

Package: theft (via r-universe)

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Type Package

Title Tools for Handling Extraction of Features from Time Series

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Description Consolidates and calculates different sets of time-series features from multiple 'R' and 'Python' packages including 'Rcatch22' Henderson, T. (2021) <[doi:10.5281/zenodo.5546815](https://doi.org/10.5281/zenodo.5546815)>, 'feasts' O'Hara-Wild, M., Hyndman, R., and Wang, E. (2021) <<https://CRAN.R-project.org/package=feasts>>, 'tsfeatures' Hyndman, R., Kang, Y., Montero-Manso, P., Talagala, T., Wang, E., Yang, Y., and O'Hara-Wild, M. (2020) <<https://CRAN.R-project.org/package=tsfeatures>>, 'tsfresh' Christ, M., Braun, N., Neuffer, J., and Kempa-Liehr A.W. (2018) <[doi:10.1016/j.neucom.2018.03.067](https://doi.org/10.1016/j.neucom.2018.03.067)>, 'TSFEL' Barandas, M., et al. (2020) <[doi:10.1016/j.softx.2020.100456](https://doi.org/10.1016/j.softx.2020.100456)>, and 'Kats' Facebook Infrastructure Data Science (2021) <<https://facebookresearch.github.io/Kats/>>.

BugReports <https://github.com/hendersontrent/theft/issues>

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Encoding UTF-8

LazyData true

Depends R (>= 3.5.0)

Imports utils, stats, rlang, dplyr, tidyr, purrr, tsibble, fabletools, feasts, tsfeatures, Rcatch22, reticulate, R.matlab

Suggests lifecycle, cachem, bslib, knitr, rmarkdown, pkgdown, testthat

RoxygenNote 7.3.3

VignetteBuilder knitr

URL <https://hendersontrent.github.io/theft/>

Config/pak/sysreqs libicu-dev libpng-dev libssl-dev python3

Repository <https://henderson trent.r-universe.dev>
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calculate_features	<i>Compute features on an input time series dataset</i>
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Description

Compute features on an input time series dataset

Usage

```
calculate_features(
  data,
  feature_set = c("catch22", "feasts", "tsfeatures", "kats", "tsfresh", "tsfel", "hctsa",
    "quantiles", "moments", "fftquantiles", "fft"),
  features = NULL,
  catch24 = FALSE,
  tsfresh_cleanup = FALSE,
  use_compengine = FALSE,
  seed = 123,
  z_score = FALSE,
  squared = TRUE,
  n_jobs = 0,
  warn = TRUE
)
```

Arguments

data	tbl_ts containing the time series data
feature_set	character or vector of character denoting the set of time-series features to calculate. Can be one of "catch22", "feasts", "tsfeatures", "tsfresh", "tsfel", "kats", "quantiles", "moments", "fftquantiles", and or "fft"
features	named list containing a set of user-supplied functions to calculate on data. Each function should take a single argument which is the time series. Defaults to NULL for no manually-specified features. Each list entry must have a name as calculate_features looks for these to name the features. If you don't want to use the existing feature sets and only compute those passed to features, set feature_set = NULL
catch24	Boolean specifying whether to compute catch24 in addition to catch22 if catch22 is one of the feature sets selected. Defaults to FALSE
tsfresh_cleanup	Boolean specifying whether to use the in-built tsfresh relevant feature filter or not. Defaults to FALSE
use_compengine	Boolean specifying whether to use the "compengine" features in tsfeatures. Defaults to FALSE to provide immense computational efficiency benefits
seed	integer denoting a fixed number for R's random number generator to ensure reproducibility. Defaults to 123
z_score	Boolean specifying whether to z-score the time-series before computing features. Defaults to FALSE
squared	Boolean specifying whether to compute squared magnitude ($ X[k] ^2$) for the "fft" and "fftquantiles" feature sets if specified. Defaults to TRUE
n_jobs	integer denoting the number of parallel processes to use. Defaults to 0 for no parallelisation
warn	Boolean specifying whether to produce warnings from feature set packages. Defaults to TRUE

Value

object of class `feature_calculations` that contains the summary statistics for each feature

Author(s)

Trent Henderson

Examples

```
features <- calculate_features(data = simData,  
  feature_set = "catch22")
```

`check_vector_quality` *Check for presence of NAs and non-numerics in a vector*

Description

Check for presence of NAs and non-numerics in a vector

Usage

```
check_vector_quality(x)
```

Arguments

x input vector

Value

Boolean of whether the data is good to extract features on or not

Author(s)

Trent Henderson

feature_list	<i>All features available in theft in tidy format</i>
--------------	---

Description

The variables include:

Usage

```
feature_list
```

Format

A tidy data frame with 2 variables:

feature_set Name of the set the feature is from

feature Name of the feature

fft_features	<i>Calculate FFT absolute value and angle coefficients for an input time-series vector</i>
--------------	--

Description

Computes the absolute value and angle of FFT coefficients 0-99, following the same convention as tsfresh's `fft_coefficient` feature with `attr = "abs"` and `attr = "angle"`.

