100		$[1, \infty)$
lam	numeric	0.9		$[0.5, 1]$
includeSim	logical	FALSE	TRUE, FALSE	-
details	logical	FALSE	TRUE, FALSE	-
nonoise	logical	FALSE	TRUE, FALSE	-
seed	integer	NA		$(-\infty, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustAP`

Methods

Public methods:

- `LearnerClustAP$new()`
- `LearnerClustAP$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustAP$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustAP$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Bodenhofer, Ulrich, Kothmeier, Andreas, Hochreiter, Sepp (2011). "APCluster: an R package for affinity propagation clustering." *Bioinformatics*, **27**(17), 2463–2464.

Frey, J B, Dueck, Delbert (2007). "Clustering by passing messages between data points." *science*, **315**(5814), 972–976.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`, `mlr_learners_clust.cmeans`,
`mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`,
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.mea`
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.ap")
print(learner)
```

`mlr_learners_clust.bico`

BICO Clustering Learner

Description

BICO (fast computation of k-means coresets in a data stream) clustering. Calls `stream::DSC_BICO()` from package **stream**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.bico")
lrn("clust.bico")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **stream**

Parameters

Id	Type	Default	Range
k	integer	5	$[1, \infty)$
space	integer	10	$[1, \infty)$
p	integer	10	$[1, \infty)$
iterations	integer	10	$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustBICO`

Methods

Public methods:

- `LearnerClustBICO$new()`
- `LearnerClustBICO$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustBICO$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustBICO$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Fichtenberger, Hendrik, Gille, Marc, Schmidt, Melanie, Schwiegelshohn, Chris, Sohler, Christian (2013). "BICO: BIRCH Meets Coresets for k-Means Clustering." In *Algorithms–ESA 2013: 21st Annual European Symposium, Sophia Antipolis, France, September 2-4, 2013. Proceedings 21*, 481–492. Springer.

Hahsler M, Bolaños M, Forrest J (2017). "Introduction to stream: An Extensible Framework for Data Stream Clustering Research with R." *Journal of Statistical Software*, **76**(14), 1–50. doi:10.18637/jss.v076.i14.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`, `mlr_learners_clust.cmeans`,
`mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`,
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.mea`
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.bico")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.birch`
BIRCH Clustering Learner

Description

BIRCH (balanced iterative reducing clustering using hierarchies) clustering. Calls `stream::DSC_BIRCH()` from package **stream**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.birch")
lrn("clust.birch")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **stream**

Parameters

Id	Type	Default	Range
threshold	numeric	-	$[0, \infty)$
branching	integer	-	$[1, \infty)$
maxLeaf	integer	-	$[1, \infty)$
maxMem	integer	0	$[0, \infty)$
outlierThreshold	numeric	0.25	$(-\infty, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustBIRCH`

Methods

Public methods:

- `LearnerClustBIRCH$new()`
- `LearnerClustBIRCH$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustBIRCH$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustBIRCH$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Zhang, Tian, Ramakrishnan, Raghu, Livny, Miron (1996). "BIRCH: An Efficient Data Clustering Method for Very Large Databases." *ACM sigmod record*, **25**(2), 103–114.

Zhang, Tian, Ramakrishnan, Raghu, Livny, Miron (1997). "BIRCH: A new data clustering algorithm and its applications." *Data Mining and Knowledge Discovery*, **1**, 141–182.

Hahsler M, Bolaños M, Forrest J (2017). "Introduction to stream: An Extensible Framework for Data Stream Clustering Research with R." *Journal of Statistical Software*, **76**(14), 1–50. doi:10.18637/jss.v076.i14.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.clara`, `mlr_learners_clust.cmeans`,
`mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`,
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.mea`
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.birch")
print(learner)
```

`mlr_learners_clust.clara`

CLARA Clustering Learner

Description

Clustering Large Applications (CLARA) clustering. Calls `cluster::clara()` from package **cluster**.

CLARA extends the PAM algorithm to handle larger datasets by working on sub-datasets of fixed size. The `k` parameter is set to 2 by default since `cluster::clara()` doesn't have a default value for the number of clusters. The predict method uses `clue::cl_predict()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.clara")
lrn("clust.clara")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **cluster**, **clue**

Parameters

Id	Type	Default	Levels	Range
k	integer	-		$[1, \infty)$
metric	character	euclidean	euclidean, manhattan, jaccard	-
stand	logical	FALSE	TRUE, FALSE	-
samples	integer	5		$[1, \infty)$
sampsize	integer	-		$[1, \infty)$
trace	integer	0		$[0, \infty)$
medoids.x	logical	TRUE	TRUE, FALSE	-
keep.data	logical	TRUE	TRUE, FALSE	-
rngR	logical	FALSE	TRUE, FALSE	-
pamLike	logical	FALSE	TRUE, FALSE	-
correct.d	logical	TRUE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustCLARA`

Methods

Public methods:

- `LearnerClustCLARA$new()`
- `LearnerClustCLARA$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustCLARA$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustCLARA$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Kaufman, Leonard, Rousseeuw, J P (2009). *Finding groups in data: an introduction to cluster analysis*. John Wiley & Sons.

Schubert, Erich, Rousseeuw, J P (2019). "Faster k-medoids clustering: improving the PAM, CLARA, and CLARANS algorithms." In *Similarity Search and Applications: 12th International Conference, SISAP 2019, Newark, NJ, USA, October 2–4, 2019, Proceedings 12*, 171–187. Springer.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.cmeans,
mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc,
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.clara")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
```

```
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.cmeans`

Fuzzy C-Means Clustering Learner

Description

Fuzzy c-means clustering. Calls `e1071::cmeans()` from package **e1071**.

The `centers` parameter is set to 2 by default since `e1071::cmeans()` doesn't have a default value for the number of clusters. The predict method uses `clue::cl_predict()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.cmeans")
lrn("clust.cmeans")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **e1071**, **clue**

Parameters

Id	Type	Default	Levels	Range
centers	untyped	-		-
iter.max	integer	100		$[1, \infty)$
verbose	logical	FALSE	TRUE, FALSE	-
dist	character	euclidean	euclidean, manhattan	-
method	character	cmeans	cmeans, ufcl	-

m	numeric	2	$[1, \infty)$
rate.par	numeric	-	$[0, 1]$
weights	untyped	1L	-
control	untyped	-	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustCMeans`

Methods

Public methods:

- `LearnerClustCMeans$new()`
- `LearnerClustCMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustCMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustCMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Dimitriadou, Evgenia, Hornik, Kurt, Leisch, Friedrich, Meyer, David, Weingessel, Andreas (2008). "Misc functions of the Department of Statistics (e1071), TU Wien." *R package*, **1**, 5–24.

