

Package ‘trendeval’

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Title Evaluate Trending Models

Version 0.1.0

Description Provides a coherent interface for evaluating models fit with the trending package. This package is part of the RECON (<<https://www.repidemicsconsortium.org/>>) toolkit for outbreak analysis.

URL <https://github.com/reconverse/trendeval>

BugReports <https://github.com/reconverse/trendeval/issues>

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Imports trending (>= 0.1.0), yardstick, rsample, stats, tibble, utils

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R topics documented:

calculate_aic	2
calculate_mae	3
calculate_rmse	5
calculate_rsqr	6
evaluate_aic	8
evaluate_resampling	9

Index	11
--------------	-----------

calculate_aic	<i>Generic for calculating the AIC</i>
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Description

Generic `calculate_aic()` returns the Akaike's 'An Information Criterion' for the given input.

Usage

```
calculate_aic(x, ...)

## Default S3 method:
calculate_aic(x, ...)

## S3 method for class 'trending_model'
calculate_aic(x, data, as_tibble = FALSE, ...)

## S3 method for class 'list'
calculate_aic(x, data, ...)

## S3 method for class 'trending_fit'
calculate_aic(x, as_tibble = FALSE, ...)

## S3 method for class 'trending_fit_tbl'
calculate_aic(x, ...)
```

Arguments

<code>x</code>	An R object.
<code>...</code>	Not currently used.
<code>data</code>	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
<code>as_tibble</code>	Should the result be returned as tibble (<code>as_tibble = TRUE</code>) or a list (<code>as_tibble = FALSE</code>).

Details

Specific methods are given for [trending_fit](#) and [trending_fit_tbl](#) objects. The default method applies `stats::AIC()` directly.

Value

For a single [trending_fit](#) input, if `as_tibble = FALSE` the object returned will be a list with entries:

- `metric`: "AIC"
- `result`: the resulting AIC value fit (NULL if the calculation failed)

- warnings: any warnings generated during calculation
- errors: any errors generated during calculation

If `as_tibble = TRUE`, or the input is a `trending_fit_tbl`, then the output will be a `tibble` with one row for each fitted model columns corresponding to output generated with single model input.

Author(s)

Tim Taylor

```
#' @examples x = rnorm(100, mean = 0) y = rpois(n = 100, lambda = exp(1.5 + 0.5*x)) dat <-
data.frame(x = x, y = y) poisson_model <- glm_model(y ~ x, family = "poisson") negbin_model <-
glm_nb_model(y ~ x) fitted_model <- fit(poisson_model, dat) fitted_models <- fit(list(poisson_model,
negbin_model), data = dat)
calculate_aic(poisson_model, dat) calculate_aic(fitted_model) calculate_aic(fitted_model, as_tibble
= TRUE) calculate_aic(fitted_models)
```

calculate_mae

Generic for calculating the root mean squared error

Description

Generic `calculate_mae()` returns the root mean square error for the given input.

Usage

```
calculate_mae(x, ...)

## Default S3 method:
calculate_mae(x, ...)

## S3 method for class 'trending_model'
calculate_mae(x, data, na.rm = TRUE, as_tibble = TRUE, ...)

## S3 method for class 'list'
calculate_mae(x, data, na.rm = TRUE, ...)

## S3 method for class 'trending_fit'
calculate_mae(x, new_data, na.rm = TRUE, as_tibble = TRUE, ...)

## S3 method for class 'trending_fit_tbl'
calculate_mae(x, new_data, na.rm = TRUE, ...)

## S3 method for class 'trending_predict'
calculate_mae(x, na.rm = TRUE, as_tibble = TRUE, ...)

## S3 method for class 'trending_predict_tbl'
calculate_mae(x, na.rm = TRUE, ...)
```

```
## S3 method for class 'trending_prediction'
calculate_mae(x, na.rm = TRUE, as_tibble = TRUE, ...)
```

Arguments

x	An R object.
...	Not currently used.
data	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
na.rm	Should NA values should be removed before calculation of metric (passed to the underlying function <code>yardstick::mae_vec</code>).
as_tibble	Should the result be returned as <code>tibble</code> (<code>as_tibble = TRUE</code>) or a list (<code>as_tibble = FALSE</code>).
new_data	a <code>data.frame</code> containing data (including the response variable and all predictors) on which to assess the model.

