Package ‘tlemix’

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Type Package

Title Trimmed Maximum Likelihood Estimation

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Depends R (>= 2.10), methods

Suggests mvtnorm, tcltk, flexmix

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Description TLE implements a general framework for robust fitting of finite mixture models. Parameter estimation is performed using the EM algorithm.

License GPL (>= 3)

LazyLoad yes

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TLE - Robust Estimation of Mixture Models using the Fast-TLE algorithm.

Description

TLE implements a general framework for robust fitting of finite mixture models. Parameter estimation is performed using the EM algorithm.

Details

Package: tlemix
Type: Package
Version: 1.0
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License: GPL-2
LazyLoad: yes

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela Maintainer: P. Filzmoser, peter.filzmoser@tuwien.ac.at

References


See Also

flexmix, TLE
Description

Used by TLE-flexmix gaussian, poisson & binomial model (FLXglm.Estimate) driver to get model coefficients.

Usage

coefglm(nmix, family)

Arguments

<table>
<thead>
<tr>
<th>nmix</th>
<th>flexmix model</th>
</tr>
</thead>
<tbody>
<tr>
<td>family</td>
<td>family, can be &quot;gaussian&quot;, &quot;poisson&quot; or &quot;binomial&quot;</td>
</tr>
</tbody>
</table>

Value

List of model coefficients.

Note

This function is only used internally.

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela, <P.Filzmoser@tuwien.ac.at>

See Also

TLG

coeffmclust

Description

Returns coefficients of mclust type estimate. This function is only used internally.

Usage

coeffmclust(nmix)

See Also

TLG
dPois

Arguments

mix Object of type flexmix.

Value

cov Description of 'comp1'
center Description of 'comp2'
prior Description...

Note

This function is only used internally.

Author(s)

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http://www.statistik.tuwien.ac.at/public/filz/

See Also

coef, parameters

dPois Mixture two Poisson Regression Models

Description

In this data set we consider two Poisson regression models with equal mixing proportions and with additional noise. For each Poisson regression model 100 data points are generated according to a Poisson distribution. For the noise we generated 50 points from a uniform distribution over the range of each variate.

Usage

data(dPois)

Format

A data frame with 150 observations on the following 3 variables.

y A numeric vector of y-coordinates
x A numeric vector of x-coordinates

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela, <P.Filzmoser@tuwien.ac.at>
http://www.statistik.tuwien.ac.at/public/filz/
estimate

See Also

TLE

Examples

data(dPois)
str(dPois)
# Example needs some computing time:
# est.tle <- TLE(y~x,"poisson",data=dPois,Density=flexmix.Density,
#    Estimate=flexmix.Estimate,msglvl=1,nc=2,kTrim=200,class="hard")
# tleplot(est.tle,dPois)

estimate

Getter for estimate object of TLE-objects.

Description

This is the estimate function for TLE objects. It returns the estimate slot of TLE objects.

Usage

estimate(object)

Arguments

object Object of class TLE

Value

object Estimate object that is returned by the model driver’s estimate function.

Author(s)

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http://www.statistik.tuwien.ac.at/public/filz/

See Also

TLE
Description

Density function according to current parameter estimate

Usage

flexmix.Density(data, pars, model, family)

Arguments

data Model data, expected to be model.frame with family attribute
pars Model estimate
model The model
family The model family

Value

ll Log-likelihood
c Cluster
cc Cluster as matrix
lik Log-likelihood

Author(s)

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See Also

flexmix
Description

TLE - flexmix gaussian, poisson & binomial model driver. Calculates the density function according to current parameter estimates.

Usage

```r
flexmix.Estimat(e(data, ind = NULL, nc, class = "hard", cluster = NULL, 
niter = 200, minprior = 0.1, model, family, ntry=9)
```

Arguments

data A model.frame containing the data.
ind Data subset
nc Number of clusters
class Classification method used: auto, weighted, hard or random
cluster optional vector of working class memberships
niter Number of iterations
minprior Minimum number of observations per component
model The model
family The model family
ntry Number of trials

Value

Returns flexmix class estimate.

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela

See Also

flexmix
FLXmclust.Density  
*Model driver for flexmix*

Description
Density function according to current parameter estimate

Usage
FLXmclust.Density(data, estim, model, ...)

Arguments
- **data**: Model data, expected to be model.frame with family attribute
- **estim**: Model estimate
- **model**: The model used
- **...**: Any other arguments

Value
- **ll**: Log-likelihood
- **lc**: Log-likelihood by cluster
- **c**: Cluster
- **cc**: Cluster as matrix.
- **lik**: Log-likelihood.

Author(s)
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See Also
flexmix
**FLXmclust.Estimate**  

*Flexible Mixture Estimation*

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**Description**

TLE - flexmix mclust model driver

**Usage**

```
FLXmclust.Estimate(data, ind = NULL, nc, class = "hard", cluster = NULL, 
niter = 200, minprior = 0.1, model = NULL, ntry=9,...)
```

**Arguments**

- `data`: A model.frame containing the data.
- `ind`: Data subset
- `nc`: Number of clusters
- `class`: Classification method used: auto, weighted, hard or random
- `cluster`: optional vector of working class memberships
- `niter`: Number of iterations
- `minprior`: Minimum number of observations per component
- `model`: Model used to extract model formula
- `ntry`: Number of trials
- `...`: Any other arguments

**Value**

Returns flexmix class estimate.

**Author(s)**

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http://www.statistik.tuwien.ac.at/public/filz/

**See Also**

flexmix
gaussData  

*Mixture of two standard normal distributions*

**Description**

Mixture of two standard normal distributions with outliers.

**Usage**

data(gaussData)

**Format**

A data frame with 100 observations on the following 3 variables.

