Package 'SIMle'

July 21, 2025

Type Package

Title Estimation and Inference for General Time Series Regression

Version 0.1.0

Description We provide functions for estimation and inference of nonlinear and non-
stationary time series regression using the sieve methods and bootstrapping procedure.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.2.3

Repository CRAN

Suggests knitr, rmarkdown

VignetteBuilder knitr

Imports ggplot2, Matrix, plotly, stringr, RCurl, splines, methods,
utils, stats, Sie2nts

NeedsCompilation no

Author Xiucai Ding [aut, cre, cph],
Chen Qian [aut, cph]

Maintainer Xiucai Ding <xiucaiding89@gmail.com>

Date/Publication 2023-10-10 17:30:02 UTC

Contents

---

auto.exact.test   *Automated exact form test*

Description

This function utilizes L2 test for the automated execution of exact form tests with chosen bases.

Usage

```
auto.exact.test(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  ops,
  exact_func,
  m = "MV",
  r = 1,
  s = 1,
  per = 0,
  k = 0,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line

ops	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria "AIC" stands for Akaike Information Criterion, "BIC" stands for Bayesian Information Criterion, "CV" represents cross-validation, and "Kfold" corresponds to k-fold cross-validation for time series data
exact_func	A list contains elements that are matrix contain exact functions, which are desired to be tested. The k-th element represents the k-th variable. The matrix contains values of the exact function within its domain
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
per	the percentage for test set used in cross validation option "CV"
k	the number of fold used in k-fold cross validation "Kfold"
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Details

In the parameter type, this package provides 32 types of bases, including options such as 'Legen' for Legendre polynomials, 'Cheby' for the first kind of Chebyshev polynomials, 'tri' for trigonometric polynomials, 'cos' for cosine polynomials, 'sin' for sine polynomials, and 'Cspli' for the class of spline functions. In the 'Cspli' option, the first input 'c' represents knots plus 2, which correspond to 0 and 1. The term 'or' indicates the order of splines, so the number of basis elements is the number of knots + 2 - 2 plus the number of the order. When functions automatically choose the number of basis elements for splines, the number is not less than the order of the spline. The package provides 'db1' to 'db20' for Daubechies1 wavelet basis to Daubechies20 wavelet basis, and 'cf1' to 'cf5' for Coiflet1 wavelet basis to Coiflet5 wavelet basis. The wavelet tables provided by the Sie2nts package are generated by the Cascade algorithm using a low-pass filter. If exact values of wavelets are required, the Recursion algorithm should be used.

Value

A list whose elements are p value of exact form test. Each element in the list represents p-values in the order of variates.

References

[1] Ding, Xiucai, and Zhou, Zhou. "Estimation and inference for precision matrices of nonstationary time series." The Annals of Statistics 48(4) (2020): 2455-2477.

[2] Ding, Xiucai, and Zhou, Zhou. "Auto-regressive approximations to non-stationary time series, with inference and applications." Available online, 2021.

[3] Ding, Xiucai, and Zhou Zhou. "Simultaneous Sieve Inference for Time-Inhomogeneous Nonlinear Time Series Regression." Available online, 2021.

---

auto.fit *Automated estimation of nonlinear time series regression*

Description

This function estimates nonlinear time series regression by sieve methods with chosen bases.

Usage

```
auto.fit(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  type,
  ops,
  per = 0,
  k = 0,
  fix_num = 0,
  r = 1,
  s = 1,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
type	select type of estimation."nfix" refers to no fix estimation. "fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
ops	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria
per	the percentage for test set used in cross validation option "CV"
k	the number of fold used in k-fold cross validation "Kfold"

fix_num	fix_num indicates the use of fixed-value nonlinear time series regression. The default value is 0, which is employed for non-fixed estimation. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

If "nfix" is selected, the function returns a list where each element is a matrix representing the estimation function in two dimensions. Otherwise, if "nfix" is not selected, the function returns a list where each element is a vector representing the estimation function.

---

auto.homo.test *Automated time-homogeneity test*

Description

This function utilizes Simultaneous Confidence Regions (SCR) for the automated execution of time-homogeneity tests with chosen bases.

Usage

```
auto.homo.test(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  ops,
  m = "MV",
  fix_num = 0,
  r = 1,
  s = 1,
  per = 0,
  k = 0,
  upper = 10
)
```

Arguments

`ts`	ts is the data set which is a time series data typically
`c`	the maximum value of number of basis for time input
`d`	the maximum value of number of basis for variate input
`b_time`	type of basis for time input
`b_timese`	type of basis for variate input
`mp_type`	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
`ops`	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria
`m`	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
`fix_num`	fix_num indicates fixed value for time
`r`	indicates number of variate
`s`	s is a positive scaling factor, the default is 1
`per`	the percentage for test set used in "CV" option
`k`	the number of fold used in "Kfold" option
`upper`	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list is returned, containing dataframes with three columns each. The first column pertains to input values, the second column contains values of the estimated function along with their upper and lower bounds, which are used for time-homogeneity testing. The third column serves as a factor indicating the types corresponding to the values in the second column.

