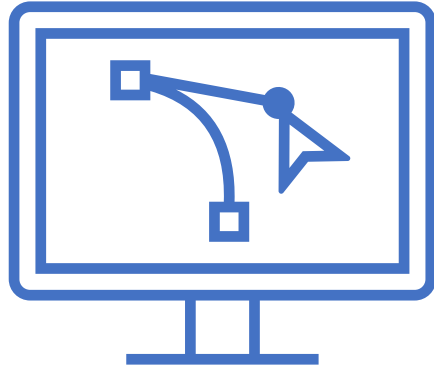




Introduction to the dendroTools R package

<https://dendroschool.org>

Dr. Jernej Jevšenak
Slovenian Forestry Institute

22 October 2020

dendroTools R package on CRAN

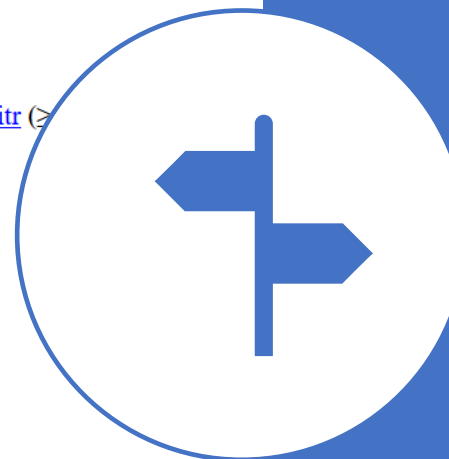
dendroTools: Linear and Nonlinear Methods for Analyzing Daily and Monthly Dendroclimatological Data

Provides novel dendroclimatological methods, primarily used by the Tree-ring research community. There are four core functions. The first one is `daily_response()`, which finds the optimal sequence related to one or more tree-ring proxy records. Similar function is `daily_response_seascorr()`, which implements partial correlations in the analysis of daily response functions. For the enthusiasts, there is the `monthly_response()` function. The last core function is `compare_methods()`, which effectively compares several linear and nonlinear regression algorithms on the task of climate reconstruction.

Version: 1.0.7
Depends: R (≥ 3.4)
Imports: [ggplot2](#) ($\geq 2.2.0$), [brnn](#) (≥ 0.6), [reshape2](#) ($\geq 1.4.2$), [scales](#) ($\geq 0.4.1$), stats, [oce](#) ($\geq 0.9-21$), [MLmetrics](#) ($\geq 1.1.1$), [dplyr](#) ($\geq 0.7.0$), [gridExtra](#) ($\geq 2.2.1$), [knitr](#) ($\geq 1.18.1$), [randomForest](#) ($\geq 4.6-14$), [Cubist](#) ($\geq 0.2.2$), [lubridate](#) ($\geq 1.7.4$), [psych](#) ($\geq 1.8.3.3$), [boot](#) ($\geq 1.3-22$), [viridis](#) ($\geq 0.5.1$)
Suggests: [testthat](#), [dplR](#), [rmarkdown](#)
Published: 2020-01-07
Author: Jernej Jevsenak [aut, cre]
Maintainer: Jernej Jevsenak <jernej.jevsenak at gmail.com>
BugReports: <http://github.com/jernejjevsenak/dendroTools/issues>
License: [GPL-3](#)
URL: <http://github.com/jernejjevsenak/dendroTools>
NeedsCompilation: no
Citation: [dendroTools citation info](#)
Materials: [NEWS](#)
CRAN checks: [dendroTools results](#)

Downloads:

Reference manual: [dendroTools.pdf](#)
Vignettes: [Examples of the daily_response](#)
[compare_methods vignette](#)
Package source: [dendroTools_1.0.7.tar.gz](#)
Windows binaries: r-devel: [dendroTools_1.0.7.zip](#), r-release: [dendroTools_1.0.7.zip](#), r-oldrel: [dendroTools_1.0.7.zip](#)
macOS binaries: r-release: [dendroTools_1.0.7.tgz](#), r-oldrel: [dendroTools_1.0.7.tgz](#)
Old sources: [dendroTools archive](#)



Sources of daily data

- KNMI Climate explorer
 - <https://climexp.knmi.nl/selectdailyfield2.cgi?id=someone@somewhere>
- E-OBS gridded daily data for Europe
 - <https://www.ecad.eu/download/ensembles/download.php#datafiles>
- CRU JRA v2.0: A forcings dataset of gridded land surface blend of Climatic Research Unit (CRU) and Japanese reanalysis (JRA) data
 - <https://catalogue.ceda.ac.uk/uuid/7f785c0e80aa4df2b39d068ce7351bbb>
- Joint Research Centre, AgriForCast Resources Portal, from 1975 – 2018, free registration needed
 - <http://agri4cast.jrc.ec.europa.eu/DataPortal/RequestDataResource.aspx?idResource=7&o=d>



