Package 'FASeg'

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Type Package

Title Joint Segmentation of Correlated Time Series

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Description It contains a function designed to the joint segmentation in the mean of several correlated series. The method is described in the paper X. Collilieux, E. Lebarbier and S. Robin. A factor model approach for the joint segmentation with between-series correlation (2015) <doi:10.48550/arXiv.1505.05660>.

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Contents

FASeg-package *Joint Segmentation of Set of Correlated Time-Series*

Description

FASeg contains a function designed to the joint segmentation (the segmentation is series-specific) in the mean of several correlated series. The form of the correlation is assumed to be arbitrary and we propose to model it with a factor model. A EM algorithm is used to estimate the parameters and a model selection strategy is proposed to determine both the number of breakpoints and the number of factors

Author(s)

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References

A factor model approach for the joint segmentation with between-series correlation (arXiv:1505.05660)

Examples

```
library(FASeg)
data(Y)
M=max(Y$series)
uniKmax=3
multiKmax=11
qmax=M-1
selection=FALSE
WithoutCorr=FALSE
seg=F_FASeg(Y,uniKmax,multiKmax,qmax,selection,WithoutCorr)
```

F_FASeg *Joint Segmentation of Set of Correlated Time-Series*

Description

This function is dedicated to the joint segmentation (the segmentation is series-specific) in the mean of several correlated series. The form of the correlation is assumed to be arbitrary and we propose to model it with a factor model. A EM algorithm is used to estimate the parameters. A model selection procedure is also proposed to determine both the number of breakpoints and the number of factors.

Usage

```
F_FASeg(Y, uniKmax, multiKmax, qmax, selection, WithoutCorr)
```

Arguments

Y	Data frame, with size [(n*M) x 3], which contains the data and other informations, n is the length of each series and M is the number of series
uniKmax	Maximal number of segments per series (uniKmax will be lower or equal to n)
multiKmax	Maximal number of segments for all the series (multiKmax will be greater or equal to M)
qmax	Maximal number of factors (qmax will be lower or equal to M-1) (default qmax=M-1). If qmax=0 then a joint segmentation with multiKmax segments and without taking into account the correlation between series is performed
selection	A logical value indicating if the selection of the number of segments K and the number of factors Q is performed (default=TRUE). If it is TRUE, K and Q are selected; if it is FALSE, K is fixed to multiKmax and Q is fixed to qmax
WithoutCorr	A logical value indicating if, when K and Q are selected, the joint segmentation without taking into account the correlation between series is also a possible solution in the selection (default=FALSE)

Value

Contains the following attributes:

SelectedK	Selected number of segments for all the series if selection=TRUE, the number of segments fixed by the user otherwise (K=multiKmax)
Selectedq	Selected number of factors if selection=TRUE, the number of factors fixed by the user otherwise (Q=qmax)
SelectedSigma	Estimation of the covariance matrix Sigma
SelectedPsi	Estimation of the matrix Psi
SelectedB	Estimation of the matrix of coefficients B
SelectedZ	Estimation of the latent vectors Z
SelectedSeg	Optimal segmentation with a selected or fixed value of the number of segments and the number of factors

Author(s)

Xavier Collilieux, Emilie Lebarbier and Stephane Robin

References

A factor model approach for the joint segmentation with between-series correlation (arXiv:1505.05660)

Y *Matrix of data*

Description

A data frame [(n x M) x 3] containing 5 Gaussian series with size n=50 each simulated as in the paper arXiv:1505.05660 (with rho=0.6 and sigma=0.2). The total number of segments is K=11 or 6 breakpoints (at position 39 for series 1; 35 for series 2; no breaks for series 3; 11 for series 4 and 2, 3 and 12 for series 5).

Usage

```
data(Y)
```

Format

A data frame with 250 observations on the following 3 variables.

`series` a numeric vector

`position` a numeric vector

`signal` a numeric vector

Details

series: the number of the series; position: the grid {1:n}; signal: the values of the observed signal

Examples

```
library(FASeg)
data(Y)
```

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