Package ‘MatrixMixtures’

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Title  Model-Based Clustering via Matrix-Variate Mixture Models

Version 1.0.0

Description Implements finite mixtures of matrix-variate contaminated normal distributions via expectation conditional-maximization algorithm for model-based clustering, as described in Tomarchio et al. (2020) <arXiv:2005.03861>. One key advantage of this model is the ability to automatically detect potential outlying matrices by computing their a posteriori probability of being typical or atypical points. Finite mixtures of matrix-variate t and matrix-variate normal distributions are also implemented by using expectation-maximization algorithms.

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Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Imports doSNOW, foreach, snow, withr

Depends R (>= 2.10)

NeedsCompilation no

Author Salvatore D. Tomarchio [aut],
Michael P.B. Gallaugher [aut, cre],
Antonio Punzo [aut],
Paul D. McNicholas [aut]

Maintainer Michael P.B. Gallaugher <michael_gallaugher@baylor.edu>

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MatrixMixt

Fitting for Matrix-Variate Mixture Models

Description

Fits, by using expectation-maximization algorithms, mixtures of matrix-variate distributions (normal, t, contaminated normal) to the given data. Can be run in parallel. The Bayesian information criterion (BIC) is used to select the number of groups.

Usage

MatrixMixt(
  X,
  G = 1:3,
  mod,
  tol = 1e-05,
  maxiter = 10000,
  ncores = 1,
  verbose = TRUE
)

Arguments

X  A list of dimension N, where N is the sample size. Each element of the list corresponds to an observed p x r matrix.
G  A vector containing the numbers of groups to be tried.
mod  The matrix-variate distribution to be used for the mixture model. Possible values are: "MVN" for the normal distribution, "MVT" for the t distribution "MVCN" for the contaminated normal.
tol  Threshold for Aitken’s acceleration procedure. Default value is 1e-05.
maxiter  Maximum number of iterations of the algorithms. Default value is 10000.
ncores  A positive integer indicating the number of cores used for running in parallel. Default value is 1.
verbose  Logical indicating whether the running output should be displayed.

Value

A list with the following elements:

flag  Convergence flag (TRUE - success, FALSE - failure).
pig  Vector of the estimated mixing proportions (length G).
nu  Vector of the estimated degree of freedoms (length G). Only for "MVT".
alpha  Vector of the estimated inliers proportions (length G). Only for "MVCN".
etta  Vector of the estimated inflation parameters (length G). Only for "MVCN".
**SimX**

M Array of the mean matrices (p x r x G).
Sigma Array of the estimated row covariance matrices (p x p x G).
Psi Array of the estimated column covariance matrices (r x r x G).
class Vector of estimated data classification.
z Matrix of estimated posterior probabilities (N x G).
v Matrix of estimated inlier probabilities (N x G). Only for "MVCN".
lik Estimated log-likelihood.
BIC Estimated BIC.

**Examples**
```
data(SimX)
res <- MatrixMixt(X = SimX, G = 2, mod = "MVCN")
```

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**Simulated Data**

**Description**
A simulated dataset with 2 groups and 80 observations. Each group consists of 40 observations, 5 of which are outliers.

**Usage**
```
data(SimX)
```

**Format**
An object of class list of length 80.
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