`auto.SCR`	*Automated creation of a Simultaneous Confidence Region (SCR) for the estimated function*

Description

This function generates a Simultaneous Confidence Region (SCR) for the estimated function with chosen bases.

Usage

```
auto.SCR(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  type,
  ops,
  m = "MV",
  fix_num = 0,
  r = 1,
  s = 1,
  per = 0,
  k = 0,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
type	select type of estimation."fixt" indicates fix time t estimation. "fixx" represents fixed variate estimation
ops	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
fix_num	fix_num indicates the use of fixed-value nonlinear time series regression. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
per	the percentage for test set used in "CV" option
k	the number of fold used in "Kfold" option
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list containing dataframes with three columns each. The first column corresponds to input values. The second column contains values of the estimated function, along with their upper and lower bounds. The third column is a factor that indicates the types associated with the values in the second column.

---

auto.sep.test	*Automated separability test*

Description

This function utilizes Simultaneous Confidence Regions (SCR) for the automated execution of separability tests with with chosen bases.

Usage

```
auto.sep.test(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  type,
  ops,
  m = "MV",
  fix_num = 0,
  r = 1,
  s = 1,
  per = 0,
  k = 0,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
type	select type of estimation."fixt" indicates fix time t. "fixx" represents fix variate

ops	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
fix_num	fix_num indicates the use of fixed-value nonlinear time series regression. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
per	the percentage for test set used in "CV" option
k	the number of fold used in "Kfold" option
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list containing dataframes with three columns each. The first column represents input values. The second column contains values of the estimated function, along with their upper and lower bounds, which are used for separability testing. The third column is a factor indicating the types corresponding to the values in the second column.

---

bs.gene.trans	*Generate Mapping Basis*

Description

this function generates the value of k-th basis function. (The wavelet basis options return the full table)

Usage

```
bs.gene.trans(
  type,
  mp_type,
  k,
  upper = 10,
  s = 1,
  n_esti = 500,
  c = 10,
  or = 4
)
```

Arguments

`type`	type indicates which type of basis is used
`mp_type`	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
`k`	k-th basis function
`upper`	the upper bound for basis domain, the default is 10
`s`	s is a positive scaling factor, the default is 1
`n_esti`	the number of values got from k-th basis function, the default is 500
`c`	c only used in Cspli which indicates the total number of knots to generate, the default is 10, c should not be less than k.(for splines, the true number of basis is c-2+or)
`or`	indicates the order of spline and only used in Cspli type, default is 4 which indicates cubic spline

Value

A matrix in which the k-th column corresponds to the values of the k-th mapped basis function

References

[1] Chen, Xiaohong. "Large Sample Sieve Estimation of Semi-Nonparametric Models." Handbook of Econometrics, 6(B): 5549–5632,2007.

Examples

```
bs.gene.trans("Legen", "algeb", 5)
```

`bs.plot.trans`	*Plots of mapping basis*

Description

This function generates the plot of first k basis function.

Usage

```
bs.plot.trans(type, mp_type, k, upper = 10, s = 1, or = 4, title = "")
```

Arguments

type	type indicates which type of basis is used
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
k	The k is the number of basis functions represented (If wavelet are chosen, the real number of basis is 2^k. If Cspli is chosen, the real number of basis is k - 2 + or)
upper	the upper bound for basis domain, the default is 10
s	s is a positive scaling factor, the default is 1
or	indicates the order of spline and only used in Cspli type, default is 4 which indicates cubic spline
title	give the title for the basis plot

Value

The plot of 1 to k basis functions

Examples

```
bs.plot.trans("Legen", "algeb", 2)
```

---

cv.plot	*Visualization of the cross-validation results*

Description

Visualization of the cross-validation results

Usage

```
cv.plot(cv_m, title = "")
```

Arguments

cv_m	give the cross validation data frame
title	give the title for plot

Value

the plot shows cross validation result (3D)

`cv.res` *Cross validation result by specific criteria*

Description

this function gets the cross validation result by specific criteria.