Sources of daily data

- ERA daily datasets
 - <https://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/>
- NOAA daily datasets
 - <https://www.esrl.noaa.gov/psd/data/gridded/tables/daily.html>



dendroTools installation

```
> # from CRAN (The Comprehensive R Archive Network)
> install.packages("dendroTools")

> # current version under development
> library("devtools")
> devtools::install_github("jernejjevsenak/dendroTools")
```





Contents lists available at [ScienceDirect](#)

Dendrochronologia

journal homepage: www.elsevier.com/locate/dendro



dendroTools: R package for studying linear and nonlinear responses between tree-rings and daily environmental data



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ARTICLE INFO

Keywords:

Dendroclimatology
Daily climate data
Running window
Nonlinear modelling
Tree-ring proxies
Climate reconstruction

ABSTRACT

We introduce in this paper the *dendroTools* R package for studying the statistical relationships between tree-ring parameters and daily environmental data. The core function of the package is *daily_response()*, which works by sliding a moving window through daily environmental data and calculating statistical metrics with one or more tree ring proxies. Possible metrics are correlation coefficient, coefficient of determination and adjusted coefficient of determination. In addition to linear regression, it is possible to use a nonlinear artificial neural network with the Bayesian regularization training algorithm (*brnn*). *dendroTools* provides the opportunity to use daily climate data and robust nonlinear functions for the analysis of climate-growth relationships. Models should thus be better adapted to the real (continuous) growth of trees and should gain in predictive capabilities. The *dendroTools* R package is freely available in the CRAN repository. The functionality of the package is demonstrated on two examples, one using a mean vessel area (MVA) chronology and one a traditional tree-ring width (TRW).

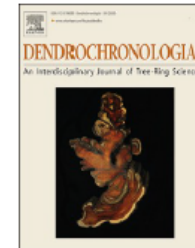




Contents lists available at [ScienceDirect](#)

Dendrochronologia

journal homepage: www.elsevier.com/locate/dendro



TECHNICAL NOTE

New features in the *dendroTools* R package: Bootstrapped and partial correlation coefficients for monthly and daily climate data

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ARTICLE INFO

Keywords:

dendroTools
Daily climate data
Partial correlations
Bootstrap
Dendroclimatology

ABSTRACT

Climate-growth relationships are usually analysed using monthly climate data. The *dendroTools* R package also provides methodological approaches that enable climate-growth analysis for daily climate data. Such analysis reveals more complete climate signal patterns. In this article, new functions of the *dendroTools* R package are presented. Partial correlation coefficients are now implemented and can be used to calculate the strength of a linear relationship between two variables, while controlling for a third variable. Bootstrapped correlations can then be used to provide insights into the confidence intervals of statistical estimates. The calculation of partial and bootstrapped correlations is available for daily and monthly data. Finally, data transformation, S3 generic plotting and summary functions are also presented here.





Contents lists available at ScienceDirect

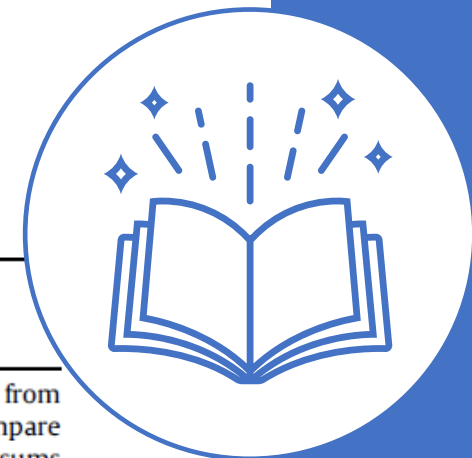
Quaternary Science Reviews

journal homepage: www.elsevier.com/locate/quascirev

Daily climate data reveal stronger climate-growth relationships for an extended European tree-ring network

Jernej Jevšenak

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ARTICLE INFO

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Tree-ring network

Daily climate data

Climate-growth relationships

dendroTools

ABSTRACT

An extended European tree-ring network was compiled from various sources of tree-ring data from Europe, northern Africa and western Asia. A total of 1860 tree-ring chronologies were used to compare correlation coefficients calculated with aggregated day-wise and month-wise mean temperature, sums of precipitation and standardised precipitation-evapotranspiration index (SPEI). For the daily approach, climate data were aggregated over periods ranging from 21 to 365 days. Absolute correlations calculated with day-wise aggregated climate data were on average higher by 0.060 (temperature data), 0.076 (precipitation data) and 0.075 (SPEI data). Bootstrapped correlations are computationally expensive and were therefore calculated on a 69.4% subset of the data. Bootstrapped correlations indicated statistically significant differences between the daily and monthly approach in approximately 1% of examples. A comparison of time windows used for calculations of correlations revealed slightly later onset and earlier ending day of the year for the daily approach, while the largest differences between the two approaches arise from window lengths: Correlations calculated with day-wise aggregated climate data were calculated using fewer days than the monthly approach. Differences in the onset and ending dates of periods for the daily and monthly approaches were greater for precipitation and SPEI data than for temperature data.

