Package 'mlr3cluster'

October 4, 2024

Title Cluster Extension for 'mlr3'

Version 0.1.10

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 (>= 0.21.0), R (>= 3.1.0)

Imports backports (>= 1.1.10), checkmate, clue, cluster, data.table,
fpc, mlr3misc (>= 0.14.0), paradox (>= 1.0.0), R6, stats

Suggests apcluster, ClusterR (>= 1.3.1), dbscan, e1071, kernlab, LPCM,
mclust, mlbench, RWeka, stream, testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

RoxygenNote 7.3.2

Collate 'LearnerClust.R' 'zzz.R' 'LearnerClustAffinityPropagation.R'
'LearnerClustAgnes.R' 'LearnerClustBICO.R'
'LearnerClustBIRCH.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'
'LearnerClustMclust.R' 'LearnerClustMeanShift.R'
'LearnerClustMiniBatchKMeans.R' 'LearnerClustOPTICS.R'
'LearnerClustPAM.R' 'LearnerClustSimpleKMeans.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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Repository CRAN

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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

```
if (requireNamespace("e1071")) {
  # create a prediction object
  task = tsk("usarrests")
  learner = lrn("clust.kmeans")
  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::Prediction](#)s 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())
    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))
> 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 Hierarchical Clustering Learner

Description

A LearnerClust for agglomerative hierarchical clustering implemented in cluster::agnes(). 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](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.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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("cluster")) {
  learner = mlr3::lrn("clust.agnes")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.ap   *Affinity Propagation Clustering Learner*

Description

A LearnerClust for Affinity Propagation clustering implemented in `apcluster::apcluster()`. `apcluster::apcluster()` doesn't have set a default for 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		-
q	numeric	-		$[0, 1]$
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	-		$(-\infty, \infty)$

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.cmeans`, `mlr_learners_clust.cobwe`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`, `mlr_learners_clust.diana`, `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.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("apcluster")) {
  learner = mlr3::lrn("clust.ap")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

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 **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.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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("stream")) {
  learner = mlr3::lrn("clust.bico")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

mlr_learners_clust.birch

BIRCH Clustering Learner

Description

BIRCH (Balanced Iterative Reducing Clustering using Hierarchies) clustering. Calls `stream::DSC_BIRCH()` from **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.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.featureless`, `mlr_learners_clust.ff`,
`mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`,
`mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("stream")) {
  learner = mlr3::lrn("clust.birch")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.cmeans

Fuzzy C-Means Clustering Learner

Description

A LearnerClust for fuzzy clustering implemented in `e1071::cmeans()`. `e1071::cmeans()` doesn't have a default value for the number of clusters. Therefore, the centers parameter here is set to 2 by default. 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**

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.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.featureless`, `mlr_learners_clust.ff`,
`mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`,
`mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("e1071")) {
  learner = mlr3::lrn("clust.cmeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

`mlr_learners_clust.cobweb`

Cobweb Clustering Learner

Description

A LearnerClust for Cobweb clustering implemented in `RWeka::Cobweb()`. 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 (de-
  pending 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.dbscan`, `mlr_learners_clust.dbscan_fpc`, `mlr_learners_clust.diana`,
`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.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("RWeka")) {
  learner = mlr3::lrn("clust.cobweb")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

mlr_learners_clust.dbscan

Density-based Spatial Clustering of Applications with Noise (DB-
SCAN) Clustering Learner

Description

DBSCAN (Density-based spatial clustering of applications with noise) clustering. Calls `dbscan::dbscan()`
from **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		$[0, \infty)$
borderPoints	logical	TRUE	TRUE, FALSE	-
weights	untyped	-		-
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.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.featureless, mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans, mlr_learners_clust.kmeans, mlr_learners_clust.mclust, mlr_learners_clust.meanshift, mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("dbscan")) {
  learner = mlr3::lrn("clust.dbscan")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

mlr_learners_clust.dbscan_fpc

Density-based Spatial Clustering of Applications with Noise (DB-SCAN) Clustering Learner

Description

DBSCAN (Density-based spatial clustering of applications with noise) clustering. Calls `fpc::dbscan()` from **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, 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.cmeans`, `mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.diana`, `mlr_learners_clust.em`, `mlr_learners_clust.fanny`, `mlr_learners_clust.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hcl`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("fpc")) {
  learner = mlr3::lrn("clust.dbscan_fpc")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.diana

Divisive Hierarchical Clustering Learner

Description

A [LearnerClust](#) for divisive hierarchical clustering implemented in [cluster::diana()](#). 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.cmeans, mlr_learners_clust.cobweb, mlr_learners_clust.dbscan, mlr_learners_clust.dbscan_fpc, 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.mclust, mlr_learners_clust.meanshift, mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("cluster")) {
  learner = mlr3::lrn("clust.diana")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.em *Expectation-Maximization Clustering Learner*

Description

A LearnerClust for Expectation-Maximization clustering implemented in `RWeka::list_Weka_interfaces()`.
The predict method uses `RWeka::predict.Weka_clusterer()` to compute the cluster membership 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.em")
lrn("clust.em")
```

