

RCC\_MDPCA {RCCM}

Retained Component Criterion for the Moving Dynamic Principal Component Analysis

## Description

The RCC\_MDPCA criterion is a new tool to determine the optimal number of components (i.e. MDPCs) to retain for the Moving Dynamic Principal Component Analysis (MDPCA). This criterion balances between the following two desires, reducing the dimension of the data and increasing the accuracy of the final results of MDPCA; See Alshammri and Pan (2019). Notice that the following libraries are needed to be installed before using the mcof function: library(roll); library(MDPCA)

## Usage

```
RCC_MDPCA(x,w,l)
```

## 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 MDPCA

`l`  
number of lagged series to be included in the calculation of MDPCA

## 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-l`" is used.

## Author(s)

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## References

Alshammri, F. and Pan, J. (2019). 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_MDPCA values of x after applying MDPCA with w=100 and l=2.
myresults=RCC_MDPCA(X,100,2)
##print the RCC_MDPCA values
myresults
```

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