

Package ‘mlr3cluster’

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Title Cluster Extension for 'mlr3'

Version 0.2.0

Description Extends the 'mlr3' package with cluster analysis.

License LGPL-3

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

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

Depends mlr3 (>= 1.3.0), R (>= 3.4.0)

Imports backports (>= 1.1.10), checkmate (>= 2.0.0), cluster,
data.table (>= 1.15.0), fpc, mlr3misc (>= 0.19.0), paradox (>= 1.0.1), R6, stats

Suggests apcluster, clue, ClusterR (>= 1.3.1), dbscan, e1071, kernlab,
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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' 'LearnerClustProtoclust.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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mlr3cluster-package	<i>mlr3cluster: Cluster Extension for 'mlr3'</i>
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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	<i>Convert to a Cluster Prediction</i>
---------------------	--

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	<i>Convert to a Cluster Task</i>
---------------	----------------------------------

Description

Convert object to a [TaskClust](#). This is a S3 generic, specialized for at least the following objects:

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

Usage

```

as_task_clust(x, ...)

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

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

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

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

```

Arguments

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

Value

[TaskClust](#).

Examples

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

LearnerClust

Cluster Learner

Description

This Learner specializes [mlr3::Learner](#) for cluster problems:

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

Predefined learners can be found in the [mlr3misc::Dictionary mlr3::mlr_learners](#).

Super class

[mlr3::Learner](#) -> LearnerClust

Public fields

assignments (NULL | vector())

Cluster assignments from learned model.

save_assignments (logical())

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 Nesting Clustering Learner*

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

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

Usage:

```
LearnerClustAgnes$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.ap *Affinity Propagation Clustering Learner*

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

- [LearnerClustAP\\$new\(\)](#)
- [LearnerClustAP\\$clone\(\)](#)

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustAP$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Bodenhofer, Ulrich, Kothmeier, Andreas, Hochreiter, Sepp (2011). “APCluster: an R package for affinity propagation clustering.” *Bioinformatics*, **27**(17), 2463–2464.
- Frey, J B, Dueck, Delbert (2007). “Clustering by passing messages between data points.” *science*, **315**(5814), 972–976.

See Also

- Chapter in the [mlr3book](https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners): 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.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.protoclust](#), [mlr_learners_clust.xmeans](#)

Examples

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

```
mlr_learners_clust.bico
```

BICO Clustering Learner

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

`LearnerClustBICO$new()`

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

Usage:

`LearnerClustBICO$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

References

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

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

See Also

- Chapter in the [mlr3book](https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners): 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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.birch

BIRCH Clustering Learner

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustBIRCH$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Zhang, Tian, Ramakrishnan, Raghu, Livny, Miron (1996). “BIRCH: An Efficient Data Clustering Method for Very Large Databases.” *ACM sigmod record*, **25**(2), 103–114.
- Zhang, Tian, Ramakrishnan, Raghu, Livny, Miron (1997). “BIRCH: A new data clustering algorithm and its applications.” *Data Mining and Knowledge Discovery*, **1**, 141–182.
- Hahsler M, Bolaños M, Forrest J (2017). “Introduction to stream: An Extensible Framework for Data Stream Clustering Research with R.” *Journal of Statistical Software*, **76**(14), 1–50. doi:[10.18637/jss.v076.i14](https://doi.org/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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

```
mlr_learners_clust.cmeans
```

Fuzzy C-Means Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

Id	Type	Default	Levels	Range
centers	untyped	-		-
iter.max	integer	100		$[1, \infty)$
verbose	logical	FALSE	TRUE, FALSE	-
dist	character	euclidean	euclidean, manhattan	-
method	character	cmeans	cmeans, ufcl	-
m	numeric	2		$[1, \infty)$
rate.par	numeric	-		$[0, 1]$
weights	untyped	1L		-
control	untyped	-		-

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustCMeans$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Dimitriadou, Evgenia, Hornik, Kurt, Leisch, Friedrich, Meyer, David, Weingessel, Andreas (2008). “Misc functions of the Department of Statistics (e1071), TU Wien.” *R package*, **1**, 5–24.
- Bezdek, C J (2013). *Pattern recognition with fuzzy objective function algorithms*. Springer Science & Business Media.

See Also

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

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

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.cobweb
```