Meta Information

- Task type: "clust"
- Predict Types: "partition"
- 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.cmeans`,
`mlr_learners_clust.cobweb`, `mlr_learners_clust.dbscan`, `mlr_learners_clust.dbscan_fpc`,
`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.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("RWeka")) {
  learner = mlr3::lrn("clust.em")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

`mlr_learners_clust.fanny`

Fuzzy Analysis Clustering Learner

Description

A [LearnerClust](#) for fuzzy clustering implemented in `cluster::fanny()`. `cluster::fanny()` doesn't have a default value for the number of clusters. Therefore, the k parameter which corresponds to the number of clusters here is set to 2 by default. 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	-
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.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.featureless, mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans, mlr_learners_clust.kmeans, mlr_learners_clust.mclust, mlr_learners_clust.meanshift, mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("cluster")) {
  learner = mlr3::lrn("clust.fanny")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.featureless

Featureless Clustering Learner

Description

A simple LearnerClust which 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.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.ff,
mlr_learners_clust.hclust, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans,
mlr_learners_clust.kmeans, mlr_learners_clust.mclust, mlr_learners_clust.meanshift,
mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("mlr3")) {
  learner = mlr3::lrn("clust.featureless")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.ff   *Farthest First Clustering Learner*

Description

A LearnerClust for Farthest First clustering implemented in RWeka::FarthestFirst(). 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 -> LearnerClustFF

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.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.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`,
`mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`,
`mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("RWeka")) {
  learner = mlr3::lrn("clust.ff")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.hclust

Agglomerative Hierarchical Clustering Learner

Description

A LearnerClust for agglomerative hierarchical clustering implemented in `stats::hclust()`. Difference 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	2		$[1, \infty)$

Super classes

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

Methods

Public methods:

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

Method new(): Creates a new instance of this [R6](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.agnes, 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.featureless, mlr_learners_clust.ff, mlr_learners_clust.hdbscan, mlr_learners_clust.kkmeans, mlr_learners_clust.kmeans, mlr_learners_clust.mclust, mlr_learners_clust.meanshift, mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("stats")) {
  learner = mlr3::lrn("clust.hclust")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.hdbscan

Hierarchical DBSCAN (HDBSCAN) Clustering Learner

Description

HDBSCAN (Hierarchical DBSCAN) clustering. Calls dbscan::hdbscan() from **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	-		$[0, \infty)$
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.agnes, 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.featureless, mlr_learners_clust.ff, mlr_learners_clust.hclust, mlr_learners_clust.kkmeans, mlr_learners_clust.kmeans, mlr_learners_clust.mclust, mlr_learners_clust.meanshift, mlr_learners_clust.optics, mlr_learners_clust.pam, mlr_learners_clust.xmeans