Usage

```
fft_features(y, squared = TRUE)
```

Arguments

<code>y</code>	numeric vector of values
<code>squared</code>	Boolean specifying whether to compute squared magnitude ($ X[k] ^2$) instead of absolute value ($ X[k] $). Defaults to TRUE

Value

data.frame of results

Author(s)

Trent Henderson

References

Christ, M., Braun, N., Neuffer, J., and Kempa-Liehr, A.W. (2018). Time Series FeatuRe Extraction on basis of Scalable Hypothesis tests (tsfresh – A Python package). *Neurocomputing*, **307**, 72–77. [doi:10.1016/j.neucom.2018.03.067](https://doi.org/10.1016/j.neucom.2018.03.067)

fftquantiles	<i>Calculate quantiles combined with FFT absolute value and angle coefficients</i>
--------------	--

Description

Computes 101 quantiles together with the absolute value and angle of FFT coefficients 0-99, following the same convention as tsfresh's `fft_coefficient` feature with `attr = "abs"` and `attr = "angle"`.

Usage

```
fftquantiles(y, quantiles = seq(0, 1, by = 0.01), squared = TRUE)
```

Arguments

<code>y</code>	numeric vector of values
<code>quantiles</code>	numeric vector of quantiles to calculate. Defaults to <code>seq(0, 1, by = 0.01)</code>
<code>squared</code>	Boolean specifying whether to compute squared magnitude ($ X[k] ^2$) instead of absolute value ($ X[k] $). Defaults to <code>TRUE</code>

Value

`data.frame` of results

Author(s)

Trent Henderson

References

Christ, M., Braun, N., Neuffer, J., and Kempa-Liehr, A.W. (2018). Time Series FeatuRe Extraction on basis of Scalable Hypothesis tests (tsfresh – A Python package). *Neurocomputing*, **307**, 72–77. [doi:10.1016/j.neucom.2018.03.067](https://doi.org/10.1016/j.neucom.2018.03.067)

init_theft	<i>Communicate to R the Python virtual environment containing the relevant libraries for calculating features</i>
------------	---

Description

Communicate to R the Python virtual environment containing the relevant libraries for calculating features

Usage

```
init_theft(venv, hctsa = FALSE)
```

Arguments

venv	character specifying the name of the to the Python virtual environment where "tsfresh", "TSFEL", and/or "Kats" are installed
hctsa	Boolean denoting whether pyhctsa was installed or not. Defaults to FALSE

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_python_pkgs("theft-test")  
init_theft("theft-test")  
  
## End(Not run)
```

init_theft_hctsa	<i>Communicate to R the Python virtual environment containing pyhctsa only</i>
------------------	--

Description

Communicate to R the Python virtual environment containing pyhctsa only

Usage

```
init_theft_hctsa(venv)
```

Arguments

venv character specifying the name of the to the Python virtual environment where "pyhctsa" is installed

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:
install_python_pkgs("theft-test")
init_theft_hctsa("theft-test")

## End(Not run)
```

init_theft_kats	<i>Communicate to R the Python virtual environment containing kats only</i>
-----------------	---

Description

Communicate to R the Python virtual environment containing kats only

Usage

```
init_theft_kats(venv)
```

Arguments

venv character specifying the name of the to the Python virtual environment where "kats" is installed

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:
install_python_pkgs("theft-test")
init_theft_kats("theft-test")

## End(Not run)
```

init_theft_tsfel	<i>Communicate to R the Python virtual environment containing tsfel only</i>
------------------	--

Description

Communicate to R the Python virtual environment containing tsfel only

Usage

```
init_theft_tsfel(venv)
```

Arguments

venv	character specifying the name of the to the Python virtual environment where "tsfel" is installed
------	---

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:
install_python_pkgs("theft-test")
init_theft_tsfel("theft-test")

## End(Not run)
```

init_theft_tsfresh	<i>Communicate to R the Python virtual environment containing tsfresh only</i>
--------------------	--

Description

Communicate to R the Python virtual environment containing tsfresh only

Usage

```
init_theft_tsfresh(venv)
```

Arguments

venv	character specifying the name of the to the Python virtual environment where "tsfresh" is installed
------	---

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:
install_python_pkgs("theft-test")
init_theft_tsfresh("theft-test")

## End(Not run)
```

install_kats	<i>Download and install Kats from Python into a new virtual environment</i>
--------------	---

Description

Download and install Kats from Python into a new virtual environment

Usage

