Package 'cwm'

February 19, 2015

Type Package

Title Cluster Weighted Models by EM algorithm

Version 0.0.3

Date 2013-03-26

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Depends R (>= 2.14), MASS

Imports methods, stats, matlab, permute

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Description This package estimates gaussian cluster weighted linear regressions by EM algorithm.

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

Date/Publication 2014-01-09 07:26:17

R topics documented:

cwm-package *The package performs cluster weighed modelling assuming normal distribution*

Description

It is a R porting of Original Code from Murphy

Details

Package:	cwm
Type:	Package
Version:	0.0.1
Date:	2013-03-17
License:	GPL

Author(s)

Giorgio A. Spedicato

References

Murphy

Examples

```
library(MASS)
data(geyser)
x=geyser[,1]
y=geyser[,2]
cwmExample=cwrEm(x,y,nc=2)
print(cwmExample)
```

bestPermutation *Function to obtain the best permutation for a classification problem*

Description

When a classificator is run on a set of 1,2,..., k groups it returns a possibile classification schemes, but it does not know the correspondence of original gruoups and given groups. This function return the permutation of original group versus output group that maximizes the trace of the confusion matrix.

Usage

```
bestPermutation(origClass, inizOutput)
```

Arguments

`origClass`	original group identification vector
`inizOutput`	classified group identification vector

Details

Program fails if number of original groups differs from identified groups as in `inizOutput`.

Value

An object of class bestPermutation containing:

`permutation`	Best permutation
`groups`	Classification with respect to best permutation

Note

Shall be improved

Author(s)

Giorgio Spedicato

References

Giorgio Spedicato

See Also

`cwrEm`

Examples

```
#non sense example
x=c(1,2,3)
y=c(1,2,3)
bestPermutation(x,y)
```

`betaplasma` *Betaplasma dataset*

Description

Example dataset

Usage

```
data(betaplasma)
```

Format

A data frame with 315 observations on the following 15 variables.

`id` a numeric vector

`age` a numeric vector

`sex` a factor with levels `F` `M`

`smokestat` a factor with levels `Never` `Former` `Current`

`bmi` a numeric vector

`vituse` a factor with levels `Often` `Not often` `No`

`calories` a numeric vector

`fat` a numeric vector

`fiber` a numeric vector

`alcohol` a numeric vector

`chol` a numeric vector

`betadiet` a numeric vector

`retdiet` a numeric vector

`betacaro` a numeric vector

`retplasma` a numeric vector

Details

Unknown

Source

Unknown

References

unknown

Examples

```
data(betaplasma)
```

cwrEm *Function to estimate Cluster Weighted Regression (CWR) models*

Description

This function estimates CWR models via EM algoritms. An object of class cwrObj is returned containing posterior probabilities and group parameters.

Usage

```
cwrEm(X, Y, nc, max_iter = 1000, thresh = 0.01, cov_typeX = "full",
cov_typeY = "full", clamp_weights = FALSE, create_init_params = TRUE,
cwrStart = NULL, cov_priorX = NULL, cov_priorY = NULL, verbose = TRUE,
regress = TRUE, clamp_covX = FALSE, clamp_covY = FALSE)
```

Arguments

X	X data matrix
Y	Y data matrix
nc	Number of clusters
max_iter	Max iterations. Default 1000
thresh	threshold to assess numerical convergence. Default 0.01
cov_typeX	Type of covariance of groups in X space. May be: "full" (default), "spherical", "diagonal"
cov_typeY	Type of covariance of groups in Y space. May be: "full" (default), "spherical", "diagonal"
clamp_weights	Fixed weights
create_init_params	Creates initial parameters
cwrStart	cwrObj to initialize. If autostart -> NULL
cov_priorX	Prior X covariance if not autostart. See cov_typeX
cov_priorY	Prior Y covariance if not autostart. See cov_typeY
verbose	Prints details of estimation process
regress	Regression model. Default TRUE
clamp_covX	Fixed covX matrix.
clamp_covY	Fixed covY matrix.

Details

This is the main function to estimate CWR models

Value

A CWR object with the following component:

muX	Means matrix of X component
muY	Means matrix of X component
aic	AIC of model
X	X matrix
Y	Y matrix
SigmaY	Array containing Y Variances
SigmaX	Array containing X Variances
weightsY	Matrix containing posterior probabilities

Warning

Estimation can be slow. Convergence is not guaranteeted.

Note

This is the main function. X and Y may be vectors or matrices. cwrObj objects containing parameters and posterior probabilities are returned.

