

# Package ‘spooky’

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**Type** Package

**Title** Time Feature Extrapolation Using Spectral Analysis and Jack-Knife Resampling

**Version** 1.1.0

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**Description** Proposes application of spectral analysis and jack-knife resampling for multivariate sequence forecasting. The application allows for a fast random search in a compact space of hyperparameters composed by Sequence Length and Jack-Knife Leave-N-Out.

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**Depends** R (>= 3.6)

**Imports** purrr (>= 0.3.4), ggplot2 (>= 3.3.5), readr (>= 2.1.2),  
lubridate (>= 1.7.10), imputeTS (>= 3.2), fANCOVA (>= 0.6-1),  
scales (>= 1.1.1), tictoc (>= 1.0.1), modeest (>= 2.4.0),  
moments (>= 0.14), greybox (>= 1.0.1)

**URL** [https://rpubs.com/giancarlo\\_vercellino/spooky](https://rpubs.com/giancarlo_vercellino/spooky)

**NeedsCompilation** no

**Repository** CRAN

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spooky	<i>spooky</i>
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## Description

Automatic jack-knife of spectral analysis for time feature extrapolation

## Usage

```
spooky(
  df,
  seq_len = NULL,
  lno = NULL,
  n_samp = 30,
  n_windows = 3,
  ci = 0.8,
  smoother = FALSE,
  dates = NULL,
  error_scale = "naive",
  error_benchmark = "naive",
  seed = 42
)
```

## Arguments

<code>df</code>	A data frame with time features on columns
<code>seq_len</code>	Positive integer. Time-step number of the forecasting sequence. Default: NULL (automatic selection between 1 and the square root of full length).
<code>lno</code>	Positive integer. Number of data points to leave out for resampling (using jack-knife approach). Default: NULL (automatic selection between 1 and the square root of full length).
<code>n_samp</code>	Positive integer. Number of samples for random search. Default: 30.
<code>n_windows</code>	Positive integer. Number of validation windows to test prediction error. Default: 10.
<code>ci</code>	Confidence interval for prediction. Default: 0.8
<code>smoother</code>	Logical. Flag to TRUE for loess smoothing. Default: FALSE.
<code>dates</code>	Date. Vector with dates for time features.
<code>error_scale</code>	String. Scale for the scaled error metrics. Two options: "naive" (average of naive one-step absolute error for the historical series) or "deviation" (standard error of the historical series). Default: "naive".
<code>error_benchmark</code>	String. Benchmark for the relative error metrics. Two options: "naive" (sequential extension of last value) or "average" (mean value of true sequence). Default: "naive".
<code>seed</code>	Positive integer. Random seed. Default: 42.

**Value**

This function returns a list including:

- exploration: list of all not-null models, complete with predictions, test metrics, prediction stats and plot
- history: a table with the sampled models, hyper-parameters, validation errors, weighted average rank
- best\_model: results for the best selected model according to the weighted average rank, including:
  - testing\_errors: testing errors for each time feature for the best selected model (me, mae, mse, rmsse, mpe, mape, rmae, rrmse, rame, mase, smse, sce, gmrae)
  - preds: min, max, q25, q50, q75, quantiles at selected ci, mean, sd, mode, skewness, kurtosis, IQR to range, risk ratio, upside probability and divergence for each point fo predicted sequences
  - plots: standard plot with confidence interval for each time feature
- time\_log

**Author(s)**

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**See Also**

Useful links:

- [https://rpubs.com/giancarlo\\_vercellino/spooky](https://rpubs.com/giancarlo_vercellino/spooky)

**Examples**

```
spooky(time_features, seq_len = c(10, 30), lno = c(1, 30), n_samp = 1)
```

---

time\_features

*time features example: IBM and Microsoft Close Prices*

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**Description**

A data frame with with daily with daily prices for IBM and Microsoft since March 2017.

**Usage**

```
time_features
```

**Format**

A data frame with 2 columns and 1324 rows.

**Source**

finance.yahoo.com

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windower

*support functions for spooky*

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**Description**

support functions for spooky

**Usage**

```

windower(
  df,
  seq_len,
  lno = 1,
  n_windows = 5,
  ci = 0.8,
  dates = NULL,
  error_scale,
  error_benchmark
)

```

**Arguments**

<code>df</code>	A data frame with time features on columns
<code>seq_len</code>	Positive integer. Time-step number of the forecasting sequence. Default: NULL (automatic selection between 1 and the square root of full length).
<code>lno</code>	Positive integer. Number of data points to leave out for resampling (using jack-knife approach). Default: NULL (automatic selection between 1 and the square root of full length).
<code>n_windows</code>	Positive integer. Number of validation windows to test prediction error. Default: 10.
<code>ci</code>	Confidence interval for prediction. Default: 0.8
<code>dates</code>	Date. Vector with dates for time features.
<code>error_scale</code>	String. Scale for the scaled error metrics. Two options: "naive" (average of naive one-step absolute error for the historical series) or "deviation" (standard error of the historical series). Default: "naive".
<code>error_benchmark</code>	String. Benchmark for the relative error metrics. Two options: "naive" (sequential extension of last value) or "average" (mean value of true sequence). Default: "naive".

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