Cobweb Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

`LearnerClustCobweb$new()`

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

Usage:

`LearnerClustCobweb$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

References

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

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

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

See Also

- Chapter in the [mlr3book](https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners): 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.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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.dbscan

DBSCAN Clustering Learner

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustDBSCAN$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Hahsler M, Piekenbrock M, Doran D (2019). “dbscan: Fast Density-Based Clustering with R.” *Journal of Statistical Software*, **91**(1), 1–30. doi:[10.18637/jss.v091.i01](https://doi.org/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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

```
mlr_learners_clust.dbscan_fpc
      DBSCAN Clustering Learner (fpc)
```

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

`LearnerClustDBSCANfpc$new()`

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

Usage:

`LearnerClustDBSCANfpc$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.hc`, `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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

```
mlr_learners_clust.diana
```

Divisive Analysis Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustDiana$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

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

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

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.em *Expectation-Maximization Clustering Learner*

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

- [LearnerClustEM\\$new\(\)](#)
- [LearnerClustEM\\$clone\(\)](#)

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustEM$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

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

See Also

- Chapter in the [mlr3book](https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners): 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.protoclust](#), [mlr_learners_clust.xmeans](#)

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.fanny
```

Fuzzy Analysis Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods**Public methods:**

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustFanny$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

- Chapter in the [mlr3book](https://mlr3book.ml-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners): https://mlr3book.ml-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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.featureless
      Featureless Clustering Learner
```

Description

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

Dictionary

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

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

Meta Information

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

Parameters

Id	Type	Default	Range
num_clusters	integer	-	[1, ∞)

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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.ff *Farthest First Clustering Learner*

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

```
mlr3::Learner -> mlr3cluster::LearnerClust -> 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.featurel**, **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.protoclust**, **mlr_learners_clust.xmeans**

Examples

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

# Define a Task
```

```
task = tsk("usarrests")

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.hclust
<i>Hierarchical Clustering Learner</i>

Description

Agglomerative hierarchical clustering. Calls `stats::hclust()` from package **stats**.
Distance calculation is done by `stats::dist()`.

Dictionary

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

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

Meta Information

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

Parameters

Id	Type	Default	Levels	Range
method	character	complete	ward.D, ward.D2, single, complete, average, mcquitty, median, centroid	-
members	untyped	NULL		-
distmethod	character	euclidean	euclidean, maximum, manhattan, canberra, binary, minkowski	-
diag	logical	FALSE	TRUE, FALSE	-

upper	logical	FALSE	TRUE, FALSE	-
p	numeric	2		$(-\infty, \infty)$
k	integer	NULL		$[1, \infty)$

Super classes

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

Methods

Public methods:

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

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

Usage:

`LearnerClustHclust$new()`

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

Usage:

`LearnerClustHclust$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

References

- Becker, A R, Chambers, M J, Wilks, R A (1988). *The New S Language*. Wadsworth & Brooks/Cole.
- Everitt, S B (1974). *Cluster Analysis*. Heinemann Educational Books.
- Hartigan, A J (1975). *Clustering Algorithms*. John Wiley & Sons.
- Sneath, H A P, Sokal, R R (1973). *Numerical Taxonomy*. Freeman.
- Anderberg, R M (1973). *Cluster Analysis for Applications*. Academic Press.
- Gordon, David A (1999). *Classification*, 2 edition. Chapman and Hall / CRC.
- Murtagh, Fionn (1985). “Multidimensional Clustering Algorithms.” In *COMPSTAT Lectures 4*. Physica-Verlag.
- McQuitty, L L (1966). “Similarity Analysis by Reciprocal Pairs for Discrete and Continuous Data.” *Educational and Psychological Measurement*, **26**(4), 825–831. doi:10.1177/001316446602600402.
- Legendre, Pierre, Legendre, Louis (2012). *Numerical Ecology*, 3 edition. Elsevier Science BV.
- Murtagh, Fionn, Legendre, Pierre (2014). “Ward’s Hierarchical Agglomerative Clustering Method: Which Algorithms Implement Ward’s Criterion?” *Journal of Classification*, **31**, 274–295. doi:10.1007/s003570149161z.

See Also

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.hdbscan`, `mlr_learners_clust.kkmeans`, `mlr_learners_clust.kmean`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.hdbscan
```