Details

Specific methods are given for `trending_model` (and lists of these), `trending_fit`, `trending_fit_tbl`, `trending_predict_tbl`, `trending_predict_tbl` and `trending_prediction` objects. Each of these are simply wrappers around the `yardstick::mae_vec` with the addition of explicit error handling.

Value

For a single `trending_fit` input, if `as_tibble = FALSE` the object returned will be a list with entries:

- `metric`: "mae"
- `result`: the resulting mae value (NULL if the calculation failed)
- `warnings`: any warnings generated during calculation
- `errors`: any errors generated during calculation

If `as_tibble = TRUE`, or for the other `trending` classes, then the output will be a `tibble` with one row for each fitted model columns corresponding to output generated with single model input.

Author(s)

Tim Taylor

```
#' @examples x = rnorm(100, mean = 0) y = rpois(n = 100, lambda = exp(1.5 + 0.5*x)) dat <-
data.frame(x = x, y = y) poisson_model <- glm_model(y ~ x, family = "poisson") negbin_model <-
glm_nb_model(y ~ x) fitted_model <- fit(poisson_model, dat) fitted_models <- fit(list(poisson_model,
negbin_model), data = dat)
```

```
calculate_mae(poisson_model, dat) calculate_mae(fitted_model) calculate_mae(fitted_model, as_tibble
= TRUE) calculate_mae(fitted_models)
```

calculate_rmse	<i>Generic for calculating the root mean squared error</i>
----------------	--

Description

Generic `calculate_rmse()` returns the root mean square error for the given input.

Usage

```
calculate_rmse(x, ...)  
  
## Default S3 method:  
calculate_rmse(x, ...)  
  
## S3 method for class 'trending_model'  
calculate_rmse(x, data, na.rm = TRUE, as_tibble = TRUE, ...)  
  
## S3 method for class 'list'  
calculate_rmse(x, data, na.rm = TRUE, ...)  
  
## S3 method for class 'trending_fit'  
calculate_rmse(x, new_data, na.rm = TRUE, as_tibble = TRUE, ...)  
  
## S3 method for class 'trending_fit_tbl'  
calculate_rmse(x, new_data, na.rm = TRUE, ...)  
  
## S3 method for class 'trending_predict'  
calculate_rmse(x, na.rm = TRUE, as_tibble = TRUE, ...)  
  
## S3 method for class 'trending_predict_tbl'  
calculate_rmse(x, na.rm = TRUE, ...)  
  
## S3 method for class 'trending_prediction'  
calculate_rmse(x, na.rm = TRUE, as_tibble = TRUE, ...)
```

Arguments

<code>x</code>	An R object.
<code>...</code>	Not currently used.
<code>data</code>	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
<code>na.rm</code>	Should NA values should be removed before calculation of metric (passed to the underlying function <code>yardstick::rmse_vec</code>).
<code>as_tibble</code>	Should the result be returned as <code>tibble</code> (<code>as_tibble = TRUE</code>) or a list (<code>as_tibble = FALSE</code>).
<code>new_data</code>	a <code>data.frame</code> containing data (including the response variable and all predictors) on which to assess the model.

Details

Specific methods are given for `trending_model` (and lists of these), `trending_fit`, `trending_fit_tbl`, `trending_predict_tbl`, `trending_predict_tbl` and `trending_prediction` objects. Each of these are simply wrappers around the `yardstick::rmse_vec` with the addition of explicit error handling.

Value

For a single `trending_fit` input, if `as_tibble = FALSE` the object returned will be a list with entries:

- `metric`: "rmse"
- `result`: the resulting rmse value (NULL if the calculation failed)
- `warnings`: any warnings generated during calculation
- `errors`: any errors generated during calculation

If `as_tibble = TRUE`, or for the other `trending` classes, then the output will be a `tibble` with one row for each fitted model columns corresponding to output generated with single model input.