daily_response

daily_response

Description

Function calculates all possible values of a selected statistical metric between one or more response variables and daily sequences of environmental data. Calculations are based on moving window which is defined with two arguments: window width and a location in a matrix of daily sequences of environmental data. Window width could be fixed (use `fixed_width`) or variable width (use `lower_limit` and `upper_limit` arguments). In this case, all window widths between lower and upper limit will be used. All calculated metrics are stored in a matrix. The location of stored calculated metric in the matrix is indicating a window width (row names) and a location in a matrix of daily sequences of environmental data (column names).

Usage

```
daily_response(response, env_data, method = "lm", metric = "r.squared",
  cor_method = "pearson", lower_limit = 30, upper_limit = 90,
  fixed_width = 0, previous_year = FALSE, neurons = 1,
  brnn_smooth = TRUE, remove_insignificant = TRUE, alpha = 0.05,
  row_names_subset = FALSE, PCA_transformation = FALSE,
  log_preprocess = TRUE, components_selection = "automatic",
  eigenvalues_threshold = 1, N_components = 2,
  aggregate_function = "mean", temporal_stability_check = "sequential",
  k = 2, k_running_window = 30, cross_validation_type = "blocked",
  subset_years = NULL, plot_specific_window = NULL, ylimits = NULL,
  seed = NULL, tidy_env_data = FALSE, reference_window = "start",
  boot = FALSE, boot_n = 1000, boot_ci_type = "norm",
  boot_conf_int = 0.95)
```



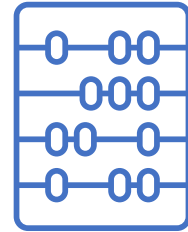
The algorithm

response [1 x n]

	TRW
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
...	...

env_data [366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

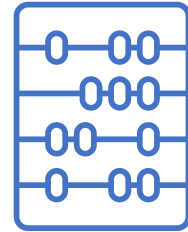


The algorithm

		mean. median or sum																
response		env_data																
TRW	temporary	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...	...
2015 1.203	0.22	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...	...
2014 1.051	-6.12	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...	...
2013 1.706	2.08	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...	...
2012 0.892	-0.24	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...	...
2011 0.942	-1.5	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...	...
2010 0.771	-3.34	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...	...
2009 1.436	6.78	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...	...
2008 0.747	1.32	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...	...
2007 0.976	-2.52	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...	...
2006 1.091	3.7	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...	...
2005 0.763	-4.46	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...	...
2004 0.732	4.22	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...	...
2003 0.675	-1.42	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...	...
2002 0.83	1.06	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...	...
2001 0.813	1.14	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...	...
2000 0.746	4.42	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...	...
1999 0.671	-2.22	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...	...
1998 0.861	-1.22	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...	...
1997 1.383	1.22	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10																	

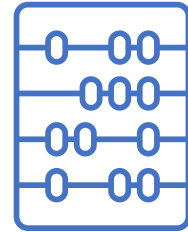


The algorithm

response		env_data																
		mean. median or sum																
TRW	temporary	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...	...
2015 1.203	1.18	2015 -3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...	...
2014 1.051	-6.42	2014 -4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...	...
2013 1.706	3.58	2013 2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...	...
2012 0.892	-0.92	2012 2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...	...
2011 0.942	-1.8	2011 -1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...	...
2010 0.771	-1.62	2010 -7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...	...
2009 1.436	6.48	2009 7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...	...
2008 0.747	1.18	2008 0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...	...
2007 0.976	-2.32	2007 -4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...	...
2006 1.091	6.32	2006 -2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...	...
2005 0.763	-4.9	2005 -2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...	...
2004 0.732	3.34	2004 1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...	...
2003 0.675	-2.42	2003 2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...	...
2002 0.83	1.54	2002 0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...	...
2001 0.813	1.2	2001 1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...	...
2000 0.746	3.84	2000 8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...	...
1999 0.671	-1.48	1999 -3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...	...
1998 0.861	-5.22	1998 -1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...	...
1997 1.383	5.22	1997 6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09																



The algorithm

mean. median or sum

response

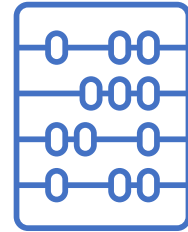
TRW	temporary
2015 1.203	-1.14
2014 1.051	-0.84
2013 1.706	3.46
2012 0.892	0.66
2011 0.942	0.56
2010 0.771	-1.24
2009 1.436	5.94
2008 0.747	-1.48
2007 0.976	-5.22
2006 1.091	5.12
2005 0.763	0.2
2004 0.732	-2.5
2003 0.675	3.38
2002 0.83	0.94
2001 0.813	-3.16
2000 0.746	3.16
1999 0.671	5.84
1998 0.861	0.11
1997 1.383	0.11
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09															