Examples

```
if (requireNamespace("dbscan")) {
  learner = mlr3::lrn("clust.hdbscan")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.kkmeans
                    Kernel K-Means Clustering Learner

Description

A [LearnerClust](#) for kernel k-means clustering implemented in [kernlab::kkmeans()](#). [kernlab::kkmeans()](#) doesn't have a default value for the number of clusters. Therefore, the centers parameter here is set to 2 by default. Kernel parameters have to be passed directly and not by using the kpar list in 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	vanilladot, polydot, rbfdot, 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.agnes`, `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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("kernlab")) {
  learner = mlr3::lrn("clust.kkmeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.kmeans
K-Means Clustering Learner

Description

A [LearnerClust](#) for k-means clustering implemented in [stats::kmeans()](#). [stats::kmeans()](#) doesn't have a default value for the number of clusters. Therefore, the centers parameter here is set to 2 by default. 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	integer	0		$[0, \infty)$

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.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.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`,
`mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("stats") && requireNamespace("clue")) {
  learner = mlr3::lrn("clust.kmeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.MBatchKMeans

Mini Batch K-Means Clustering Learner

Description

A LearnerClust for mini batch k-means clustering implemented in `ClusterR::MiniBatchKmeans()`.
`ClusterR::MiniBatchKmeans()` doesn't have a default value for the number of clusters. There-
fore, the clusters parameter here is set to 2 by default. 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.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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("ClusterR")) {
  learner = mlr3::lrn("clust.MBatchKMeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

`mlr_learners_clust.mclust`

Gaussian Mixture Models-Based Clustering Learner

Description

A LearnerClust for model-based clustering implemented in `mclust::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
G	untyped	1:9
modelNames	untyped	-
prior	untyped	-
control	untyped	mclust::emControl()
initialization	untyped	-
x	untyped	-

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): `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.agnes`, `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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("mclust")) {
  learner = mlr3::lrn("clust.mclust")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.meanshift

Mean Shift Clustering Learner

Description

A [LearnerClust](#) for Mean Shift clustering implemented in [LPCM::ms()](#). 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	Range
h	untyped	-	-
subset	untyped	-	-
scaled	integer	1	$[0, \infty)$
iter	integer	200	$[1, \infty)$
thr	numeric	0.01	$(-\infty, \infty)$

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.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.mclust`, `mlr_learners_clust.optics`, `mlr_learners_clust.par`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("LPCM")) {
  learner = mlr3::lrn("clust.meanshift")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.optics

Ordering Points to Identify the Clustering Structure (OPTICS) Clustering Learner

---

Description

OPTICS (Ordering points to identify the clustering structure) point ordering clustering. Calls `dbscan::optics()` from **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.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.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("dbscan")) {
  learner = mlr3::lrn("clust.optics")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

mlr_learners_clust.pam

Partitioning Around Medoids Clustering Learner

Description

A [LearnerClust](#) for PAM clustering implemented in `cluster::pam()`. `cluster::pam()` doesn't have a default value for the number of clusters. Therefore, the k parameter which corresponds to the number of clusters here is set to 2 by default. 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**

Parameters

Id	Type	Default	Levels	Range
k	integer	-		$[1, \infty)$
metric	character	-	euclidian, manhattan	-
medoids	untyped	NULL		-
stand	logical	FALSE	TRUE, FALSE	-
do.swap	logical	TRUE	TRUE, FALSE	-
pamonce	integer	0		$[0, 5]$
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.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.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("cluster")) {
  learner = mlr3::lrn("clust.pam")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_learners_clust.SimpleKMeans
K-Means Clustering Learner from Weka

Description

A [LearnerClust](#) for Simple K Means clustering implemented in [RWeka::SimpleKMeans()](#). 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.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.featureless`, `mlr_learners_clust.ff`, `mlr_learners_clust.hclust`, `mlr_learners_clust.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.xmeans`

Examples

```
if (requireNamespace("RWeka")) {
  learner = mlr3::lrn("clust.SimpleKMeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

`mlr_learners_clust.xmeans`

X-means Clustering Learner

Description

A LearnerClust for X-means clustering implemented in `RWeka::XMeans()`. 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.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.kkmear`, `mlr_learners_clust.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`

Examples

```
if (requireNamespace("RWeka")) {
  learner = mlr3::lrn("clust.xmeans")
  print(learner)

  # available parameters:
  learner$param_set$ids()
}
```

---

mlr_measures_clust.ch   *Calinski Harabasz Pseudo F-Statistic*

Description

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

Format

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

Construction

This measures 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 subset output of the function call.

Format

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

Construction

This measures 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 subset output of the function call.

Format

R6::R6Class() inheriting from MeasureClust.

Construction

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

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

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.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 subset output of the function call.

Format

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

Construction

This measures 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())
    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)
    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())
    Vector of cluster partitions.

prob (matrix())
    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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