Usage

```
cv.res(ts, c, d, b_time, b_timese, mp_type, ops, r = 1, s = 1, per = 0, k = 0)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
ops	Criteria for choosing the number of bases are provided by the package, offering four options: "AIC," "BIC," "CV," and "Kfold," each corresponding to a specific Criteria
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
per	the percentage for test set used in "CV" option
k	the number of fold used in "Kfold" option

Value

A data frame containing the criterion values corresponding to "c" and "d". The first element refers to the optimal number of basis for time input, and the second element refers to the optimal number of basis for variate.

---

exact.test	*Exact form test*

Description

This function employs the L2 test for the user-specific execution of exact form tests.

Usage

```
exact.test(
  ts,
  c,
  d,
  m = "MV",
  b_time,
  b_timese,
  mp_type,
  exact_func,
  r = 1,
  s = 1,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	number of basis for time input
d	number of basis for variate input
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
exact_func	A list contains elements that are matrix contain exact functions, which are desired to be tested. The k-th element represents the k-th variable. The matrix contains values of the exact function within its domain
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
upper	The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper.

Value

A list whose elements are p value of exact form test. Each element in the list represents p-values in
the order of variates.

---

fit.plot	*Visualization of estimation*

Description

Visualization of estimation

Usage

```
fit.plot(
  res_esti,
  ops,
  mp_type,
  title = "",
  lower = -1.3,
  upper = 1.3,
  domain = 10
)
```

Arguments

`res_esti`	the result of estimation
`ops`	select type of estimation."nfix" refers to no fix estimation. "fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
`mp_type`	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
`title`	give the title for plot
`lower`	give the lower bound for scale limits, the default is -1.3
`upper`	give the upper bound for scale limits, the default is 1.3
`domain`	The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -domain to domain.

Value

the plot shows estimated function

Examples

```
generate_nAR1 = function(n, v){
 ts = c()
 w = rnorm(n, 0, 1/v)
 x_ini = runif(1,0,1)
 for(i in 1:n){
   if(i == 1){
     ts[i] = sin(2*pi*(i/n))*exp(-x_ini^2)  + w[i] #
   } else{
     ts[i] = sin(2*pi*(i/n))*exp(-ts[i-1]^2) + w[i]
   }
 }
 return(ts)
}
ts  = generate_nAR1(200, 1) # change sample size in real case
res_esti = fix.fit(ts, 5, 2, "Legen", "Legen", "algeb", "fixt", 0.1)
fit.plot(res_esti[[1]], "fixt", "algeb")
```

---

fix.fit   *User-specified estimation of nonlinear time series regression*

Description

This function estimates nonlinear time series regression by sieve methods

Usage

```
fix.fit(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  type,
  fix_num = 0,
  r = 1,
  s = 1,
  n_esti = 2000,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	number of basis for time input
d	number of basis for variate input

b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
type	select type of estimation."nfix" refers to no fix estimation. "fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
fix_num	fix_num indicates the use of fixed-value nonlinear time series regression. The default value is 0, which is employed for non-fixed estimation. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
n_esti	number of points for estimation, the default is 2000
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

If "nfix" is selected, the function returns a list where each element is a matrix representing the estimation function in two dimensions. Otherwise, if "nfix" is not selected, the function returns a list where each element is a vector representing the estimation function.

---

fix.SCR	*User-specified creation of a Simultaneous Confidence Region (SCR) for the estimated function*

Description

This function generates a Simultaneous Confidence Region (SCR) for the estimated function

Usage

```
fix.SCR(
  ts,
  c,
  d,
  m = "MV",
  b_time,
  b_timese,
  mp_type,
  type,
  fix_num = 0,
  r = 1,
  s = 1,
```

```
    n_point = 4000,
    upper = 10
)
```

Arguments

`ts`	ts is the data set which is a time series data typically
`c`	the maximum value of number of basis for time input
`d`	the maximum value of number of basis for variate input
`m`	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
`b_time`	type of basis for time input
`b_timese`	type of basis for variate input
`mp_type`	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
`type`	select type of estimation."fixt" indicates fixed time t value. "fixx" represents fix variate value
`fix_num`	fix_num indicates the use of fixed-value nonlinear time series regression. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
`r`	indicates number of variate
`s`	s is a positive scaling factor, the default is 1
`n_point`	number of points for SCR, the default is 4000
`upper`	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list containing dataframes with three columns each. The first column corresponds to input values. The second column contains values of the estimated function, along with their upper and lower bounds. The third column is a factor that indicates the types associated with the values in the second column.

`homo.test`	*User-specified time-homogeneity test*

Description

This function utilizes Simultaneous Confidence Regions (SCR) for the automated execution of time-homogeneity tests

Usage

```
homo.test(
  ts,
  c,
  d,
  m = "MV",
  b_time,
  b_timese,
  mp_type,
  fix_num = 0,
  r = 1,
  s = 1,
  n_point = 4000,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	number of basis for time input
d	number of basis for variate input
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
fix_num	fix_num indicates fixed value for time
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
n_point	number of points for SCR, the default is 2000
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list is returned, containing dataframes with three columns each. The first column pertains to input values, the second column contains values of the estimated function along with their upper and lower bounds, which are used for time-homogeneity testing. The third column serves as a factor indicating the types corresponding to the values in the second column.