Bezdek, C J (2013). *Pattern recognition with fuzzy objective function algorithms*. Springer Science & Business Media.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:

  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc,
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.cmeans")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.cobweb

Cobweb Clustering Learner

Description

Cobweb clustering. Calls RWeka::Cobweb() from package **RWeka**.

The predict method uses RWeka::predict.Weka_clusterer() to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.cobweb")
lrn("clust.cobweb")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **RWeka**

Parameters

Id	Type	Default	Range
A	numeric	1	$[0, \infty)$
C	numeric	0.002	$[0, \infty)$
S	integer	42	$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustCobweb`

Methods

Public methods:

- `LearnerClustCobweb$new()`
- `LearnerClustCobweb$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustCobweb$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustCobweb$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Witten, H I, Frank, Eibe (2002). "Data mining: practical machine learning tools and techniques with Java implementations." *Acm Sigmod Record*, **31**(1), 76–77.

Fisher, H D (1987). "Knowledge acquisition via incremental conceptual clustering." *Machine learning*, **2**, 139–172.

Gennari, H J, Langley, Pat, Fisher, Doug (1989). "Models of incremental concept formation." *Artificial intelligence*, **40**(1-3), 11–61.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc,
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.cobweb")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)
```

```
# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.dbscan`
DBSCAN Clustering Learner

Description

DBSCAN (density-based spatial clustering of applications with noise) clustering. Calls `dbscan::dbscan()` from package **dbscan**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.dbscan")
lrn("clust.dbscan")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **dbscan**

Parameters

Id	Type	Default	Levels	Range
eps	numeric	-		$[0, \infty)$
minPts	integer	5		$[0, \infty)$
weights	untyped	-		-
borderPoints	logical	TRUE	TRUE, FALSE	-
search	character	kdtree	kdtree, linear, dist	-
bucketSize	integer	10		$[1, \infty)$
splitRule	character	SUGGEST	STD, MIDPT, FAIR, SL_MIDPT, SL_FAIR, SUGGEST	-
approx	numeric	0		$(-\infty, \infty)$

Super classes

mlr3::Learner -> mlr3cluster::LearnerClust -> LearnerClustDBSCAN

Methods

Public methods:

- LearnerClustDBSCAN$new()
- LearnerClustDBSCAN$clone()

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustDBSCAN$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustDBSCAN$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Hahsler M, Piekenbrock M, Doran D (2019). "dbscan: Fast Density-Based Clustering with R." *Journal of Statistical Software*, **91**(1), 1–30. doi:10.18637/jss.v091.i01.

Ester, Martin, Kriegel, Hans-Peter, Sander, Jörg, Xu, Xiaowei, others (1996). "A density-based algorithm for discovering clusters in large spatial databases with noise." In *kdd*, volume 96 number 34, 226–231.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara, mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan_fpc,

mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.dbscan")
print(learner)
```

`mlr_learners_clust.dbscan_fpc`

DBSCAN Clustering Learner (fpc)

Description

DBSCAN (density-based spatial clustering of applications with noise) clustering. Calls `fpc::dbscan()` from package **fpc**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.dbscan_fpc")
lrn("clust.dbscan_fpc")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **fpc**

Parameters

Id	Type	Default	Levels	Range
eps	numeric	-		$[0, \infty)$
MinPts	integer	5		$[0, \infty)$
scale	logical	FALSE	TRUE, FALSE	-
method	character	hybrid	hybrid, raw, dist	-
seeds	logical	TRUE	TRUE, FALSE	-
showplot	untyped	FALSE		-

countmode	untyped	NULL	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustDBSCANfpc`

Methods

Public methods:

- `LearnerClustDBSCANfpc$new()`
- `LearnerClustDBSCANfpc$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustDBSCANfpc$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustDBSCANfpc$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Ester, Martin, Kriegel, Hans-Peter, Sander, Jörg, Xu, Xiaowei, others (1996). "A density-based algorithm for discovering clusters in large spatial databases with noise." In *kdd*, volume 96 number 34, 226–231.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.

- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dia
mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featureless, mlr_learners_clust.ff,
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.dbscan_fpc")
print(learner)
```

---

mlr_learners_clust.diana

Divisive Analysis Clustering Learner

Description

Divisive hierarchical clustering. Calls `cluster::diana()` from package **cluster**.

The predict method uses `stats::cutree()` which cuts the tree resulting from hierarchical clustering into specified number of groups (see parameter k). The default value for k is 2.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.diana")
lrn("clust.diana")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **cluster**

Parameters

Id	Type	Default	Levels	Range
metric	character	euclidean	euclidean, manhattan	-
stand	logical	FALSE	TRUE, FALSE	-
trace.lev	integer	0		$[0, \infty)$
k	integer	2		$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustDiana`

Methods

Public methods:

- `LearnerClustDiana$new()`
- `LearnerClustDiana$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustDiana$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustDiana$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Kaufman, Leonard, Rousseeuw, J P (2009). *Finding groups in data: an introduction to cluster analysis*. John Wiley & Sons.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.

  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featureless, mlr_learners_clust.ff,
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.diana")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.em *Expectation-Maximization Clustering Learner*

Description

Expectation-Maximization clustering. Calls the EM Weka clusterer from package **RWeka**.

