Package 'JPTA'

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Type Package

Title Joint Principal Trend Analysis

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Description Given two longitudinal high-dimensional datasets for a group of subjects, JPTA is used to extract shared latent trends and identify relevant features.

License GPL-2

LazyData TRUE

Depends fda, stats

RoxygenNote 6.0.1

R topics documented:

JPTA *Joint Principal Trend Analysis (JPTA) of two high-dimensional longitudinal datasets.*

Description

Joint Principal Trend Analysis (JPTA) of two high-dimensional longitudinal datasets.

Usage

```
JPTA(x, y, niter = 6, lambda = 1, sumabs = 0.7, sumabsu = NULL,
  sumabsv = NULL, topfeau = 10, topfeav = 10, feature.flag = TRUE,
  timevec = c(1:dim(x)[3]))
```

Arguments

x	A N * P * T longitudinal data tensor. N is the number of subjects, P is the number of features, T is the number of time points.
y	A N * Q * T longitudinal data tensor. Q is the number of features.
niter	Number of iterations.
lambda	Tuning parameter for smoothness of principal trends.
sumabs	A measure of sparsity for u and v vectors, between 0 and 1. It is used when feature.flag is FALSE and if sumabsu or sumabsv is not specified. In this case, sumabsu will be set as sumabs*sqrt(P) and sumabsv will be set as sumabs*sqrt(Q).
sumabsu	Tuning parameter for feature selection in x when feature.flag is FALSE. It must be between 1 and the square root of P.
sumabsv	Tuning parameter for feature selection in y when feature.flag is FALSE. It must be between 1 and the square root of Q.
topfeau	The number of nonzero features in u for feature selection in x when feature.flag is TRUE.
topfeav	The number of nonzero features in v for feature selection in y when feature.flag is TRUE.
feature.flag	To indicate the way of feature selection.
timevec	A vector for time points.

Value

returns a list with following objects.

u	Loadings for features in x.
v	Loadings for features in y.
theta	Weights for basis functions.
B	Basis function matrix
err	Reconstruction error.
xprd	JPTA reconstruction for x.
yprd	JPTA reconstruction for y.

References

Joint Principal Trend Analysis for Longitudinal High-dimensional Data by Yuping Zhang and Zhengqing Ouyang

Examples

```
N = 10
P = 50
Q = 40
T = 10
x = array(NA, dim = c(N,P,T))
y = array(NA, dim = c(N,Q,T))
timevec = seq(from=0, to=2, length.out=T)
e = 0.1
p1 = 40
q1 = 30
```

```
for(j in 1:N){
 for(i in 1:P){
    x[j, i, ] = ((i>0) & (i<=p1))*sin(pi*timevec) + rnorm(T, 0, e)
 }
 for(i in 1:Q){
   y[j, i, ] = ((i>0) & (i<=q1))*sin(pi*timevec)  + rnorm(T, 0, e)
 }
}
for(i in 1:P){
  x[,i,] = (x[,i,] - mean(x[,i,], na.rm= TRUE))
}
for(i in 1:Q){
  y[,i,] = (y[,i,] - mean(y[,i,], na.rm= TRUE))
}
out = JPTA(x, y, niter=5, lambda=0.1, sumabs=0.8, feature.flag=FALSE, timevec=timevec)
```

JPTA.CV *Cross-valiation for Joint Principal Trend Analysis.*

Description

Cross-valiation for Joint Principal Trend Analysis.

Usage

```
JPTA.CV(x, y, timevec = c(1:dim(x)[3]), niter = 6, lambdas = 0.5,
  sumabss = seq(0.5, 1, by = 0.1), topfeaus = c(5:20), topfeavs = c(5:20),
  feature.flag = TRUE, nfolds = 10, seed = NULL, trace = TRUE)
```

Arguments

x	A N * P * T Longitudinal data tensor. N is the number of subjects, P is the number of features, T is the number of time points.
y	A N * Q * T Longitudinal data tensor. Q is the number of features.
timevec	A vector for time points.
niter	Number of iterations.
lambdas	Tuning parameter vector for smoothness of principal trends.
sumabss	Tuning parameter vector for sparsity of features. This vector is used when feature.flag is FALSE.
topfeaus	Tuning parameter vector for the number of nonzero features in u. This vector is used when feature.flag is TRUE.
topfeavs	Tuning parameter vector for the number of nonzero features in v. This vector is used when feature.flag is TRUE.
feature.flag	To indicate the way of feature selection.
nfolds	The number of folds for cross-validation.
seed	The seed argument in set.seed used in the cross-validation function.
trace	Print out progress as iterations are performed. Default is TRUE.

Value

returns a list with following objects.

errmeans	Means of cross-validation errors.
errses	Standard errors of cross-validation errors.

References

Joint Principal Trend Analysis for Longitudinal High-dimensional Data by Yuping Zhang and Zhengqing Ouyang

Examples

```
N = 10
P = 50
Q = 40
T = 10
x = array(NA, dim = c(N,P,T))
y = array(NA, dim = c(N,Q,T))
timevec = seq(from=0, to=2, length.out=T)
p1 = 40
q1 = 30
e=0.1
for(j in 1:N){
 for(i in 1:P){
    x[j, i, ] = ((i>0) & (i<=p1))*sin(pi*timevec) + rnorm(T, 0, e)
 }
 for(i in 1:Q){
   y[j, i, ] = ((i>0) & (i<=q1))*sin(pi*timevec)  + rnorm(T, 0, e)
 }
}
for(i in 1:P){
  x[,i,] = (x[,i,] - mean(x[,i,], na.rm= TRUE))
}
for(i in 1:Q){
  y[,i,] = (y[,i,] - mean(y[,i,], na.rm= TRUE))
}
lambdas = c(0.01, 0.1, 1)
sumabss=seq(from=0.5,to=1, by=0.01)
nfolds = 2
cv.obj = JPTA.CV(x, y, timevec=timevec, niter=5, lambdas=lambdas, sumabs=sumabss, feature.flag=FALSE, nfolds=
```

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