---

scr.plot *Visualization of simultaneous confidence region (SCR)*

Description

Visualization of simultaneous confidence region (SCR)

Usage

```
scr.plot(scr_df, ops, title = "", lower = -1.3, upper = 1.3)
```

Arguments

scr_df	the result of estimation
ops	select type of estimation."nfix" refers to no fix estimation. "fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
title	give the title for plot
lower	give the lower bound for scale limits, the default is -1.3
upper	give the upper bound for scale limits, the default is 1.3

Value

the plot shows estimated function and its simultaneous confidence region (SCR)

Examples

```
generate_nAR1 = function(n, v){
 ts = c()
 w = rnorm(n, 0, 1/v)
 x_ini = runif(1,0,1)
 for(i in 1:n){
   if(i == 1){
     ts[i] = sin(2*pi*(i/n))*exp(-x_ini^2)  + w[i] #
   } else{
     ts[i] = sin(2*pi*(i/n))*exp(-ts[i-1]^2) + w[i]
   }
 }
 return(ts)
}
ts  = generate_nAR1(27, 1) #change sample size in real case.
res_esti = fix.SCR(ts, 1, 1, m = "MV", "Legen", "Legen", "algeb", "fixt", 0.6, r = 1)
scr.plot(res_esti[[1]], "fixt")
```

---

sep.test   *User-specified separability test*

Description

This function utilizes Simultaneous Confidence Regions (SCR) for the automated execution of separability tests

Usage

```
sep.test(
  ts,
  c,
  d,
  m = "MV",
  b_time,
  b_timese,
  mp_type,
  type,
  fix_num = 0,
  r = 1,
  s = 1,
  n_point = 2000,
  upper = 10
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	the maximum value of number of basis for time input
d	the maximum value of number of basis for variate input
m	the window size for the simultaneous confidence region procedure, with the default being 'MV,' which stands for the Minimum Volatility method
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
type	select type of estimation."fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
fix_num	fix_num indicates the use of fixed-value nonlinear time series regression. If "fixt" is chosen, it represents a fixed time value. Otherwise, if not selected, it pertains to a fixed variate value
r	indicates number of variate
s	s is a positive scaling factor, the default is 1

n_point	number of points for SCR, the default is 2000
upper	upper The upper bound for the variate basis domain. The default value is 10. When "algeb" or "logari" is chosen, the domain is automatically set from -upper to upper

Value

A list containing dataframes with three columns each. The first column represents input values. The second column contains values of the estimated function, along with their upper and lower bounds, which are used for separability testing. The third column is a factor indicating the types corresponding to the values in the second column.

---

series.predict *Predicting time series with 1 step*

Description

This function predicts the time series data basis on the estimation.

Usage

```
series.predict(
  ts,
  c,
  d,
  b_time,
  b_timese,
  mp_type,
  r = 1,
  s = 1,
  n_esti = 2000
)
```

Arguments

ts	ts is the data set which is a time series data typically
c	number of basis for time input
d	number of basis for variate input
b_time	type of basis for time input
b_timese	type of basis for variate input
mp_type	select type of mapping function, "algeb" indicates algebraic mapping on the real line. "logari" represents logarithmic mapping on the real line
r	indicates number of variate
s	s is a positive scaling factor, the default is 1
n_esti	number of points for estimation, the default is 2000

Value

predictive values for time series

---

test.plot	*Visulization of Simultaneous Confidence Region(SCR) for test result*

Description

Visulization of Simultaneous Confidence Region(SCR) for test result

Usage

```
test.plot(df, type, ops = "", title = "", lower = -1.3, upper = 1.3)
```

Arguments

df	the result of test (estimated function under null and Simultaneous Confidence Region (SCR))
type	specify type of test, "homot" represents time-homogeneity test. "separa" is separability test
ops	select type of estimation."nfix" refers to no fix estimation. "fixt" indicates fix time t estimation. "fixx" represents fix variate estimation
title	give the title for plot
lower	give the lower bound for scale limits, the default is -1.3
upper	give the upper bound for scale limits, the default is 1.3

Value

the plot shows test estimated function and simultaneous confidence region (SCR)

Index