The predict method uses RWeka::predict.Weka_clusterer() to compute the cluster memberships for new data. The learner supports both partitional and fuzzy clustering.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function mlr3::lrn():

```
mlr_learners$get("clust.em")
lrn("clust.em")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **RWeka**

Parameters

Id	Type	Default	Levels	Range
I	integer	100		$[1, \infty)$
ll_cv	numeric	1e-06		$[1e-06, \infty)$
ll_iter	numeric	1e-06		$[1e-06, \infty)$
M	numeric	1e-06		$[1e-06, \infty)$
max	integer	-1		$[-1, \infty)$
N	integer	-1		$[-1, \infty)$
num_slots	integer	1		$[1, \infty)$
S	integer	100		$[0, \infty)$
X	integer	10		$[1, \infty)$
K	integer	10		$[1, \infty)$
V	logical	FALSE	TRUE, FALSE	-
output_debug_info	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustEM`

Methods

Public methods:

- `LearnerClustEM$new()`
- `LearnerClustEM$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustEM$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustEM$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Witten, H I, Frank, Eibe (2002). "Data mining: practical machine learning tools and techniques with Java implementations." *Acm Sigmod Record*, **31**(1), 76–77.

Dempster, P A, Laird, M N, Rubin, B D (1977). "Maximum likelihood from incomplete data via the EM algorithm." *Journal of the royal statistical society: series B (methodological)*, **39**(1), 1–22.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.fanny, mlr_learners_clust.featureless,
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.em")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)
```

```
# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.fanny`

Fuzzy Analysis Clustering Learner

Description

Fuzzy Analysis (FANNY) clustering. Calls `cluster::fanny()` from package **cluster**.

The k parameter is set to 2 by default since `cluster::fanny()` doesn't have a default value for the number of clusters. The predict method copies cluster assignments and memberships generated for train data. The predict does not work for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.fanny")
lrn("clust.fanny")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **cluster**

Parameters

Id	Type	Default	Levels	Range
k	integer	-		$[1, \infty)$
memb.exp	numeric	2		$[1, \infty)$
metric	character	euclidean	euclidean, manhattan, SqEuclidean	-
stand	logical	FALSE	TRUE, FALSE	-
iniMem.p	untyped	NULL		-
maxit	integer	500		$[0, \infty)$
tol	numeric	1e-15		$[0, \infty)$
trace.lev	integer	0		$[0, \infty)$

Super classes

mlr3::Learner -> mlr3cluster::LearnerClust -> LearnerClustFanny

Methods

Public methods:

- LearnerClustFanny$new()
- LearnerClustFanny$clone()

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustFanny$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustFanny$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Kaufman, Leonard, Rousseeuw, J P (2009). *Finding groups in data: an introduction to cluster analysis*. John Wiley & Sons.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.featureless, mlr_learners_clust.ff,
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.fanny")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.featureless`
Featureless Clustering Learner

Description

Featureless clustering. Randomly (but evenly) assigns observations to `num_clusters` partitions (default: 1 partition).

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.featureless")
lrn("clust.featureless")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**

Parameters

Id	Type	Default	Range
num_clusters	integer	-	$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustFeatureless`

Methods

Public methods:

- `LearnerClustFeatureless$new()`
- `LearnerClustFeatureless$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustFeatureless$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustFeatureless$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,

mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.ff,
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.featureless")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.ff *Farthest First Clustering Learner*

Description

Farthest First clustering. Calls RWeka::FarthestFirst() from package **RWeka**.

The predict method uses RWeka::predict.Weka_clusterer() to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function mlr3::lrn():

```
mlr_learners$get("clust.ff")
lrn("clust.ff")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **RWeka**

Parameters

Id	Type	Default	Levels	Range
N	integer	2		$[1, \infty)$
S	integer	1		$[1, \infty)$
output_debug_info	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustFarthestFirst`

Methods

Public methods:

- `LearnerClustFarthestFirst$new()`
- `LearnerClustFarthestFirst$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustFarthestFirst$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustFarthestFirst$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Witten, H I, Frank, Eibe (2002). "Data mining: practical machine learning tools and techniques with Java implementations." *Acm Sigmod Record*, **31**(1), 76–77.

Hochbaum, S D, Shmoys, B D (1985). "A best possible heuristic for the k-center problem." *Mathematics of operations research*, **10**(2), 180–184.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.ff")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.hclust` *Hierarchical Clustering Learner*

Description

Agglomerative hierarchical clustering. Calls `stats::hclust()` from package **stats**.

Distance calculation is done by `stats::dist()`.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.hclust")
lrn("clust.hclust")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, 'stats'

Parameters

Id	Type	Default	Levels	Range
method	character	complete	ward.D, ward.D2, single, complete, average, mcquitty, median, centroid	-
members	untyped	NULL		-
distmethod	character	euclidean	euclidean, maximum, manhattan, canberra, binary, minkowski	-
diag	logical	FALSE	TRUE, FALSE	-
upper	logical	FALSE	TRUE, FALSE	-
p	numeric	2		$(-\infty, \infty)$
k	integer	NULL		$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustHclust`

Methods

Public methods:

- `LearnerClustHclust$new()`
- `LearnerClustHclust$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustHclust$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustHclust$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Becker, A R, Chambers, M J, Wilks, R A (1988). *The New S Language*. Wadsworth & Brooks/Cole.

Everitt, S B (1974). *Cluster Analysis*. Heinemann Educational Books.

Hartigan, A J (1975). *Clustering Algorithms*. John Wiley & Sons.

Sneath, HA P, Sokal, R R (1973). *Numerical Taxonomy*. Freeman.

Anderberg, R M (1973). *Cluster Analysis for Applications*. Academic Press.

Gordon, David A (1999). *Classification*, 2 edition. Chapman and Hall / CRC.

Murtagh, Fionn (1985). "Multidimensional Clustering Algorithms." In *COMPSTAT Lectures 4*. Physica-Verlag.

McQuitty, L L (1966). "Similarity Analysis by Reciprocal Pairs for Discrete and Continuous Data." *Educational and Psychological Measurement*, **26**(4), 825–831. doi:10.1177/001316446602600402.

Legendre, Pierre, Legendre, Louis (2012). *Numerical Ecology*, 3 edition. Elsevier Science BV.