HDBSCAN Clustering Learner

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

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

Usage:

```
LearnerClustHDBSCAN$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

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

See Also

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.featurel`, `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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

```
# Define a Task
```

```
task = tsk("usarrests")

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.kkmeans

Kernel K-Means Clustering Learner

Description

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

The `centers` parameter is set to 2 by default since `kernlab::kkmeans()` doesn't have a default value for the number of clusters. Kernel parameters have to be passed directly and not by using the `kpar` list in `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.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.kmeans`, `mlr_learners_clust.mclust`, `mlr_learners_clust.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.kmeans

K-Means Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

- [LearnerClustKMeans\\$new\(\)](#)
- [LearnerClustKMeans\\$clone\(\)](#)

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustKMeans$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Forgy, W E (1965). “Cluster analysis of multivariate data: efficiency versus interpretability of classifications.” *Biometrics*, **21**, 768–769.
- Hartigan, A J, Wong, A M (1979). “Algorithm AS 136: A K-means clustering algorithm.” *Journal of the Royal Statistical Society. Series C (Applied Statistics)*, **28**(1), 100–108. doi:10.2307/2346830.
- Lloyd, P S (1982). “Least squares quantization in PCM.” *IEEE Transactions on Information Theory*, **28**(2), 129–137.
- MacQueen, James (1967). “Some methods for classification and analysis of multivariate observations.” In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, volume 1, 281–297.

See Also

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

Other Learner: [mlr_learners_clust.MBatchKMeans](#), [mlr_learners_clust.SimpleKMeans](#), [mlr_learners_clust.agne](#), [mlr_learners_clust.ap](#), [mlr_learners_clust.bico](#), [mlr_learners_clust.birch](#), [mlr_learners_clust.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.featurel
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.protoclust, mlr_learners_clust.xmeans
```

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.MBatchKMeans
```

Mini Batch K-Means Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods**Public methods:**

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

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

Usage:

```
LearnerClustMiniBatchKMeans$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

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

Other Learner: `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agnes`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.mclust
<i>Gaussian Mixture Model Clustering Learner</i>

Description

Gaussian mixture model-based clustering. Calls `mclust::Mclust()` from package **mclust**.
The predict method uses `mclust::predict.Mclust()` to compute the cluster memberships for new data.

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

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

Usage:

```
LearnerClustMclust$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

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

See Also

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.meanshift`, `mlr_learners_clust.optics`, `mlr_learners_clust.pam`, `mlr_learners_clust.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.meanshift
```

Mean Shift Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods**Public methods:**

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

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

Usage:

```
LearnerClustMeanShift$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

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

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

Other Learner: `mlr_learners_clust.MBatchKMeans`, `mlr_learners_clust.SimpleKMeans`, `mlr_learners_clust.agne`, `mlr_learners_clust.ap`, `mlr_learners_clust.bico`, `mlr_learners_clust.birch`, `mlr_learners_clust.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.feature1`, `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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

```
mlr_learners_clust.optics
```

OPTICS Clustering Learner

Description

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

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

Usage:

```
LearnerClustOPTICS$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Hahsler M, Piekenbrock M, Doran D (2019). “dbscan: Fast Density-Based Clustering with R.” *Journal of Statistical Software*, **91**(1), 1–30. doi:10.18637/jss.v091.i01.
- Ankerst, Mihael, Breunig, M M, Kriegel, Hans-Peter, Sander, Jörg (1999). “OPTICS: Ordering points to identify the clustering structure.” *ACM Sigmod record*, **28**(2), 49–60.

See Also

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

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

Examples

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

```
mlr_learners_clust.pam
```

Partitioning Around Medoids Clustering Learner

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods

Public methods:

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

Method `new()`: Creates a new instance of this [R6](#) class.

Usage:

```
LearnerClustPAM$new()
```

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

Usage:

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

Arguments:

deep Whether to make a deep clone.

References

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

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

See Also

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

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

Examples

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

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

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

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

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

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

mlr_learners_clust.protoclust
<i>Prototype Hierarchical Clustering Learner</i>

Description

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

Dictionary

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

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

Meta Information

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

Parameters

Id	Type	Default	Levels	Range
method	character	euclidean	euclidean, maximum, manhattan, canberra, binary, minkowski	-
diag	logical	FALSE	TRUE, FALSE	-
upper	logical	FALSE	TRUE, FALSE	-
p	numeric	2		$(-\infty, \infty)$
verb	logical	FALSE	TRUE, FALSE	-
k	integer	NULL		$[1, \infty)$

Super classes

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

Methods

Public methods:

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

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

Usage:

`LearnerClustProtoclust$new()`

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

Usage:

`LearnerClustProtoclust$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

References

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

See Also

- Chapter in the `mlr3book`: https://mlr3book.ml-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.pam`, `mlr_learners_clust.xmeans`

Examples

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

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

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

# Print the model
print(learner$model)

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

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

mlr_learners_clust.SimpleKMeans

K-Means Clustering Learner (Weka)

Description

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

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

Dictionary

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

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

Meta Information

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

Parameters

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

Super classes

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

Methods**Public methods:**

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

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

Usage:

```
LearnerClustSimpleKMeans$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

- Witten, H I, Frank, Eibe (2002). “Data mining: practical machine learning tools and techniques with Java implementations.” *Acm Sigmod Record*, **31**(1), 76–77.
- Forgy, W E (1965). “Cluster analysis of multivariate data: efficiency versus interpretability of classifications.” *Biometrics*, **21**, 768–769.
- Lloyd, P S (1982). “Least squares quantization in PCM.” *IEEE Transactions on Information Theory*, **28**(2), 129–137.
- MacQueen, James (1967). “Some methods for classification and analysis of multivariate observations.” In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, volume 1, 281–297.

See Also

- Chapter in the **mlr3book**: https://mlr3book.ml-r.org/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.protoclust`, `mlr_learners_clust.xmeans`

Examples

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

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

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

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

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

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

mlr_learners_clust.xmeans
X-Means Clustering Learner

Description

X-means clustering. Calls `RWeka::XMeans()` from package **RWeka**.
The predict method uses `RWeka::predict.Weka_clusterer()` to compute the cluster memberships for new data.

Dictionary

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

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

Meta Information

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

Parameters

Id	Type	Default	Levels	Range
B	numeric	1		$[0, \infty)$
C	numeric	0		$[0, \infty)$
D	untyped	"weka.core.EuclideanDistance"		-
H	integer	4		$[1, \infty)$
I	integer	1		$[1, \infty)$
J	integer	1000		$[1, \infty)$
K	untyped	""		-
L	integer	2		$[1, \infty)$

M	integer	1000		$[1, \infty)$
S	integer	10		$[1, \infty)$
U	integer	0		$[0, \infty)$
use_kdtree	logical	FALSE	TRUE, FALSE	-
N	untyped	-		-
O	untyped	-		-
Y	untyped	-		-
output_debug_info	logical	FALSE	TRUE, FALSE	-

Super classes

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

Methods

Public methods:

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

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

Usage:

```
LearnerClustXMeans$new()
```

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

Usage:

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

Arguments:

`deep` Whether to make a deep clone.

References

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

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

See Also

- Chapter in the `mlr3book`: https://mlr3book.mlr-org.com/chapters/chapter2/data_and_basic_modeling.html#sec-learners
- Package `mlr3extralearners` for more learners.
- Dictionary of Learners: `mlr3::mlr_learners`

- `as.data.table(mlr_learners)` for a table of available [Learners](#) in the running session (depending on the loaded packages).
- **mlr3pipelines** to combine learners with pre- and postprocessing steps.
- Extension packages for additional task types:
 - **mlr3proba** for probabilistic supervised regression and survival analysis.
 - **mlr3cluster** for unsupervised clustering.
- **mlr3tuning** for tuning of hyperparameters, **mlr3tuningspaces** for established default tuning spaces.

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

Examples

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

`mlr_measures_clust.ch` *Calinski Harabasz Pseudo F-Statistic*

Description

The score function calls `fpc::cluster.stats()` from package **fpc**. "ch" is used 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	<i>Ruspini Cluster Task</i>
-------------------	-----------------------------

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](https://doi.org/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	<i>US Arrests Cluster Task</i>
---------------------	--------------------------------

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).
- **mlr3select** 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	<i>Cluster Task</i>
-----------	---------------------

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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