The algorithm

mean. median or sum

response

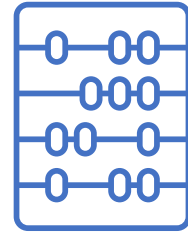
TRW	temporary
2015 1.203	1.7
2014 1.051	-5.46
2013 1.706	5.62
2012 0.892	-1.02
2011 0.942	-1.96
2010 0.771	-0.62
2009 1.436	5.52
2008 0.747	1.6
2007 0.976	-2.86
2006 1.091	8.1
2005 0.763	-5.2
2004 0.732	1.36
2003 0.675	-2.82
2002 0.83	1.18
2001 0.813	1.38
2000 0.746	4.76
1999 0.671	-0.76
1998 0.861	-5.24
1997 1.383	5.24
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17														

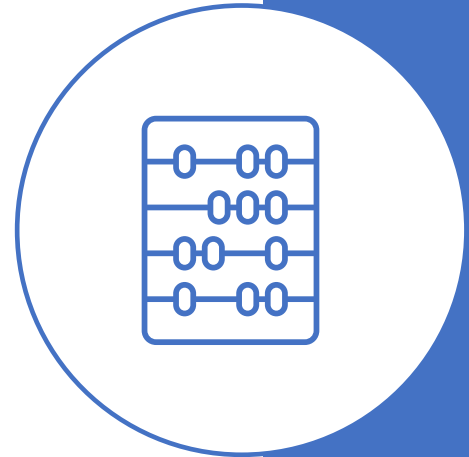


The algorithm

		mean. median or sum																
response		env_data																
TRW	temporary	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...	...
2015	1.203	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...	...
2014	1.051	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...	...
2013	1.706	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...	...
2012	0.892	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...	...
2011	0.942	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...	...
2010	0.771	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...	...
2009	1.436	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...	...
2008	0.747	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...	...
2007	0.976	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...	...
2006	1.091	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...	...
2005	0.763	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...	...
2004	0.732	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...	...
2003	0.675	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...	...
2002	0.83	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...	...
2001	0.813	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...	...
2000	0.746	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...	...
1999	0.671	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...	...
1998	0.861	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...	...
1997	1.383	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17														

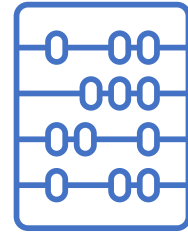


The algorithm

		mean. median or sum														
response		env_data														
TRW	temporary	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
2015 1.203	-0.10	2015 -3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5
2014 1.051	-3.15	2014 -4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8
2013 1.706	4.30	2013 2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7
2012 0.892	0.07	2012 2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8
2011 0.942	-0.55	2011 -1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6
2010 0.771	-0.82	2010 -7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1
2009 1.436	5.77	2009 7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2
2008 0.747	-0.27	2008 0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8
2007 0.976	-4.48	2007 -4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4
2006 1.091	6.03	2006 -2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6
2005 0.763	-2.20	2005 -2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1
2004 0.732	-0.10	2004 1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1
2003 0.675	0.03	2003 2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5
2002 0.83	1.20	2002 0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5
2001 0.813	-0.88	2001 1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2
2000 0.746	3.73	2000 8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9
1999 0.671	2.93	1999 -3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4
1998 0.861	-0.68	1998 -1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1
1997 1.383	0.68	1997 6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Pearson correlation coefficient
(or fitted linear / nonlinear model)

5	0.10	0.09	-0.09	0.17	0.25											



The algorithm

mean. median or sum

response

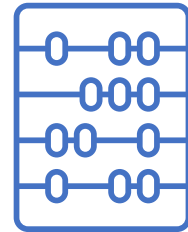
TRW	temporary
2015 1.203	0.88
2014 1.051	-4.42
2013 1.706	4.52
2012 0.892	-0.23
2011 0.942	-1.00
2010 0.771	-1.05
2009 1.436	5.93
2008 0.747	0.68
2007 0.976	-3.32
2006 1.091	6.78
2005 0.763	-3.53
2004 0.732	1.32
2003 0.675	-1.57
2002 0.83	1.15
2001 0.813	0.40
2000 0.746	3.93
1999 0.671	0.87
1998 0.861	0.82
1997 1.383	0.82
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Pearson correlation coefficient
(or fitted linear / nonlinear model)