Murtagh, Fionn, Legendre, Pierre (2014). "Ward's Hierarchical Agglomerative Clustering Method: Which Algorithms Implement Ward's Criterion?" *Journal of Classification*, **31**, 274–295. doi:10.1007/s003570149161z.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:

  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans, mlr_learners_clust.kmean
mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.meanshift,
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.hclust")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.hdbscan

HDBSCAN Clustering Learner

Description

HDBSCAN (hierarchical DBSCAN) clustering. Calls dbscan::hdbscan() from package **dbscan**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function mlr3::lrn():

```
mlr_learners$get("clust.hdbscan")
lrn("clust.hdbscan")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **dbscan**

Parameters

Id	Type	Default	Levels	Range
minPts	integer	-		$[0, \infty)$
cluster_selection_epsilon	numeric	0		$(-\infty, \infty)$
gen_hdbscan_tree	logical	FALSE	TRUE, FALSE	-
gen_simplified_tree	logical	FALSE	TRUE, FALSE	-
verbose	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustHDBSCAN`

Methods

Public methods:

- `LearnerClustHDBSCAN$new()`
- `LearnerClustHDBSCAN$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustHDBSCAN$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustHDBSCAN$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Hahsler M, Piekenbrock M, Doran D (2019). "dbscan: Fast Density-Based Clustering with R." *Journal of Statistical Software*, **91**(1), 1–30. doi:10.18637/jss.v091.i01.

Campello, JGB R, Moulavi, Davoud, Sander, Jörg (2013). "Density-based clustering based on hierarchical density estimates." In *Pacific-Asia conference on knowledge discovery and data mining*, 160–172. Springer.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.kkmeans, mlr_learners_clust.kmeans
mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.meanshift,
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.hdbscan")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.kkmeans`
Kernel K-Means Clustering Learner

Description

Kernel k-means clustering. Calls `kernlab::kkmeans()` from package **kernlab**.

The `centers` parameter is set to 2 by default since `kernlab::kkmeans()` doesn't have a default value for the number of clusters. Kernel parameters have to be passed directly and not by using the `kpar` list in `kernlab::kkmeans()`. The predict method finds the nearest center in kernel distance to assign clusters for new data points.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.kkmeans")
lrn("clust.kkmeans")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **kernlab**

Parameters

Id	Type	Default	Levels	Range
centers	untyped	-		-
kernel	character	rbfdot	rbfdot, polydot, vanilladot, tanhdot, laplacedot, besseldot, anovadot, splinedot	-
sigma	numeric	-		$[0, \infty)$
degree	integer	3		$[1, \infty)$
scale	numeric	1		$[0, \infty)$
offset	numeric	1		$(-\infty, \infty)$
order	integer	1		$(-\infty, \infty)$
alg	character	kkmeans	kkmeans, kerninghan	-
p	numeric	1		$(-\infty, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustKKMeans`

Methods

Public methods:

- `LearnerClustKKMeans$new()`
- `LearnerClustKKMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustKKMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustKKMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Karatzoglou, Alexandros, Smola, Alexandros, Hornik, Kurt, Zeileis, Achim (2004). "kernlab-an S4 package for kernel methods in R." *Journal of statistical software*, **11**, 1–20.

Dhillon, S I, Guan, Yuqiang, Kulis, Brian (2004). *A unified view of kernel k-means, spectral clustering and graph cuts*. Citeseer.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kmeans`
`mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.kkmeans")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.kmeans`
K-Means Clustering Learner

Description

K-means clustering. Calls `stats::kmeans()` from package **stats**.

The `centers` parameter is set to 2 by default since `stats::kmeans()` doesn't have a default value for the number of clusters. The predict method uses `clue::cl_predict()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.kmeans")
lrn("clust.kmeans")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, 'stats', **clue**

Parameters

Id	Type	Default	Levels	Range
centers	untyped	-		-
iter.max	integer	10		$[1, \infty)$
algorithm	character	Hartigan-Wong	Hartigan-Wong, Lloyd, Forgy, MacQueen	-
nstart	integer	1		$[1, \infty)$
trace	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustKMeans`

Methods

Public methods:

- `LearnerClustKMeans$new()`
- `LearnerClustKMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustKMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustKMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Forgy, W E (1965). "Cluster analysis of multivariate data: efficiency versus interpretability of classifications." *Biometrics*, **21**, 768–769.

Hartigan, A J, Wong, A M (1979). "Algorithm AS 136: A K-means clustering algorithm." *Journal of the Royal Statistical Society. Series C (Applied Statistics)*, **28**(1), 100–108. doi:10.2307/2346830.

Lloyd, P S (1982). "Least squares quantization in PCM." *IEEE Transactions on Information Theory*, **28**(2), 129–137.

MacQueen, James (1967). "Some methods for classification and analysis of multivariate observations." In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, volume 1, 281–297.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.kmeans")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.kproto`

K-Prototypes Clustering Learner

Description

K-prototypes clustering for mixed-type data. Calls `clustMixType::kproto()` from package **clustMixType**.

The k parameter is set to 2 by default since `clustMixType::kproto()` doesn't have a default value for the number of clusters.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.kproto")
lrn("clust.kproto")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric", "factor", "ordered"
- Required Packages: **mlr3**, **mlr3cluster**, **clustMixType**

Parameters

Id	Type	Default	Levels	Range
k	untyped	-		-
lambda	untyped	NULL		-
type	character	huang	huang, gower	-
iter.max	integer	100		$[1, \infty)$
nstart	integer	1		$[1, \infty)$
na.rm	character	yes	yes, no, imp.internal, imp.onestep	-
verbose	logical	TRUE	TRUE, FALSE	-
init	character	NULL	nbh.dens, sel.cen, nstart.m	-
p_nstart.m	numeric	0.9		$[0, 1]$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustKProto`

Methods

Public methods:

- `LearnerClustKProto$new()`
- `LearnerClustKProto$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustKProto$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustKProto$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Huang, Zhexue (1998). "Extensions to the k-Means Algorithm for Clustering Large Data Sets with Categorical Values." *Data Mining and Knowledge Discovery*, **2**(3), 283–304.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.kproto")
print(learner)

# Define a mixed-type Task (kproto requires at least one factor variable)
data = data.frame(
  x1 = c(1, 2, 10, 11, 1, 2, 10, 11),
  x2 = factor(c("a", "a", "b", "b", "a", "a", "b", "b"))
)
task = as_task_clust(data)

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.MBatchKMeans

Mini Batch K-Means Clustering Learner

Description

Mini-batch k-means clustering. Calls `ClusterR::MiniBatchKmeans()` from package **ClusterR**.

The `clusters` parameter is set to 2 by default since `ClusterR::MiniBatchKmeans()` doesn't have a default value for the number of clusters. The predict method uses `ClusterR::predict_MBatchKMeans()` to compute the cluster memberships for new data. The learner supports both partitional and fuzzy clustering.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.MBatchKMeans")
lrn("clust.MBatchKMeans")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **ClusterR**

Parameters

Id	Type	Default	Levels	Range
clusters	integer	2		$[1, \infty)$
batch_size	integer	10		$[1, \infty)$
num_init	integer	1		$[1, \infty)$
max_iters	integer	100		$[1, \infty)$
init_fraction	numeric	1		$[0, 1]$
initializer	character	kmeans++	optimal_init, quantile_init, kmeans++, random	-
early_stop_iter	integer	10		$[1, \infty)$
verbose	logical	FALSE	TRUE, FALSE	-
CENTROIDS	untyped	NULL		-
tol	numeric	1e-04		$[0, \infty)$
tol_optimal_init	numeric	0.3		$[0, \infty)$
seed	integer	1		$(-\infty, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustMiniBatchKMeans`

Methods

Public methods:

- `LearnerClustMiniBatchKMeans$new()`
- `LearnerClustMiniBatchKMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustMiniBatchKMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustMiniBatchKMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Sculley, David (2010). "Web-scale k-means clustering." In *Proceedings of the 19th international conference on World wide web*, 1177–1178.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agnes, mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara, mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc, mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust, mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.MBatchKMeans")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.mclust`

Gaussian Mixture Model Clustering Learner

Description

Gaussian mixture model-based clustering. Calls `mclust::Mclust()` from package **mclust**.

The predict method uses `mclust::predict.Mclust()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.mclust")
lrn("clust.mclust")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition", "prob"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **mclust**

Parameters

Id	Type	Default	Levels
G	untyped	1:9	
modelNames	untyped	-	
prior	untyped	-	
control	untyped	-	
initialization	untyped	-	
warn	logical	FALSE	TRUE, FALSE
x	untyped	-	
verbose	logical	FALSE	TRUE, FALSE

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustMclust`

Methods

Public methods:

- `LearnerClustMclust$new()`
- `LearnerClustMclust$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustMclust$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustMclust$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Scrucca, Luca, Fop, Michael, Murphy, Brendan T, Raftery, E A (2016). "mclust 5: clustering, classification and density estimation using Gaussian finite mixture models." *The R journal*, **8**(1), 289.

Fraley, Chris, Raftery, E A (2002). "Model-based clustering, discriminant analysis, and density estimation." *Journal of the American statistical Association*, **97**(458), 611–631.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`,
`mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.mclust")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.meanshift`
Mean Shift Clustering Learner

Description

Mean shift clustering. Calls `LPCM::ms()` from package **LPCM**.

There is no predict method for `LPCM::ms()`, so the method returns cluster labels for the training data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.meanshift")
lrn("clust.meanshift")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **LPCM**

Parameters

Id	Type	Default	Levels	Range
h	untyped	-		-
subset	untyped	-		-
thr	numeric	0.01		$(-\infty, \infty)$
scaled	integer	1		$[0, \infty)$
iter	integer	200		$[1, \infty)$
plot	logical	TRUE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustMeanShift`

Methods

Public methods:

- `LearnerClustMeanShift$new()`
- `LearnerClustMeanShift$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustMeanShift$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustMeanShift$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Cheng, Yizong (1995). "Mean shift, mode seeking, and clustering." *IEEE transactions on pattern analysis and machine intelligence*, **17**(8), 790–799.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).

- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.opt
mlr_learners_clust.pam, mlr_learners_clust.protoclust, mlr_learners_clust.specc, mlr_learners_clust.xme

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.meanshift")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.optics

OPTICS Clustering Learner

Description

OPTICS (ordering points to identify the clustering structure) clustering. Calls dbscan::optics() from package **dbscan**.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.optics")
lrn("clust.optics")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **dbscan**

Parameters

Id	Type	Default	Levels	Range
eps	numeric	NULL		$[0, \infty)$
minPts	integer	5		$[0, \infty)$
search	character	kdtree	kdtree, linear, dist	-
bucketSize	integer	10		$[1, \infty)$
splitRule	character	SUGGEST	STD, MIDPT, FAIR, SL_MIDPT, SL_FAIR, SUGGEST	-
approx	numeric	0		$(-\infty, \infty)$
eps_cl	numeric	-		$[0, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustOPTICS`

Methods

Public methods:

- `LearnerClustOPTICS$new()`
- `LearnerClustOPTICS$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustOPTICS$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustOPTICS$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Hahsler M, Piekenbrock M, Doran D (2019). "dbscan: Fast Density-Based Clustering with R." *Journal of Statistical Software*, **91**(1), 1–30. doi:10.18637/jss.v091.i01.

Ankerst, Mihael, Breunig, M M, Kriegel, Hans-Peter, Sander, Jörg (1999). "OPTICS: Ordering points to identify the clustering structure." *ACM Sigmod record*, **28**(2), 49–60.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.pam, mlr_learners_clust.protoclust, mlr_learners_clust.specc, mlr_learners_clust.xme

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.optics")
print(learner)
```

