

macf {macf}

## Moving Auto- and Cross-correlation Function

## Description

The function `macf` computes (and by default plots) estimates of the moving auto- and cross-correlation matrix of non-stationary (and stationary) time series. Notice that the following library is needed to be installed before using the `macf` function: `library(roll)`

## Usage

```
macf(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 size) at which the `macf` is calculated

`l`  
maximum lags at which the `macf` is calculated

## Value

`macf`  
An array of similar dimensions with lags containing the estimated `macf`

## Note

Choosing the window width (i.e. `w`) is vital to enhance the results of `macf` to extract accurate information from the data. 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)

Fayed Alshammri

## References

Alshammri, F. and Pan, J. (2019). Moving dynamic principal component analysis for non-stationary multivariate time series. Manuscript submitted for publication.

## Examples

```
##This is part of the analysis in Example 2 of Alshammri and Pan (2019).
##The data matrix X is a non-stationary time series with m=10 and T=1500.
m=10;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)]
a4=arima.sim(list(order=c(1,1,1),ar=-0.5,ma=0.55),n=T+1,sd=1)
for(i in 7:8) X[i,]=a4[(i-5):(T+i-6)]
a5=arima.sim(list(order=c(1,1,1),ar=0.6,ma=1.65),n=T+1,sd=1)
for(i in 9:10) X[i,]=a5[(i-7):(T+i-8)]
X=t(X)
X=ts(X)
##calculate and plot the moving auto- and cross-correlation of x with w=100 and l=20.
myresults=macf(X,100,20)
## returns the macf array
myresults
```

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