5	0.10	0.09	-0.09	0.17	0.25	0.21											



The algorithm

mean. median or sum

response

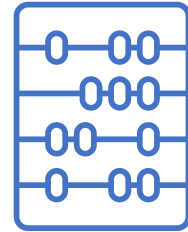
TRW	temporary
2015 1.203	1.45
2014 1.051	-5.82
2013 1.706	4.58
2012 0.892	-0.90
2011 0.942	-1.65
2010 0.771	-1.40
2009 1.436	5.75
2008 0.747	1.52
2007 0.976	-2.53
2006 1.091	7.27
2005 0.763	-4.65
2004 0.732	1.98
2003 0.675	-2.32
2002 0.83	1.37
2001 0.813	1.32
2000 0.746	4.67
1999 0.671	-1.05
1998 0.861	-1.72
1997 1.383	-1.72
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Pearson correlation coefficient
(or fitted linear / nonlinear model)

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30										



The algorithm

mean. median or sum

response

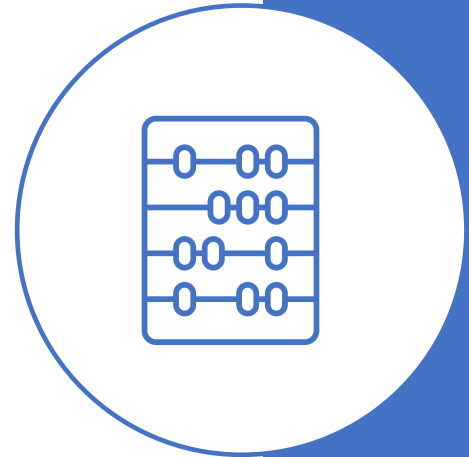
TRW	temporary
2015 1.203	0.35
2014 1.051	-6.17
2013 1.706	3.38
2012 0.892	-0.38
2011 0.942	-1.70
2010 0.771	-2.63
2009 1.436	6.72
2008 0.747	1.00
2007 0.976	-2.73
2006 1.091	4.82
2005 0.763	-4.55
2004 0.732	3.08
2003 0.675	-1.65
2002 0.83	1.33
2001 0.813	1.22
2000 0.746	4.63
1999 0.671	-1.73
1998 0.861	-1.42
1997 1.383	-1.42
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30	0.05									



The algorithm

mean. median or sum

response

temporary

2015 1.203

2014 1.051

2013 1.706

2012 0.892

2011 0.942

2010 0.771

2009 1.436

2008 0.747

2007 0.976

2006 1.091

2005 0.763

2004 0.732

2003 0.675

2002 0.83

2001 0.813

2000 0.746

1999 0.671

1998 0.861

1997 1.383

...

env_data

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 ...

2015 -3.8 0.2 1.7 1 2 1 2.8 -3.2 -4.2 -2.1 1.2 -0.1 -0.2 -1.8 -4.5 ...

2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 1.5 2.7 3 3.4 3.4 2.1 0.8 ...

2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 1 0.6 0.8 1.9 0.7 ...

2012 2.3 -0.3 -0.1 -1.5 -1.6 -1.1 -0.8 3.7 1.7 -0.2 -0.8 3.1 6.6 9 6.8 ...

2011 -1.2 -0.1 -0.2 -2.4 -3.6 -2.7 -0.9 3.8 2.5 0.1 0.7 3.2 2.5 0.2 -1.6 ...

2010 -7.7 -5.3 -3.8 -0.8 0.9 0.9 -0.3 -3.2 -2.4 -1.2 -0.2 -0.2 -1 -0.6 -1 ...

2009 7.9 6.9 7.2 6.4 5.5 6.4 2.1 8 6.2 7 8.9 2.9 -0.7 -1.1 -2.2 ...

2008 0.1 1.1 2.5 2.4 0.5 -0.6 3.2 -3.9 -3.2 -2.9 -3.7 -4.5 -2.8 -2 -3.8 ...

2007 -4.8 -0.9 -0.3 -3.6 -3 -3.8 -3.6 -5.6 -7.3 -5.8 -6 -10.8 -8.8 -2.9 -2.4 ...

2006 -2.7 3.1 6.1 6.1 5.9 10.4 12 0.2 1.6 1.4 -0.6 3.1 6.5 8.4 2.6 ...

2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 -3.4 4.8 4.2 0.4 1 -0.5 0.6 2.2 -1.1 ...

2004 1.8 5.1 6.9 6.9 0.4 -2.6 -4.8 1.1 -1.6 -4.6 -4.6 -4.1 -2.4 -2.2 -2.1 ...

2003 2.2 0.2 -1.4 -4.6 -3.5 -2.8 -1.8 4.7 8.2 8.6 10 8.4 3.3 5.2 1.5 ...

2002 0.3 2.3 0.2 1.2 1.3 2.7 0.5 1 0.5 0 3 7.7 5.6 4 6.5 ...