Author(s)

Tim Taylor

```
#' @examples x = rnorm(100, mean = 0) y = rpois(n = 100, lambda = exp(1.5 + 0.5*x)) dat <-
data.frame(x = x, y = y) poisson_model <- glm_model(y ~ x, family = "poisson") negbin_model <-
glm_nb_model(y ~ x) fitted_model <- fit(poisson_model, dat) fitted_models <- fit(list(poisson_model,
negbin_model), data = dat)
```

```
calculate_rmse(poisson_model, dat) calculate_rmse(fitted_model) calculate_rmse(fitted_model, as_tibble
= TRUE) calculate_rmse(fitted_models)
```

calculate_rsq

Generic for calculating the root mean squared error

Description

Generic `calculate_rsq()` returns the root mean square error for the given input.

Usage

```
calculate_rsq(x, ...)
```

```
## Default S3 method:
calculate_rsq(x, ...)
```

```
## S3 method for class 'trending_model'
calculate_rsq(x, data, na.rm = TRUE, as_tibble = TRUE, ...)
```

```

## S3 method for class 'list'
calculate_rsq(x, data, na.rm = TRUE, ...)

## S3 method for class 'trending_fit'
calculate_rsq(x, new_data, na.rm = TRUE, as_tibble = TRUE, ...)

## S3 method for class 'trending_fit_tbl'
calculate_rsq(x, new_data, na.rm = TRUE, ...)

## S3 method for class 'trending_predict'
calculate_rsq(x, na.rm = TRUE, as_tibble = TRUE, ...)

## S3 method for class 'trending_predict_tbl'
calculate_rsq(x, na.rm = TRUE, ...)

## S3 method for class 'trending_prediction'
calculate_rsq(x, na.rm = TRUE, as_tibble = TRUE, ...)

```

Arguments

x	An R object.
...	Not currently used.
data	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
na.rm	Should NA values should be removed before calculation of metric (passed to the underlying function <code>yardstick::rsq_vec</code>).
as_tibble	Should the result be returned as <code>tibble</code> (<code>as_tibble = TRUE</code>) or a list (<code>as_tibble = FALSE</code>).
new_data	a <code>data.frame</code> containing data (including the response variable and all predictors) on which to assess the model.

Details

Specific methods are given for `trending_model` (and lists of these), `trending_fit`, `trending_fit_tbl`, `trending_predict_tbl`, `trending_predict_tbl` and `trending_prediction` objects. Each of these are simply wrappers around the `yardstick::rsq_vec` with the addition of explicit error handling.

Value

For a single `trending_fit` input, if `as_tibble = FALSE` the object returned will be a list with entries:

- metric: "rsq"
- result: the resulting rsq value (NULL if the calculation failed)
- warnings: any warnings generated during calculation
- errors: any errors generated during calculation

If `as_tibble = TRUE`, or for the other trending classes, then the output will be a [tibble](#) with one row for each fitted model columns corresponding to output generated with single model input.

Author(s)

Tim Taylor

```
#' @examples x = rnorm(100, mean = 0) y = rpois(n = 100, lambda = exp(1.5 + 0.5*x)) dat <-
data.frame(x = x, y = y) poisson_model <- glm_model(y ~ x, family = "poisson") negbin_model <-
glm_nb_model(y ~ x) fitted_model <- fit(poisson_model, dat) fitted_models <- fit(list(poisson_model,
negbin_model), data = dat)
```

```
calculate_rsqr(poisson_model, dat) calculate_rsqr(fitted_model) calculate_rsqr(fitted_model, as_tibble
= TRUE) calculate_rsqr(fitted_models)
```

evaluate_aic

Generic for calculating the AIC

Description

`evaluate_aic()` is a generic for evaluating the Akaike's 'An Information Criterion' for a given input

Usage

```
evaluate_aic(x, ...)

## Default S3 method:
evaluate_aic(x, ...)

## S3 method for class 'trending_model'
evaluate_aic(x, data, as_tibble = FALSE, ...)

## S3 method for class 'list'
evaluate_aic(x, data, ...)
```

Arguments

<code>x</code>	An R object.
<code>...</code>	Not currently used.
<code>data</code>	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
<code>as_tibble</code>	Should the result be returned as tibble (<code>as_tibble = TRUE</code>) or a list (<code>as_tibble = FALSE</code>).

Details

Specific methods are given for [trending_fit](#) and lists of these models.

Value

If `as_tibble = TRUE`, or the input is a list of models then the output will be a [tibble](#) with one row for each fitted model columns corresponding to output generated with single model input.

