Package 'rcbmm'

November 14, 2020

Type Package

Title Regularized Copula-Based Mixture Model: Estimation and Model Selection

Version 0.1.0

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Description Model-based clustering through regularized copula-based mixture models with arbitrary marginal distributions. Estimation via the expectation-conditional-maximization algorithm. Shrinkage driven methods used to adaptively select optimal correlation structure regulated by a tuning parameter. Model selection based on average silhouette width and BIC.

Encoding UTF-8

LazyData true

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RoxygenNote 7.1.1

Suggests testthat

Imports cluster

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`angles2rho` *Matrix conversion tool*

Description

A tool for converting a matrix of angles to a correlation matrix using Choleksy factor

Usage

```
angles2rho(theta)
```

Arguments

theta	A $(p-1)$ times $(p-1)$ matrix of angles.

Value

A p times p correlation matrix.

See Also

rho2angles

Examples

```
theta <- matrix(rep(0.5, 4), 2, 2)
angles2rho(theta)
```

---

ecm *Model estimation through ECM*

Description

Implements the expectation-conditional-maximization algorithm for a regularized copula-based mixture model given initial parameter values, starting with the expectation step.

Usage

```
ecm(
  x,
  K,
  lambda,
  start = NULL,
  margins,
  trace = TRUE,
  maxit = 1000,
  epsilon = 1e-06,
  dist_mat = NULL
)
```

Arguments

x	A numeric matrix or data frame of observations. Rows correspond to observations and columns correspond to variables.
K	An integer specifying the number of components for which a regularized copula-based mixture model should be fitted.
lambda	A numeric value indicating the value of the tuning parameter for regularization.
start	A list providing the starting values for ECM. The list is produced by fit.rcbmm.
margins	A character vector specifying the marginal distributions of the components in the mixture. The vector must have a length equal to the number of columns in x. Each element must be equal to "norm", "beta" or "gamma".

trace	A logical value indicating if an update regarding the algorithm's progress should be displayed after each iteration.
maxit	A numeric value indicating the maximal number of ECM iterations.
epsilon	A numeric value specifying the tolerance associated with determining when convergence of the ECM algorithm has been achieved.
dist_mat	An object of type dist for calculating silhouette values.

Value

- KThe number of mixture components.
- lambdaThe value of the tuning parameter.
- zA numeric matrix representing the posterior probabilities of membership of the observations after the expectation step of the last iteration of the ECM algorithm. Columns are associated with a mixture component and rows are associated with observations.
- clustersA classification vector indicating the associated cluster of each observation. The classification corresponds to z.
- loglikA numeric vector displaying the penalized log-likelihood after each iteration of ECM.
- param_numberThe number of independent parameters associated with the model.
- BICThe BIC value of the model. Computed using the unpenalized log-likelihood after the last iteration of the ECM algorithm.
- mixing_probsThe mixing proportions associated with the model.
- mvdcA list of objects of class mvdc. Each element of the list corresponds to a mixture component.
- transformationA character value indicating the transformation when identifying starting values. The value is NULL unless lambda=0. See initialize.ECM.
- marginal_paramA list containing the marginal parameters of the model as estimated by ECM. Each element corresponds to a mixture component.
- copula_paramA list containing the copula parameters of the model as estimated by ECM. Each element corresponds to a mixture component.
- copula_param_anglesA list containing the copula parameters of the model re-expressed as angles.
- silhouetteSee information regarding silhouette package. Add reference here.

P2p.angles *Tool for handling angles*

Description

A tool for alternating between a matrix of angles and a vector of angles

Usage

```
P2p.angles(theta)

p2P.angles(angles)
```

Arguments

`theta`	A matrix of angles
`angles`	A vector of angles

Value

A vector of angles

A matrix of angles

`rho2angles` *Matrix conversion tool*

Description

A tool for converting a correlation matrix to a matrix of angles using Cholesky factor

Usage

```
rho2angles(rho_mat)
```

Arguments

`rho_mat`	A p times p correlation matrix to be converted to a matrix of angles.

Value

A $(p-1)$ times $(p-1)$ matrix of angles.

See Also

`angles2rho`

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