2001 1.3 1 0.6 1.6 1.2 1.6 1.9 -4.5 -7.1 -7.7 -8.9 -8.3 -5.4 -3.8 -2.2 ...

2000 8.6 4.2 1.9 4.1 3.3 5.7 8.8 -0.2 0.7 0.8 0.5 0.5 -0.3 0 0.9 ...

1999 -3 -2.5 -2 -2.8 -0.8 0.7 1.1 9 10.4 8 6 4.8 5.5 6.1 5.4 ...

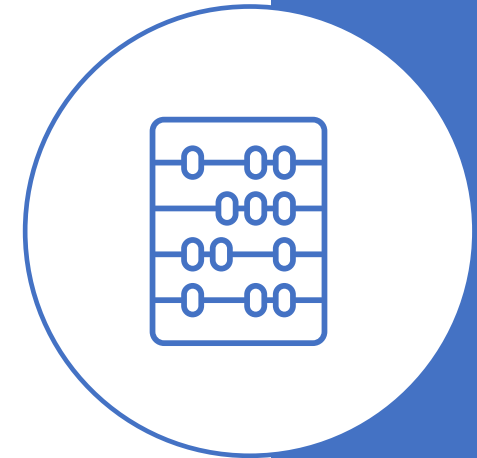
1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 3.7 3 1.5 3 2.2 2.2 -1.1 ...

1997 6.9 2.5 -0.5 -3.3 -1.5 -0.7 0.6 2.7 3.9 5 3.6 1.2 -0.5 -1.1 -0.1 ...

...

Pearson correlation coefficient
(or fitted linear / nonlinear model)

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30	0.05	0								



The algorithm

mean, median or sum

response

	TRW
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
...	...

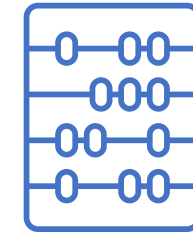
temporary

<i>temporary</i>
-0.6
2.92
0.84
3.54
1.34
-0.64
3.4
-3.18
-6.86
3.76
0.74
-3.58
7.1
4.06
-6.82
0.3
6.08
2.22

env_data

[illegible]

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

[illegible]

The algorithm

mean. median or sum

response

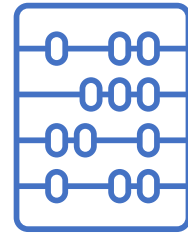
TRW	temporary
2015 1.203	-1.1
2014 1.051	1.04
2013 1.706	1.68
2012 0.892	0.72
2011 0.942	1.24
2010 0.771	-1.46
2009 1.436	6.44
2008 0.747	-2.1
2007 0.976	-5.66
2006 1.091	2.92
2005 0.763	1.4
2004 0.732	-2.9
2003 0.675	5.94
2002 0.83	1
2001 0.813	-5.26
2000 0.746	2.12
1999 0.671	6.9
1998 0.861	1.5
1997 1.383	1.5
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30	0.05	0	0.27	0.15
6	0.35										



The algorithm

mean. median or sum

response

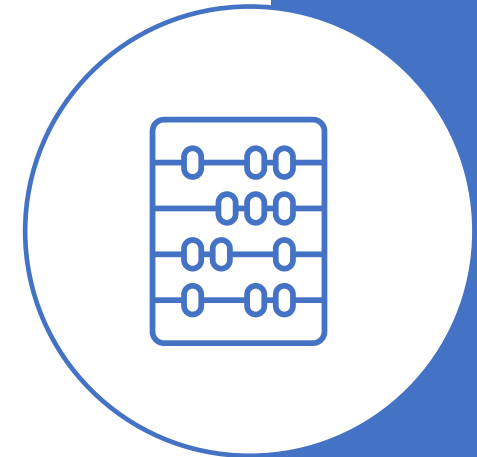
TRW	temporary
2015 1.203	-1.08
2014 1.051	2.8
2013 1.706	0.24
2012 0.892	2.08
2011 0.942	1.8
2010 0.771	-1
2009 1.436	4.86
2008 0.747	-3.42
2007 0.976	-7.74
2006 1.091	2.4
2005 0.763	1.14
2004 0.732	-3.46
2003 0.675	7.7
2002 0.83	3.36
2001 0.813	-7.48
2000 0.746	0.44
1999 0.671	6.94
1998 0.861	2.62
1997 1.383	0.62
...	...

env_data

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30	0.05	0	0.27	0.15
6	0.35	0.28									
7											



