Package ‘SDD’

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**SDD-package**

**SDD - Serial Dependence Diagrams.**

**Description**

Allows for serial dependence diagrams applicable to both linear and nonlinear time series.

**Details**

- **Package:** SDD
- **Type:** Package
- **Version:** 1.2
- **Date:** 2015-02-24
- **License:** GNU-2

**Author(s)**

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**References**


**See Also**

ADF, plot.sdd, SMI

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**Serial Dependence Diagrams**

**Description**

The function computes (and by default plots) different types of serial dependence diagrams.

**Usage**

```r
ADF(x, dtype = c("ADF", "CADF", "RPADF", "DeltaADF", "ACF"),
    lag.max = floor(10 * log10(length(x))), alpha = 0.05,
    num.clas, B = 99, bandwidth, delta = "Delta_1", fres = ".Perm",
    fdenest = ".denest", fdiv, argacf, R = 1:lag.max,
    p.adjust.method = p.adjust.methods, plot = TRUE,
    ...)
```

**Arguments**

- `x`: an "ADF" object or a univariate numeric time series object or a numeric vector.
- `dtype`: an optional character string. It specifies the type of autodependence function and must be:
  - "ADF" (default; see Bagnato, Punzo, Nicolis, 2012)
  - "CADF" (see Bagnato, Punzo, Nicolis, 2012)
  - "RPADF" (see Bagnato, De Capitani, Punzo, 2014)
  - "DeltaADF" (see Bagnato, De Capitani, Punzo, 2013)
  - "ACF"
- `lag.max`: maximum lag at which to calculate the ADF. Default is \( 10 \times \log_{10}(n) \) where \( n \) is the length of the series.
- `alpha`: significance level of the tests of lag-independence (related to each bar). Default value is 0.05.
- `num.clas`: when `dtype="ADF"` or "CADF" or "RPADF", it sets the number of equifrequency classes for each of the two marginal distributions of the contingency table. If not specified, it is determined internally using a rule of thumb described in Bagnato, Punzo, Nicolis (2012).
when `dtype="DeltaADF"`, it sets the number of permutations used. Default value is 99 (see Bagnato, De Capitani, Punzo, 2013a,b).

**bandwidth**
when `dtype="DeltaADF"`, it sets the bandwidth used for the Gaussian kernel density estimator. Default value is computed with likelihood cross-validation (see Bagnato, De Capitani, Punzo, 2013a,b).

**delta**
a character vector; when `dtype="DeltaADF"`, it specifies the type of divergence measure used (see Bagnato, De Capitani, Punzo, 2013b); for each element in `delta` a different plot is produced. Possible values are:
- "Delta_1" (default)
- "Delta_0.5"
- "Delta_2"
- "Delta_3"
- "Delta_4"
- "Delta_SD"
- "Delta_L1"
- "Delta_ST"
- "Delta_fdiv"; in this case, the external function named `fdiv` is used to compute divergence.

**fres**
an optional character string which specifies, when `dtype="DeltaADF"`, the name of the external function \((x,B)\) specifying the resampling method from the raw series, where \(x\) is a time series and \(B\) the number of resamples; the function should return a matrix with \(B\) rows and \(\text{length}(x)\) columns. If not specified, permutations are randomly generated.

**fdenest**
an optional character string which specifies when `dtype="DeltaADF"`, the name of the external function \((x,m,ngrid,bandwidth)\) to use for univariate and bi-variate density estimation, where \(x\) is the time series, \(m\) is the lag considered, \(ngrid\) is the number of points in the grid, and \(bandwidth\) is the bandwidth; the function should return:
- \(fi\), a matrix of dimension \(ngrid \times ngrid\) containing conjoint density estimates for lag \(m\)
- \(gi\), a matrix of dimension \(ngrid \times ngrid\) containing conjoint density estimates in case of independence, for lag \(m\)
- \(ngi\), is equal to \(ngrid\).

If `fdenest` is not specified, the Gaussian kernel density estimation is used (see Bagnato, De Capitani, Punzo, 2013a,b).

**fdiv**
an optional character string which specifies, when `dtype="DeltaADF"` and `delta="Delta_fdiv"`, the name of the external function \((fi,gi,ngi)\) to use to compute divergence; its arguments are defined as in `fdenest`; the function should return a scalar.