Author(s)

Tim Taylor

```
#' @examples x = rnorm(100, mean = 0) y = rpois(n = 100, lambda = exp(1.5 + 0.5*x)) dat <-
data.frame(x = x, y = y) poisson_model <- glm_model(y ~ x , family = "poisson") negbin_model
<- glm_nb_model(y ~ x)
evaluate_aic(poisson_model, dat) evaluate_aic(list(poisson_model, negbin_model), data = dat)
```

evaluate_resampling *Resampling approach for model evaluation*

Description

`evaluate_resampling()` uses repeated K-fold cross-validation and the Root Mean Square Error (RMSE) of testing sets to measure the predictive power of a single model. Methods are provided for `trending::trending_model` (and lists of these) objects.

Usage

```
evaluate_resampling(x, ...)

## Default S3 method:
evaluate_resampling(x, ...)

## S3 method for class 'trending_model'
evaluate_resampling(
  x,
  data,
  metric = c("rmse", "rsq", "mae"),
  metric_arguments = list(na.rm = TRUE),
  v = nrow(data),
  repeats = 1,
  ...
)

## S3 method for class 'list'
evaluate_resampling(
  x,
  data,
  metric = c("rmse", "rsq", "mae"),
  metric_arguments = list(na.rm = TRUE),
  v = nrow(data),
```

```

  repeats = 1,
  ...
)

```

Arguments

<code>x</code>	An R object.
<code>...</code>	Not currently used.
<code>data</code>	a <code>data.frame</code> containing data (including the response variable and all predictors) used in the specified model.
<code>metric</code>	One of "rmse" (see calculate_rmse), "mae" (see calculate_mae) and "rsq" (see calculate_rsqr).
<code>metric_arguments</code>	A named list of arguments passed to the underlying functions that calculate the metrics.
<code>v</code>	the number of equally sized data partitions to be used for K-fold cross-validation; <code>v</code> cross-validations will be performed, each using <code>v - 1</code> partition as training set, and the remaining partition as testing set. Defaults to the number of row in data, so that the method uses leave-one-out cross validation, akin to Jackknife except that the testing set (and not the training set) is used to compute the fit statistics.
<code>repeats</code>	the number of times the random K-fold cross validation should be repeated for; defaults to 1; larger values are likely to yield more reliable / stable results, at the expense of computational time

Details

These functions wrap around existing functions from several packages. `evaluate_resampling.trending_model()` and `evaluate_resampling.list()` both use `rsample::vfold_cv()` for sampling and, for the calculating the different metrics, the `yardstick` package.

See Also

[calculate_aic\(\)](#), [calculate_rmse\(\)](#), [calculate_mae\(\)](#) and [calculate_rsqr\(\)](#).

Examples

```

x <- rnorm(100, mean = 0)
y <- rpois(n = 100, lambda = exp(x + 1))
dat <- data.frame(x = x, y = y)
model <- trending::glm_model(y ~ x, poisson)
models <- list(
  poisson_model = trending::glm_model(y ~ x, poisson),
  linear_model = trending::lm_model(y ~ x)
)

evaluate_resampling(model, dat)
evaluate_resampling(models, dat)

```

Index

`calculate_aic`, [2](#)
`calculate_aic()`, [10](#)
`calculate_mae`, [3](#), [10](#)
`calculate_mae()`, [10](#)
`calculate_rmse`, [5](#), [10](#)
`calculate_rmse()`, [10](#)
`calculate_rsqr`, [6](#), [10](#)
`calculate_rsqr()`, [10](#)

`evaluate_aic`, [8](#)
`evaluate_resampling`, [9](#)
`evaluate_resampling()`, [9](#)
`evaluate_resampling.list()`, [10](#)
`evaluate_resampling.trending_model()`,
[10](#)

`rsample::vfold_cv()`, [10](#)

`stats::AIC()`, [2](#)

`tibble`, [2–9](#)
`trending::trending_model`, [9](#)
`trending_fit`, [2](#), [4](#), [6–8](#)
`trending_fit_tbl`, [2–4](#), [6](#), [7](#)
`trending_model`, [4](#), [6](#), [7](#)
`trending_predict_tbl`, [4](#), [6](#), [7](#)

`yardstick::mae_vec`, [4](#)
`yardstick::rmse_vec`, [5](#), [6](#)
`yardstick::rsqr_vec`, [7](#)