The algorithm

mean. median or sum

response

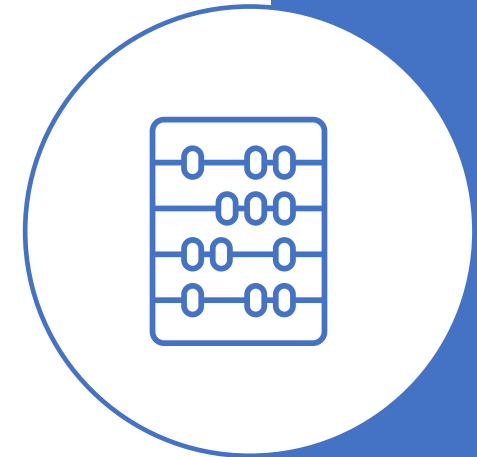
TRW	temporary
2015 1.203	-0.32
2014 1.051	-2.74
2013 1.706	4.66
2012 0.892	0.38
2011 0.942	-0.18
2010 0.771	-0.82
2009 1.436	5.64
2008 0.747	-0.8
2007 0.976	-4.66
2006 1.091	6.02
2005 0.763	-1.06
2004 0.732	-1.5
2003 0.675	0.96
2002 0.83	1.2
2001 0.813	-1.38
2000 0.746	3.66
1999 0.671	4.08
1998 0.861	-1.68
1997 1.383	-1.68
...	...

env_data

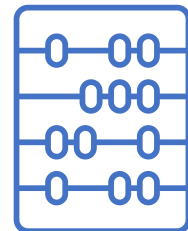
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

*Pearson correlation coefficient
(or fitted linear / nonlinear model)*

5	0.10	0.09	-0.09	0.17	0.25	0.21	0.30	0.05	0	0.27	0.15
6	0.35	0.28	0.15								
7											



The final matrix with all calculations

[illegible]

Key arguments

- lower_limit
- upper_limit

lower_limit lower limit of window width
upper_limit upper limit of window width

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	...
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	...	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	...	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	...	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2	...	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	...	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	...	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	...	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	...	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...



Key arguments

- method

method a character string specifying which method to use. Current possibilities are "cor", "lm" and "brnn".

	TRW	<i>temporary</i>
2015	1.203	-1.67
2014	1.051	2.41
2013	1.706	0.54
2012	0.892	3.74
2011	0.942	1.09
2010	0.771	-0.94
2009	1.436	3.00
2008	0.747	-3.27
2007	0.976	-6.29
2006	1.091	3.29
2005	0.763	0.91
2004	0.732	-3.01
2003	0.675	6.46
2002	0.83	3.90
2001	0.813	-6.20
2000	0.746	0.44
1999	0.671	6.60
1998	0.861	2.07
1997	1.383	1.71
...	...	...



Available methods: "cor", "lm" or "brnn"

Key arguments

- metric

`metric` a character string specifying which metric to use. Current possibilities are "r.squared" and "adj.r.squared". If `method = "cor"`, `metric` is not relevant.

	TRW	<i>temporary</i>
2015	1.203	-1.67
2014	1.051	2.41
2013	1.706	0.54
2012	0.892	3.74
2011	0.942	1.09
2010	0.771	-0.94
2009	1.436	3.00
2008	0.747	-3.27
2007	0.976	-6.29
2006	1.091	3.29
2005	0.763	0.97
2004	0.732	-3.00
2003	0.675	6.40
2002	0.83	3.90
2001	0.813	-6.20
2000	0.746	0.44
1999	0.671	6.60
1998	0.861	2.07
1997	1.383	1.71
...	...	...



Available methods: "cor", "lm" or "brnn",
Available metrics: "r.squared" and "adj.r.squared"

Key arguments

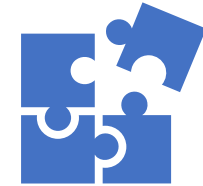
- row_names_subset

row_names_subset

if set to TRUE, row.names are used to subset env_data and response data frames.

Only years from both data frames are kept.

TRW	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015 1.203	2013 2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2014 1.051	2012 2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2013 1.706	2011 -1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2012 0.892	2010 -7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2011 0.942	2009 7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2010 0.771	2008 0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2009 1.436	2007 -4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2008 0.747	2006 -2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2007 0.976	2005 -2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2006 1.091	2004 1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2005 0.763	2003 2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2004 0.732	2002 0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2003 0.675	2001 1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2002 0.83	2000 8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
2001 0.813	1999 -3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
2000 0.746	1998 -1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1999 0.671	1997 6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
1998 0.861	1996 -1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997 1.383	1995 6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
1996 1.021	1994 -2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...



Key arguments

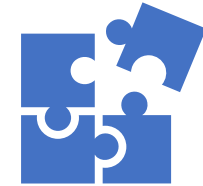
- row_names_subset

row_names_subset

if set to TRUE, row.names are used to subset env_data and response data frames.

Only years from both data frames are kept.