**plot**
if TRUE (default), the specified ADF is displayed.

**argacf**
when `dtype="ACF"`, it is a list with optional arguments for function `acf()`.

**R**
a vector. It specifies the lags on which to test for simultaneous independence (see Bagnato, Punzo, 2010, 2012 and Bagnato, De Capitani, Punzo, 2013b). Default value is \(1:\text{lag.max}\)
ADF

p.adjust.method

a character string. It specifies the method to be used in the simultaneous independence test. It must be one of p.adjust.methods.

... optional arguments to be passed to the plot.SDD method, such as graphical parameters.

digits minimal number of significant digits.

Details

There are print and data.frame methods for objects of class "ADF".

Value

Returned from this function is a SDD object which is a list with the following components:

res a data frame. According to dtype, it may contain:

- lag, a numeric vector containing the lags at which the bars of the diagrams are computed
- vbar, height of the bars of the diagram
- pvalue, p-values associated to the bars of the diagram
- pstar, transformed p-values associated to the bars of the diagram. If dtype="DeltaADF" transformed p-values are vbar
- n, vector of length lag.max, containing the effective number of pairs considered for each lag
- crit.val, vector, of length lag.max, with the critical values
- xmin vector of length lag.max, containing the non-centrality parameters for each bar of the RP-ADF

dtype a character string. It specifies the type of serial dependence diagram generated.
delta a character string. It specifies, when type="DeltaADF", the type divergence measure used.

num.clas a scalar. It is the number of classes in each contingency table.

alpha a scalar. It specifies the significance level of the tests of lag independence (related to each bar).

df a scalar. It contains the degrees of freedom of the reference chi-square distribution used when dtype is one of: "ADF", "RPADF", or "CADF".

bandwidth a scalar. It is the bandwidth used in kernel density estimation.

series the name of the series x.

R a vector. It specifies the lags to test in the simultaneous independence tests.
p.adjust.method a character string. It specifies the method to be used in the simultaneous independence tests. It must be one of p.adjust.methods.
p.adjust a vector. It contains the adjusted probabilities for the simultaneous independence tests.
Author(s)
Luca Bagnato, Lucio De Capitani, Angelo Mazza and Antonio Punzo

References


See Also

SDD-package, plot.SDD, SMI, acf

Examples

# Dependence Diagrams on raw data
data("SMI")
ADF(SMI^2, dtype="ACF", main="")
ADF(SMI, main="")
ADF(SMI, dtype="RPADF", main="")

# Dependence Diagrams on residuals from a fitted model
library("tseries")
residuals <- garch(SMI, order=c(1,1))$residuals[-1]
ADF(residuals^2, dtype="ACF", main="")
ADF(residuals, dtype="RPADF", main="")
plot.SDD

plot.SDD

Plot Method for SDD objects

Description

Plot method for objects of class "SDD".

Usage

```r
## S3 method for class 'SDD'
plot(x, norm = FALSE, stability = FALSE, step = 5, ...)
```

Arguments

- `x`: a SDD object
- `norm`: an optional logical; if TRUE, when `dtype="ADF"` or when `dtype="ACF"`, the "normalized" p-values of the ADF are computed.
- `stability`: an optional logical; if TRUE, when `dtype="RPADF"`, to evaluate the stability of the test-results a graphical representation of the confidence interval is displayed.
- `step`: an optional scalar; it sets the step between x-ticks in plot. Default value is 5.
- `...`: graphics parameters to be passed to the plotting routines.

Value

No values are returned from the plot function.

Author(s)

Luca Bagnato, Lucio De Capitani, Angelo Mazza and Antonio Punzo

See Also

`SDD-package`, `ADF`, `SMI`

Examples

```r
data("SMI")
res <- ADF(SMI, plot=FALSE)
plot(res)
```
Description

The SMI dataset consists of 660 daily returns of the Swiss Market Index spanning the period from August 12th, 2009, to March 6th, 2012 (the share prices used to compute the daily returns are downloadable from http://finance.yahoo.com/).

Usage

data(SMI)

Format

A time series object

Source


References


See Also

SDD-package, ADF, plot.SDD
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