---

mlr_learners_clust.pam

Partitioning Around Medoids Clustering Learner

Description

Partitioning Around Medoids (PAM) clustering. Calls `cluster::pam()` from package **cluster**.

The `k` parameter is set to 2 by default since `cluster::pam()` doesn't have a default value for the number of clusters. The predict method uses `clue::cl_predict()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.pam")
lrn("clust.pam")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **cluster**, **clue**

Parameters

Id	Type	Default	Levels	Range
k	integer	-		$[1, \infty)$
metric	character	euclidean	euclidean, manhattan	-
medoids	untyped	NULL		-
nstart	integer	1		$[1, \infty)$
stand	logical	FALSE	TRUE, FALSE	-
do.swap	logical	TRUE	TRUE, FALSE	-
pamonce	untyped	FALSE		-
variant	character	original	original, o_1, o_2, f_3, f_4, f_5, faster	-
trace.lev	integer	0		$[0, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustPAM`

Methods

Public methods:

- `LearnerClustPAM$new()`
- `LearnerClustPAM$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustPAM$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustPAM$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Reynolds, P A, Richards, Graeme, de la Iglesia, Beatriz, Rayward-Smith, J V (2006). "Clustering rules: a comparison of partitioning and hierarchical clustering algorithms." *Journal of Mathematical Modelling and Algorithms*, **5**, 475–504.

