Package ‘tetragon’

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Type Package
Title Automatic Sequence Prediction by Expansion of the Distance Matrix
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Description Each sequence is predicted by expanding the distance matrix. The compact set of hyperparameters is tuned through random search.
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>= 2.0.1), stringr (>= 1.4.0), lubridate (>= 1.7.10), narray
(>= 0.4.1.1), imputeTS (>= 3.2), scales (>= 1.1.1), tictoc (>=
1.0.1), modeest (>= 2.4.0), moments (>= 0.14), greybox (>=
1.0.1), dqrng (>= 0.3.0), entropy (>= 1.3.1), Rfast (>= 2.0.6),
philentropy (>= 0.5.0), fastDummies (>= 1.6.3), fANCOVA (>=
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R topics documented:
covid_in_europe ............................................................ 2
tetragon ........................................................................... 2

Index 5
covid_in_europe

**Description**

A data frame with daily and cumulative cases of Covid infections and deaths in Europe since March 2021.

**Usage**

covid_in_europe

**Format**

A data frame with 5 columns and 163 rows.

**Source**

www.ecdc.europa.eu

tetragon

**Description**

Each sequence is predicted by expanding the distance matrix. The compact set of hyper-parameters is tuned via grid or random search.

**Usage**

tetragon(
  df,
  seq_len = NULL,
  smoother = F,
  ci = 0.8,
  method = NULL,
  distr = NULL,
  n_windows = 3,
  n_sample = 30,
  dates = NULL,
  error_scale = "naive",
  error_benchmark = "naive",
  seed = 42
)
Arguments

```
df  A data frame with time features as columns. They could be continuous variables or not.
dseq_len  Positive integer. Time-step number of the projected sequence. Default: NULL (random selection between maximum boundaries).
smoother  Logical. Perform optimal smoothing using standard loess. Default: FALSE
ci  Confidence interval. Default: 0.8.
distr  String. Distribution used to expand the distance matrix. Options are: "norm", "logis", "t", "exp", "chisq". Default: NULL (random selection among all possible options).
n_windows  Positive integer. Number of validation tests to measure/sample error. Default: 3 (but a larger value is strongly suggested to really understand your accuracy).
dates  Date. Vector with dates for time features.
error_scale  String. Scale for the scaled error metrics (only for continuous variables). Two options: "naive" (average of naive one-step absolute error for the historical series) or "deviation" (standard error of the historical series). Default: "naive".
error_benchmark  String. Benchmark for the relative error metrics (only for continuous variables). Two options: "naive" (sequential extension of last value) or "average" (mean value of true sequence). Default: "naive".
seed  Positive integer. Random seed. Default: 42.
```

Value

This function returns a list including:

- exploration: list of all explored models, complete with predictions, testing metrics and plots
- history: a table with the sampled models, hyper-parameters, validation errors
- best: results for the best model including:
  - predictions: min, max, q25, q50, q75, quantiles at selected ci, and a bunch of specific measures for each point fo predicted sequences
  - testing_errors: testing errors for one-step and sequence for each ts feature
  - plots: confidence interval plot for each time feature
- time_log

Author(s)

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See Also

Useful links:

- https://rpubs.com/giancarlo_vercellino/tetragon

Examples

tetragon(covid_in_europe[, c(2, 4)], seq_len = 40, n_sample = 2)
Index

* datasets
  - covid_in_europe, 2

covid_in_europe, 2

tetragon, 2

tetragon-package (tetragon), 2