	TRW		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015	1.203	2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	...
2014	1.051	2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	...
2013	1.706	2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	...
2012	0.892	2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	...
2011	0.942	2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	...
2010	0.771	2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	...
2009	1.436	2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	...
2008	0.747	2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...
2007	0.976	2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	...
2006	1.091	2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	...
2005	0.763	2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	...
2004	0.732	2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	...
2003	0.675	2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	...
2002	0.83	2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	...
2001	0.813	1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	...
2000	0.746	1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1999	0.671	1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
1998	0.861	1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	...
1997	1.383	1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	...
1996	1.021	1994	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	...



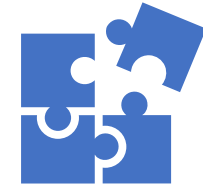
Key arguments

- row_names_subset

row_names_subset

if set to TRUE, row.names are used to subset env_data and response data frames.
Only years from both data frames are kept.

TRW	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2015 1.203	2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7 ...
2014 1.051	2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8 ...
2013 1.706	2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6 ...
2012 0.892	2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1 ...
2011 0.942	2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2 ...
2010 0.771	2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8 ...
2009 1.436	2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4 ...
2008 0.747	2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6 ...
2007 0.976	2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1 ...
2006 1.091	2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1 ...
2005 0.763	2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5 ...
2004 0.732	2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5 ...
2003 0.675	2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2 ...
2002 0.83	2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9 ...
2001 0.813	1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4 ...
2000 0.746	1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1 ...
1999 0.671	1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1 ...
1998 0.861	1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1 ...
1997 1.383	1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1 ...
1996 1.021	1994	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6 ...



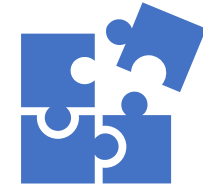
Key arguments

- row_names_subset

row_names_subset

if set to TRUE, row.names are used to subset env_data and response data frames.
Only years from both data frames are kept.

TRW	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	...
2013 1.706	2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7 ...
2012 0.892	2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8 ...
2011 0.942	2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6 ...
2010 0.771	2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1 ...
2009 1.436	2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2 ...
2008 0.747	2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8 ...
2007 0.976	2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4 ...
2006 1.091	2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6 ...
2005 0.763	2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1 ...
2004 0.732	2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1 ...
2003 0.675	2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5 ...
2002 0.83	2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5 ...
2001 0.813	2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2 ...
2000 0.746	2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9 ...
1999 0.671	1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4 ...
1998 0.861	1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1 ...
1997 1.383	1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1 ...
1996 1.021	1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1 ...



Key arguments

- aggregate_function

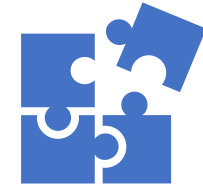
aggregate_function

character string specifying how the daily data should be aggregated. The default is 'mean', the two other options are 'median' and 'sum'

	TRW	temporary
2015	1.203	0.79
2014	1.051	-4.87

2010	0.771	-1.00
2009	1.436	6.07
2008	0.747	0.74
2007	0.976	-2.97
2006	1.091	6.26
2005	0.763	-3.30
2004	0.732	1.86
2003	0.675	-1.31
2002	0.83	1.31
2001	0.813	0.49
2000	0.746	3.97
1999	0.671	0.39
1998	0.861	-3.71
1997	1.383	-0.03
...	...	...

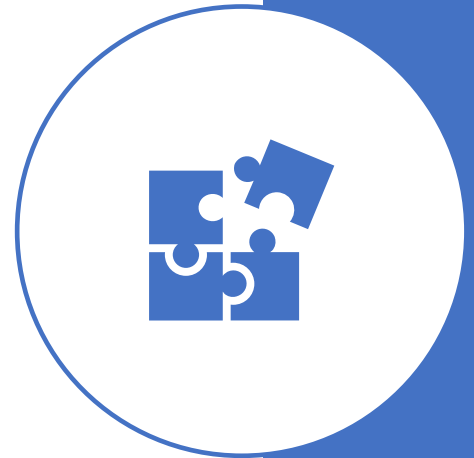
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	...
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	...
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	...
ed. The default			0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	...
			0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	...
			0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	...	...
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	0.1	-1.5	...
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	...	0.2	-2.4	...
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	...	0.2	-2.4	...
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	...	0.2	-2.4	...
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	...	0.2	-2.4	...
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	...	0.2	-2.4	...
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	...	0.2	-2.4	...
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4	...	0.2	...
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	...	0.2	...
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.7	...	...
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	...
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	...
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	...
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	...
...	...	...	...	...	...	...	...	...	...	...	...



'mean', 'median' or 'sum'

Key arguments

- previous_year
- boot
- boot_n
- alpha
- remove_insignificant
- cor_method
- subset_years



An example workflow for

- *daily_response()*
- *daily_response_seascorr()*
- *monthly_response()*
- *monthly_response_seascorr()*