Schubert, Erich, Rousseeuw, J P (2019). "Faster k-medoids clustering: improving the PAM, CLARA, and CLARANS algorithms." In *Similarity Search and Applications: 12th International Conference, SISAP 2019, Newark, NJ, USA, October 2–4, 2019, Proceedings 12*, 171–187. Springer.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`
`mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`
`mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.mea`
`mlr_learners_clust.optics`, `mlr_learners_clust.protoclust`, `mlr_learners_clust.specc`,
`mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.pam")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
```

```
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.protoclust`
Prototype Hierarchical Clustering Learner

Description

Hierarchical clustering using minimax linkage with prototypes. Calls `protoclust::protoclust()` from package **protoclust**.

There is no predict method for `protoclust::protoclust()`, so the method returns cluster labels for the training data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.protoclust")
lrn("clust.protoclust")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **protoclust**

Parameters

Id	Type	Default	Levels	Range
method	character	euclidean	euclidean, maximum, manhattan, canberra, binary, minkowski	-
diag	logical	FALSE	TRUE, FALSE	-
upper	logical	FALSE	TRUE, FALSE	-
p	numeric	2		$(-\infty, \infty)$
verb	logical	FALSE	TRUE, FALSE	-

k	integer	NULL	$[1, \infty)$

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustProtoclust`

Methods

Public methods:

- `LearnerClustProtoclust$new()`
- `LearnerClustProtoclust$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustProtoclust$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustProtoclust$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Bien, Jacob, Tibshirani, Robert (2011). "Hierarchical Clustering with Prototypes via Minimax Linkage." *Journal of the American Statistical Association*, **106**(495), 1075–1084.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.

- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.specc, mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.protoclust")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

---

mlr_learners_clust.SimpleKMeans

K-Means Clustering Learner (Weka)

Description

K-means clustering (Weka). Calls RWeka::SimpleKMeans() from package **RWeka**.

The predict method uses RWeka::predict.Weka_clusterer() to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function mlr3::lrn():

```
mlr_learners$get("clust.SimpleKMeans")
lrn("clust.SimpleKMeans")
```

Meta Information

- Task type: “clust”
- Predict Types: “partition”
- Feature Types: “logical”, “integer”, “numeric”
- Required Packages: **mlr3**, **mlr3cluster**, **RWeka**

Parameters

Id	Type	Default	Levels	Range
A	untyped	"weka.core.EuclideanDistance"		-
C	logical	FALSE	TRUE, FALSE	-
fast	logical	FALSE	TRUE, FALSE	-
I	integer	100		$[1, \infty)$
init	integer	0		$[0, 3]$
M	logical	FALSE	TRUE, FALSE	-
max_candidates	integer	100		$[1, \infty)$
min_density	integer	2		$[1, \infty)$
N	integer	2		$[1, \infty)$
num_slots	integer	1		$[1, \infty)$
O	logical	FALSE	TRUE, FALSE	-
periodic_pruning	integer	10000		$[1, \infty)$
S	integer	10		$[0, \infty)$
t2	numeric	-1		$(-\infty, \infty)$
t1	numeric	-1.5		$(-\infty, \infty)$
V	logical	FALSE	TRUE, FALSE	-
output_debug_info	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustSimpleKMeans`

Methods

Public methods:

- `LearnerClustSimpleKMeans$new()`
- `LearnerClustSimpleKMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustSimpleKMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustSimpleKMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Witten, H I, Frank, Eibe (2002). "Data mining: practical machine learning tools and techniques with Java implementations." *Acm Sigmod Record*, **31**(1), 76–77.

Forgy, W E (1965). "Cluster analysis of multivariate data: efficiency versus interpretability of classifications." *Biometrics*, **21**, 768–769.

Lloyd, P S (1982). "Least squares quantization in PCM." *IEEE Transactions on Information Theory*, **28**(2), 129–137.

MacQueen, James (1967). "Some methods for classification and analysis of multivariate observations." In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, volume 1, 281–297.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.agnes`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`, `mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`, `mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmean`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.kproto`, `mlr_learners_clust.mclust`, `mlr_learners_clust.mea`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`, `mlr_learners_clust.specc`, `mlr_learners_clust.xmeans`

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.SimpleKMeans")
print(learner)
```

```
# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.specc`
Spectral Clustering Learner

Description

Spectral clustering. Calls `kernlab::specc()` from package **kernlab**.

The `centers` parameter is set to 2 by default since `kernlab::specc()` doesn't have a default value for the number of clusters. Kernel parameters have to be passed directly and not by using the `kpar` list in `kernlab::specc()`.

There is no predict method for `kernlab::specc()`, so the method returns cluster labels for the training data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.specc")
lrn("clust.specc")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **kernlab**

Parameters

Id	Type	Default	Levels	Ran
centers	integer	-		[1, ∞
kernel	character	rbfdot	rbfdot, polydot, vanilladot, tanhdot, laplacedot, besseldot, anovadot, splinedot	-
sigma	numeric	-		[0, ∞
degree	integer	3		[1, ∞
scale	numeric	1		[0, ∞
offset	numeric	1		(−∞
order	integer	1		(−∞
nystrom.red	logical	FALSE	TRUE, FALSE	-
nystrom.sample	integer	-		[1, ∞
iterations	integer	200		[1, ∞
mod.sample	numeric	0.75		[0, 1

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustSpectral`

Methods

Public methods:

- `LearnerClustSpectral$new()`
- `LearnerClustSpectral$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustSpectral$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustSpectral$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Karatzoglou, Alexandros, Smola, Alexandros, Hornik, Kurt, Zeileis, Achim (2004). "kernlab-an S4 package for kernel methods in R." *Journal of statistical software*, **11**, 1–20.