```
install_kats(venv, python)
```

Arguments

venv	character specifying the name of the new virtual environment to create
python	character specifying the filepath to the Python interpreter to use. Python 3.10 is recommended

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_kats("theft-test", "/usr/local/bin/python3.10")  
  
## End(Not run)
```

install_pyhctsa	<i>Download and install pyhctsa from Python into a new virtual environment</i>
-----------------	--

Description

Download and install pyhctsa from Python into a new virtual environment

Usage

```
install_pyhctsa(venv, python)
```

Arguments

venv	character specifying the name of the new virtual environment to create
python	character specifying the filepath to the Python interpreter to use. Python 3.10 is recommended

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_pyhctsa("theft-test", "/usr/local/bin/python3.10")  
  
## End(Not run)
```

install_python_pkgs	<i>Download and install tsfresh, TSFEL, and Kats from Python into a new virtual environment</i>
---------------------	---

Description

Download and install tsfresh, TSFEL, and Kats from Python into a new virtual environment

Usage

```
install_python_pkgs(venv, python, hctsa = FALSE)
```

Arguments

venv	character specifying the name of the new virtual environment to create
python	character specifying the filepath to the Python interpreter to use. Python 3.10 is recommended
hctsa	Boolean denoting whether to install pyhctsa or not. Defaults to FALSE

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_python_pkgs("theft-test", "/usr/local/bin/python3.10")  
  
## End(Not run)
```

install_tsfel	<i>Download and install TSFEL from Python into a new virtual environment</i>
---------------	--

Description

Download and install TSFEL from Python into a new virtual environment

Usage

```
install_tsfel(venv, python)
```

Arguments

venv	character specifying the name of the new virtual environment to create
python	character specifying the filepath to the Python interpreter to use. Python 3.10 is recommended

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_tsfel("theft-test", "/usr/local/bin/python3.10")  
  
## End(Not run)
```

install_tsfresh	<i>Download and install tsfresh from Python into a new virtual environment</i>
-----------------	--

Description

Download and install tsfresh from Python into a new virtual environment

Usage

```
install_tsfresh(venv, python)
```

Arguments

venv	character specifying the name of the new virtual environment to create
python	character specifying the filepath to the Python interpreter to use. Python 3.10 is recommended

Value

no return value; called for side effects

Author(s)

Trent Henderson

Examples

```
## Not run:  
install_tsfresh("theft-test", "/usr/local/bin/python3.10")  
  
## End(Not run)
```

kurtosis

Calculate a kurtosis of a vector

Description

Calculate a kurtosis of a vector

Usage

```
kurtosis(y)
```

Arguments

y	numeric vector of values
---	--------------------------

Value

numeric scalar of kurtosis

Author(s)

Trent Henderson

moments	<i>Calculate a basic set of the four moments of the distribution</i>
---------	--

Description

Calculate a basic set of the four moments of the distribution

Usage

```
moments(y)
```

Arguments

y	numeric vector of values
---	--------------------------

Value

data.frame of results

Author(s)

Trent Henderson

process_hctsa_file	<i>Load in hctsa formatted MATLAB files of time series data into a tidy format ready for feature extraction</i>
--------------------	---

Description

Load in hctsa formatted MATLAB files of time series data into a tidy format ready for feature extraction

Usage

```
process_hctsa_file(data)
```

Arguments

data	string specifying the filepath to the MATLAB file to parse
------	--

Value

an object of class data.frame in tidy format

Author(s)

Trent Henderson

quantiles	<i>Calculate a basic set of quantiles for an input time-series vector</i>
-----------	---

Description

Calculate a basic set of quantiles for an input time-series vector

Usage

```
quantiles(y, quantiles = seq(0, 1, by = 0.01))
```

Arguments

y	numeric vector of values
quantiles	numeric vector of quantiles to calculate. Defaults to seq(0, 1, by = 0.01)

Value

data.frame of results

Author(s)

Trent Henderson

simData	<i>Sample of randomly-generated time series to produce function tests and vignettes</i>
---------	---

Description

The variables include:

Usage

```
simData
```

Format

A tidy tsibble with 4 variables:

id	Unique identifier for the time series
timepoint	Time index
values	Value
process	Group label for the type of time series

skewness	<i>Calculate a skewness of a vector</i>
----------	---

Description

Calculate a skewness of a vector

Usage

```
skewness(y)
```

Arguments

y	numeric vector of values
---	--------------------------

Value

numeric scalar of skewness

Author(s)

Trent Henderson

theft	<i>Tools for Handling Extraction of Features from Time-series</i>
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Description

Tools for Handling Extraction of Features from Time-series

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