Package 'FactMixtAnalysis'

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Type Package

Title Factor Mixture Analysis with covariates

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Description The package estimates Factor Mixture Analysis via the EM algorithm

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Depends R (>= 2.0.1), MASS, mvtnorm

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R topics documented:

fma *Fitting Factor Mixture Analysis model by the EM algorithm*

Description

fma is used to perform Factor Mixture Analysis (with covariates) on a matrix of data by the Expectation Maximization algorithm.

Usage

```
fma(y, k, r, x.z = NULL, x.w = NULL, it = 15, eps = 1e-04, seed = 4, scaling = FALSE, init = NULL)
```

Arguments

y	A data matrix with n rows representing observations and p columns representing variables.
k	The number of the mixture components.
r	The number of factors.
x.z	A matrix of covariates with n rows representing observations and q columns representing the predictors. These covariates are assumed to linearly affect the factor means.
x.w	A matrix of covariates with n rows representing observations and m columns representing the predictors. These covariates are assumed to differently affect the a priori probability of group membership.
it	The maximum number of iterations of the EM algorithm. By default it is set to 15.
eps	The lower bound for relative variation of the likelihood. It is used as alternative stopping rule for the EM algorithm: if the relative increment of the likelihood is lower than eps the fitting is stopped. The default is 0.0001.
seed	Fix the seed of the running. Default is 4.
scaling	If TRUE (FALSE is default) the data are scaled before fitting the FMA model.
init	A list containing initial values for all (of some) model parameters. If NULL (default) the algorithm starts from random values.

Details

Factor Mixture Analysis is a particular factor model with non Gaussian factors modelled by a multivariate Gaussian mixture. The p observed variables y are modelled in terms of the smaller set of r factors, z, and an additive specific term u: y=Hz+u, where u is assumed to be normally distributed with diagonal variance matrix Psi. H is the factor loading matrix. The model is fitted by the EM algorithm. The code implements also factor mixture model with covariates. Covariates may affect the observed variables into two manners: they are assumed to linearly affect the factor means (x.z) and \ or they can differently affect the a priori probability of group membership (x.w). The default is NULL which means that covariates are not incorporated in the model.

Value

H	The estimated factor loading matrix.
lik	The log-likelihood computed at each iteration of the EM algorithm.
w	A matrix with the estimated weights of the mixture.
Beta	An array of dimension k x r x (q +1) containing the vectors of regression coefficients which are allowed to vary across the components. When no covariate is incorporated into the model, i.e. x.z is NULL, Beta has dimension k x r and it correponds to the estimated component means of the mixture.
phi	A matrix of dimension k x m which contains the coefficients of the covariates affecting the group membership.
sigma	An array of dimension k x r x r which contains the estimated component covariance of the mixture.
psi	The noise diagonal variance matrix.
ph.y	The posterior distribution of each mixture components.
z	The reconstructed factor scores by Thomposon method.
index	The allocation vector.
bic	The BIC value.
aic	The AIC value.
elapsed	Computational time in seconds.

Author(s)

Cinzia Viroli

References

A. Montanari and C. Viroli (2010), Heteroscedastic Factor Mixture Analysis, Statistical Modelling, 10(4), 441-460.

A. Montanari and C. Viroli (2011), Dimensionally reduced mixtures of regression models, Journal of Statistical Planning and Inference, 141, 1744-1752.

C. Viroli (2011), Using factor mixture analysis to model heterogeneity, cognitive structure and determinants of dementia: an application to the Aging, Demographics, and Memory Study, Statistics in Medicine, to appear.

Examples

```
data(crabs)
y=as.matrix(crabs[,4:8])
fit=fma(y,k=2,r=1,it=50,eps=0.0001,scaling=TRUE) # without covariates
misc(fit$index,crabs[,1]) # compute the misclassification error

sex=as.double(crabs[,2])-1
fit=fma(y,k=2,r=1,x.z=sex,x.w=sex,it=50,eps=0.0001,scaling=TRUE) # with covariates
```

fma.em.alg *Internal function to perform the EM algorithm*

Description

An internal function to perform the EM algorithm

mapClass *Internal function to perform the EM algorithm*

Description

An internal function to perform the EM algorithm

misc *Misclassification error*

Description

An internal function which computes the misclassification error between two partitions

Usage

```
misc(classification, truth)
```

Arguments

classification	A numeric or character vector of class labels.
truth	A numeric or character vector of truth class labels. The length of truth should be the same as that of classification.

Value

The misclassification error (a scalar).

See Also

fma

`pi.greco.grad` *Internal function to perform the EM algorithm*

Description

An internal function to perform the EM algorithm

`pi.greco.hess` *Internal function to perform the EM algorithm*

Description

An internal function to perform the EM algorithm

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