Ng, Y A, Jordan, I M, Weiss, Yair (2001). "On Spectral Clustering: Analysis and an Algorithm." In *Advances in Neural Information Processing Systems*, volume 14.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: mlr_learners_clust.MBatchKMeans, mlr_learners_clust.SimpleKMeans, mlr_learners_clust.agne
mlr_learners_clust.ap, mlr_learners_clust.bico, mlr_learners_clust.birch, mlr_learners_clust.clara,
mlr_learners_clust.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbs
mlr_learners_clust.diana, mlr_learners_clust.em, mlr_learners_clust.fanny, mlr_learners_clust.featurele
mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.xmeans

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.specc")
print(learner)

# Define a Task
task = tsk("usarrests")

# Train the learner on the task
learner$train(task)

# Print the model
print(learner$model)

# Make predictions for the task
prediction = learner$predict(task)

# Score the predictions
prediction$score(task = task)
```

`mlr_learners_clust.xmeans`
X-Means Clustering Learner

Description

X-means clustering. Calls `RWeka::XMeans()` from package **RWeka**.

The predict method uses `RWeka::predict.Weka_clusterer()` to compute the cluster memberships for new data.

Dictionary

This mlr3::Learner can be instantiated via the dictionary mlr3::mlr_learners or with the associated sugar function `mlr3::lrn()`:

```
mlr_learners$get("clust.xmeans")
lrn("clust.xmeans")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- Feature Types: "logical", "integer", "numeric"
- Required Packages: **mlr3**, **mlr3cluster**, **RWeka**

Parameters

Id	Type	Default	Levels	Range
B	numeric	1		$[0, \infty)$
C	numeric	0		$[0, \infty)$
D	untyped	"weka.core.EuclideanDistance"		-
H	integer	4		$[1, \infty)$
I	integer	1		$[1, \infty)$
J	integer	1000		$[1, \infty)$
K	untyped	""		-
L	integer	2		$[1, \infty)$
M	integer	1000		$[1, \infty)$
S	integer	10		$[1, \infty)$
U	integer	0		$[0, \infty)$
use_kdtree	logical	FALSE	TRUE, FALSE	-
N	untyped	-		-
O	untyped	-		-
Y	untyped	-		-
output_debug_info	logical	FALSE	TRUE, FALSE	-

Super classes

`mlr3::Learner` -> `mlr3cluster::LearnerClust` -> `LearnerClustXMeans`

Methods

Public methods:

- `LearnerClustXMeans$new()`
- `LearnerClustXMeans$clone()`

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
LearnerClustXMeans$new()
```

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
LearnerClustXMeans$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

References

Witten, H I, Frank, Eibe (2002). "Data mining: practical machine learning tools and techniques with Java implementations." *Acm Sigmod Record*, **31**(1), 76–77.

Pelleg, Dan, Moore, W A, others (2000). "X-means: Extending k-means with efficient estimation of the number of clusters." In *Icml*, volume 1, 727–734.

See Also

- Chapter in the mlr3book: `https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners`
- Package mlr3extralearners for more learners.
- Dictionary of Learners: mlr3::mlr_learners
- `as.data.table(mlr_learners)` for a table of available Learners in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
  - **mlr3proba** for probabilistic supervised regression and survival analysis.
  - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`
`mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.clara`,
`mlr_learners_clust.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbs`
`mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featurele`

mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmean
mlr_learners_clust.kmeans, mlr_learners_clust.kproto, mlr_learners_clust.mclust, mlr_learners_clust.mea
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.protoclust,
mlr_learners_clust.specc

Examples

```
# Define the Learner and set parameter values
learner = lrn("clust.xmeans")
print(learner)
```

---

mlr_measures_clust.ch *Calinski Harabasz Pseudo F-Statistic*

Description

The score function calls fpc::cluster.stats() from package **fpc**. "ch" is used to subset the output of the function call.

Format

R6::R6Class() inheriting from MeasureClust.

Construction

This measure can be retrieved from the dictionary mlr3::mlr_measures:

```
mlr_measures$get("clust.ch")
msr("clust.ch")
```

Meta Information

- Range: $[0, \infty)$
- Minimize: FALSE
- Required predict type: partition

See Also

Dictionary of Measures: mlr3::mlr_measures

as.data.table(mlr_measures) for a complete table of all (also dynamically created) mlr3::Measure implementations.

Other cluster measures: mlr_measures_clust.dunn, mlr_measures_clust.silhouette, mlr_measures_clust.wss

---

`mlr_measures_clust.dunn`

Dunn Index

Description

The score function calls `fpc::cluster.stats()` from package **fpc**. "dunn" is used to subset the output of the function call.

Format

`R6::R6Class()` inheriting from MeasureClust.

Construction

This measure can be retrieved from the dictionary mlr3::mlr_measures:

```
mlr_measures$get("clust.dunn")
msr("clust.dunn")
```

Meta Information

- Range: $[0, \infty)$
- Minimize: `FALSE`
- Required predict type: `partition`

See Also

Dictionary of Measures: mlr3::mlr_measures

`as.data.table(mlr_measures)` for a complete table of all (also dynamically created) mlr3::Measure implementations.

Other cluster measures: `mlr_measures_clust.ch`, `mlr_measures_clust.silhouette`, `mlr_measures_clust.wss`

`mlr_measures_clust.silhouette`

Rousseeuw's Silhouette Quality Index

Description

The score function calls `cluster::silhouette()` from package **cluster**. "sil_width" is used to subset the output of the function call.

Format

`R6::R6Class()` inheriting from MeasureClust.

Construction

This measure can be retrieved from the dictionary mlr3::mlr_measures:

```
mlr_measures$get("clust.silhouette")
msr("clust.silhouette")
```

Meta Information

- Range: $[-1, 1]$
- Minimize: FALSE
- Required predict type: partition

See Also

Dictionary of Measures: mlr3::mlr_measures

as.data.table(mlr_measures) for a complete table of all (also dynamically created) mlr3::Measure implementations.

Other cluster measures: mlr_measures_clust.ch, mlr_measures_clust.dunn, mlr_measures_clust.wss

---

mlr_measures_clust.wss

Within Sum of Squares

Description

The score function calls fpc::cluster.stats() from package **fpc**. "within.cluster.ss" is used to subset the output of the function call.

Format

R6::R6Class() inheriting from MeasureClust.

Construction

This measure can be retrieved from the dictionary mlr3::mlr_measures:

```
mlr_measures$get("clust.wss")
msr("clust.wss")
```

Meta Information

- Range: $[0, \infty)$
- Minimize: TRUE
- Required predict type: partition

See Also

Dictionary of Measures: mlr3::mlr_measures

`as.data.table(mlr_measures)` for a complete table of all (also dynamically created) mlr3::Measure implementations.

Other cluster measures: `mlr_measures_clust.ch`, `mlr_measures_clust.dunn`, `mlr_measures_clust.silhouette`

`mlr_tasks_ruspini` *Ruspini Cluster Task*

Description

A cluster task for the cluster::ruspini data set.

Format

R6::R6Class inheriting from TaskClust.

Dictionary

This mlr3::Task can be instantiated via the dictionary mlr3::mlr_tasks or with the associated sugar function `mlr3::tsk()`:

```
mlr_tasks$get("ruspini")
tsk("ruspini")
```

Meta Information

- Task type: "clust"
- Dimensions: 75x2
- Properties: -
- Has Missings: `FALSE`
- Target: -
- Features: "x", "y"

References

Ruspini EH (1970). "Numerical methods for fuzzy clustering." *Information Sciences*, **2**(3), 319-350. doi:10.1016/S00200255(70)800561.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html
- Package **mlr3data** for more toy tasks.
- Package **mlr3oml** for downloading tasks from https://www.openml.org.
- Package **mlr3viz** for some generic visualizations.
- Dictionary of Tasks: mlr3::mlr_tasks
- `as.data.table(mlr_tasks)` for a table of available Tasks in the running session (depending on the loaded packages).
- **mlr3fselect** and **mlr3filters** for feature selection and feature filtering.
- Extension packages for additional task types:
  - Unsupervised clustering: **mlr3cluster**
  - Probabilistic supervised regression and survival analysis: https://mlr3proba.mlr-org.com/.

Other Task: `TaskClust`, `mlr_tasks_usarrests`

`mlr_tasks_usarrests` *US Arrests Cluster Task*

Description

A cluster task for the datasets::USArrests data set. Rownames are stored as variable `"states"` with column role `"name"`.

Format

R6::R6Class inheriting from TaskClust.

Dictionary

This mlr3::Task can be instantiated via the dictionary mlr3::mlr_tasks or with the associated sugar function `mlr3::tsk()`:

```
mlr_tasks$get("usarrests")
tsk("usarrests")
```

Meta Information

- Task type: “clust”
- Dimensions: 50x4
- Properties: -
- Has Missings: `FALSE`
- Target: -
- Features: “Assault”, “Murder”, “Rape”, “UrbanPop”

References

Berry, Brian J (1979). "Interactive Data Analysis: A Practical Primer." *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, **28**, 181.

See Also

- Chapter in the mlr3book: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html
- Package **mlr3data** for more toy tasks.
- Package **mlr3oml** for downloading tasks from https://www.openml.org.
- Package **mlr3viz** for some generic visualizations.
- Dictionary of Tasks: mlr3::mlr_tasks
- `as.data.table(mlr_tasks)` for a table of available Tasks in the running session (depending on the loaded packages).
- **mlr3fselect** and **mlr3filters** for feature selection and feature filtering.
- Extension packages for additional task types:
  - Unsupervised clustering: **mlr3cluster**
  - Probabilistic supervised regression and survival analysis: https://mlr3proba.mlr-org.com/.

Other Task: `TaskClust`, `mlr_tasks_ruspini`

`PredictionClust` *Prediction Object for Cluster Analysis*

Description

This object wraps the predictions returned by a learner of class LearnerClust, i.e. the predicted partition and cluster probability.

Super class

`mlr3::Prediction` -> `PredictionClust`

Active bindings

`partition (integer())`
Access the stored partition.

`prob (matrix() | NULL)`
Access to the stored probabilities.

Methods

Public methods:

- PredictionClust$new()
- PredictionClust$clone()

Method `new()`**:** Creates a new instance of this R6 class.

Usage:

```
PredictionClust$new(
  task = NULL,
  row_ids = task$row_ids,
  partition = NULL,
  prob = NULL,
  check = TRUE
)
```

Arguments:

`task` (TaskClust | `NULL`)
: Task, used to extract defaults for `row_ids`.

`row_ids` (`integer()`)
: Row ids of the predicted observations, i.e. the row ids of the test set.

`partition` (`integer()` | `NULL`)
: Vector of cluster partitions.

`prob` (`matrix()` | `NULL`)
: Numeric matrix of cluster membership probabilities with one column for each cluster and one row for each observation. Columns must be named with cluster numbers, row names are automatically removed. If `prob` is provided, but `partition` is not, the cluster memberships are calculated from the probabilities using `max.col()` with `ties.method` set to `"first"`.

`check` (`logical(1)`)
: If `TRUE`, performs some argument checks and predict type conversions.

Method `clone()`**:** The objects of this class are cloneable with this method.

Usage:

```
PredictionClust$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Examples

```
library(mlr3)
library(mlr3cluster)
task = tsk("usarrests")
learner = lrn("clust.kmeans")
p = learner$train(task)$predict(task)
p$predict_types
head(as.data.table(p))
```

TaskClust *Cluster Task*

Description

This task specializes mlr3::Task for cluster problems. As an unsupervised task, this task has no target column. The task_type is set to "clust".

Predefined tasks are stored in the dictionary mlr3::mlr_tasks.

Super classes

mlr3::Task -> mlr3::TaskUnsupervised -> TaskClust

Methods

Public methods:

- TaskClust$new()
- TaskClust$clone()

Method new(): Creates a new instance of this R6 class.

Usage:

```
TaskClust$new(id, backend, label = NA_character_)
```

Arguments:

id (character(1))
: Identifier for the new instance.

backend (mlr3::DataBackend)
: Either a mlr3::DataBackend, or any object which is convertible to a mlr3::DataBackend with as_data_backend(). E.g., a data.frame() will be converted to a mlr3::DataBackendDataTable.

label (character(1))
: Label for the new instance.

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
TaskClust$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

See Also

Other Task: mlr_tasks_ruspini, mlr_tasks_usarrests

Examples

```
library(mlr3)
library(mlr3cluster)
task = TaskClust$new("usarrests", backend = USArrests)
task$task_type

# possible properties:
mlr_reflections$task_properties$clust
```

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