Author(s)

Giorgio Spedicato

References

Murphy

See Also

stepCwr

Examples

```
##using Geyser dataset from package MASS
library(MASS)
data(geyser)
x=geyser[,1]
y=geyser[,2]
cwrEmExample=cwrEm(x,y,nc=2)
print(cwrEmExample)
```

`logLik.cwrObj` *Generic log - likelihood method for cwrObjects*

Description

This function extracts the logLikelihood.

Usage

```
  ## S3 method for class 'cwrObj'
logLik(object, ...)
```

Arguments

`object`	A cwrObj
`...`	Additional data (not yet implemented)

Details

In the future this function will perform log-likelihood calculation directly.

Value

A numeric value

Author(s)

Giorgio A. Spedicato

References

Murphy

See Also

`cwrEm`

Examples

```
## Not run:
library(MASS)
data(geyser, package="MASS")
x=geyser[,1]
y=geyser[,2]
ciao=stepCwr(x,y,nc=2)
logLik(ciao)
## End(Not run)
```

`plot.cwrObj` *S3 generic method for CWR objects*

Description

Generic S3 plot method for CWR objects. It only works when data dimension is R2.

Usage

```
  ## S3 method for class 'cwrObj'
plot(x, ...)
```

Arguments

`x`	CWR object to plot
`...`	Optional argument passed to plot method. Use of dots implemented yet.

Details

Only if data dimension lies in R2 it works.

Value

No value is returned.

Note

S3 method.

Author(s)

Giorgio Spedicato

References

Murphy

See Also

`cwrEm`

Examples

```
## Not run:
data(geyser, package="MASS")
x=geyser[,1]
y=geyser[,2]
ciao=cwrEm(x,y,nc=2)
plot(ciao)

## End(Not run)
```

`predict.cwrObj` *S3 predict method for cwrObj*

Description

Method to return predicted group membership

Usage

```
  ## S3 method for class 'cwrObj'
predict(object, ...)
```

Arguments

`object`	A cwr obj
`...`	additional parameters

Details

Get the max coulmn index of the matrix

Value

A numeric vector

Author(s)

Giorgio A. Spedicato

References

Murphy

See Also

`cwrEm`

Examples

```
data(geyser)
x=geyser[,1]
y=geyser[,2]
ciao=cwrEm(x,y,nc=2)
predict(ciao)
```

`print.cwrObj` *S3 print method for CWR objects*

Description

This method prints estimation summary values.

Usage

```
  ## S3 method for class 'cwrObj'
print(x, ...)
```

Arguments

`x`	CWR object to be printed
`...`	Further arguments. Not implemented yet.

Details

This is a short summary.

Value

This method returns no value.

Note

S3 method.

Author(s)

Giorgio Spedicato

References

Murphy

See Also

`cwrEm`,`plot.cwrObj`

Examples

```
data(geyser)
x=geyser[,1]
y=geyser[,2]
ciao=cwrEm(x,y,nc=2)
print(ciao)
```

`stepCwr` *Function to estimate CWR models via multiple EM algorithm restarts*

Description

This function iteratens nIter times a single estimation of CWR models by `cwrEm` function. Then the one that has best logLikelihood is chosen.

Usage

```
stepCwr(X, Y, nc, prop = 0.1, nIter = 10, changeTrainingSet = FALSE)
```

Arguments

`X`	X data vector
`Y`	Y data vector
`nc`	number of clusters.
`prop`	Proportion of samples. Default 0.1.
`nIter`	Number of iteration. Default 10.
`changeTrainingSet`	Boolean. If TRUE the training set is changed.

Details

This function allows the estimation of models where the structure of the data set lies to probable convergence problems.

Value

A cwr object.

Note

Uses try.

Author(s)

Giorgio Spedicato

References

Murphy, Bettina.

See Also

cwrEm

Examples

```
data(geyser)
x=geyser[,1]
y=geyser[,2]
ciao=stepCwr(x,y,nc=2)
```

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summary.cwrObj *Generic summary S3 method for CWR object.*

Description

This function prints out a detailed summary of CWR object.

Usage

```
  ## S3 method for class 'cwrObj'
summary(object, ...)
```

Arguments

object	cwrObj
...	Further arguments to be passed. Not implemented yet

Details

This function expands output from summary method.

Value

This function returns no value.

Note

Will be converted in S4 method.

Author(s)

Giorgio Spedicato

References

Murphy

See Also

cwrEm, print.cwrObj, plot.cwrObj

Examples

```
data(geyser)
x=geyser[,1]
y=geyser[,2]
ciao=cwrEm(x,y,nc=2)
summary(ciao)
```

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