

RCC_QMDPCA {RCCQ}

Retained Component Criterion for the Quadratic Moving Dynamic Principal Component Analysis

Description

The RCC_QMDPCA criterion is a new tool to determine the optimal number of components (i.e. QMDPCs) to retain for the Quadratic Moving Dynamic Principal Component Analysis (QMDPCA). This criterion balances between the following two desires, reducing the dimension of the data and increasing the accuracy of the final results of QMDPCA; See Alshammri and Pan (2020). Notice that the following libraries are needed to be installed before using the mcov function: library(roll); library(QMDPCA)

Usage

```
RCC_QMDPCA(x,w,1)
```

Arguments

x

a T-by-m data matrix, where the rows are "T" time points, and the columns are "m" variables

w

window width (i.e. window length) that used in the calculation of QMDPCA

1

number of lagged series to be included in the calculation of QMDPCA

Note

The size of w depends on the degree of stationarity of the data. Small window sizes are suitable for data that exhibit strong non-stationarity. For stationary data, a window of size "w=T-1" is used.

Author(s)

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References

Alshammri, F. and Pan, J. (2020). Quadratic moving dynamic principal component analysis for non-stationary multivariate time series. Manuscript submitted for publication.

Examples

```
##The data matrix X is a non-stationary time series with m=6 and T=1500.
m=6;T=1500
# Generate x_t
X=mat.or.vec(m,T)
a1=arima.sim(list(order=c(1,1,1),ar=0.75,ma=0.9),n=T+1,sd=1)
for(i in 1:2) X[i,]=a1[i+1:T]
a2=arima.sim(list(order=c(1,1,1),ar=0.6,ma=-1.4),n=T+1,sd=1)
for(i in 3:4) X[i,]=a2[(i-1):(T-i-2)]
a3=arima.sim(list(order=c(1,1,1),ar=-0.7,ma=-2.3),n=T+1,sd=1)
for(i in 5:6) X[i,]=a3[(i-3):(T-i-4)]
X=t(X)
X=ts(X)
##calculate and plot the RCC_QMDPCA values of x after applying MDPKA with w=100 and l=2.
myresults=RCC_QMDPCA(X,100,2)
##print the RCC_QMDPCA values
myresults
```

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