- x  a numeric vector of x-coordinates
- y  a numeric vector of y-coordinates
- c  a numeric vector of cluster memberships

**Author(s)**

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela, &lt;&lt;P.Filzmoser@tuwien.ac.at&gt;&gt;  
http://www.statistik.tuwien.ac.at/public/filz/

**Examples**

data(gaussData)  
str(gaussData)  
# Example needs some computing time:  
# estimate  
# est.tle <- TLE(y~x,"gaussian",data=gaussData,Density=flexmix.Density,  
# Estimate=flexmix.Estimate,msg1v1=1,nc=2,class="hard")  
# plot data indicating clusters  
# tleplot(est.tle,gaussData,main="TLE Scatter Plot")

**McLachlan150**  

*Mixture of two standard normal distributions*

**Description**

This simulated data set are discussed by McLachlan and Peel (2000). The data consists of 100 observations generated from a 3-component bivariate normal mixture model with equal mixing proportions. Fifty outliers, generated from a uniform distribution over the range -10 to 10 on each variate are added to the original data. Thus a sample of 150 observations is obtained.
plot-methods

Usage

data(Mclachlan150)

Format

A data frame with 100 observations on the following 3 variables.

x  a numeric vector of x-coordinates
y  a numeric vector of y-coordinates
c  a numeric vector of cluster memberships

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela, &lt;&lt;P.Filzmoser@tuwien.ac.at&gt;&gt;
http://www.statistik.tuwien.ac.at/public/filz/

References


Examples

data(McLachlan150)
str(McLachlan150)
# Example needs some computing time:
#d &lt;- as.matrix(McLachlan150[,1:2])
#est.tle &lt;- TLE(d~1,"mvtnormal",data=d,Density=FLXmclust.Density,
#   Estimate=FLXmclust.Estimate,msglvl=1,nc=3,class="hard")
#tleplot(est.tle,as.data.frame(d),main="TLE Scatter Plot")

plot-methods  Plot method for TLE-class objects.

Description

This is the plot function for TLE objects. It calls the plot function of the estimate object that is returned by estimate

Usage

## S4 method for signature 'TLE,missing'
plot(x, y=NULL,...)

Arguments

x  Object of class TLE.

y  NULL

...  Additional plot parameters.
Summary method for TLE-class objects.

Description

This is the summary function for TLE objects. It extends the summary functions of the estimate object's class by adding TLE specific results.

Usage

summary(object, ...)

Arguments

object Object of class TLE
... Additional arguments for summary method of the estimate object.

Details

The following list shows the parameters and results that are added to the estimate object's summary function.

- kTrimTrimming parameter.
- nobsNumber of observations.
- noutNumber of outliers.

Value

summary Object of class summary.TLE

Author(s)

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http://www.statistik.tuwien.ac.at/public/filz/
summary.TLE-class

Class "summary.TLE"

Description

Class for summary objects for TLE.

Objects from the Class

Objects can be created by calls of the form new("summary.TLE", ...).

Slots

call: Call of the function.
estimate: Estimate object. Class is determined by the estimation procedure used.
kTrim: Number of observations used.
kStar: Size of the initial random subsample.
maxloglik: Maximum log likelihood.
nobs: Number of observations.
nout: Number of outliers.

Methods

show signature(object = "summary.TLE"): ...

Author(s)

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TLE

Trimmed Likelihood Estimator

Description

TLE implements a general framework for robust fitting of finite mixture models. Parameter estimation is performed using the EM algorithm.

Currently two model drivers are included: flexmix.Density (flexmix.Enstimate) for gaussian, poisson and binomial regression models and FLXmclus.Density (FLXmclus.Estimate) for model based clustering.

Usage

TLE(formula,family,data,kStar=NULL, kTrim=NULL, nit = 10, msglvl = 0,
result = NULL, cit = 9, test = NULL,nc=1, Density, Estimate, ...)
Arguments

formula: An object of class formula.
family: The family to be used.
data: Data frame containing the x and y variables with an optional attribute family being either "gaussian", "poisson" or "binomial"
kStar: k*- size of the initial random subsample
kTrim: Trimming parameter: size of the C-steps random subsample
nit: Number of iterations
msglvl: Level of messages
result: Restart/continuation information
cit: Number of iterations in refinement step
test: Expected true loglikelihood of the model; procedure will be stopped if reached.
nc: Number of components.
Density: Density function of type - function(data,solution,model,family,...)
Estimate: Specific estimation procedure interface: function(data,ind,model,family,...)
...: Arguments to be passed to methods Estimate and Density

Value

Returns an object of class TLE.

Author(s)

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http://www.statistik.tuwien.ac.at/public/filz/

References


See Also

flexmix

Examples

data(gaussData)
# This example takes some seconds:
est.tle <- TLE(y~x,"gaussian",data= gaussData,nit=4, msglvl=1, cit=3,
# Density=flexmix.Density, Estimate=flexmix.Estimate, nc=2)

# Plot the 2-dimensional data
#tleplot(est.tle, gaussData)
Description

Class for TLE results.

Slots

- **estimate**: Estimate object. Class is determined by the estimation procedure used.
- **iterbest**: Iteration with best result.
- **it**: Number of iterations done.
- **maxloglik**: Maximum loglikelihood.
- **indbest**: Index of observations used during the final iteration.
- **indout**: Index of the outliers.
- **tleweights**: Matrix of weights.
- **tlelogliks**: besprechen.
- **tleclusters**: besprechen.
- **kTrim**: Number of observations used.
- **kStar**: Size of the initial random subsample.
- **mcomp**: Number of components.
- **nobs**: Number of observations.
- **stop**: The expected loglikelihood of known model (used for testing).
- **call**: Call of the function.

Methods

- **show**: Prints TLE object.
- **summary**: Generates a summary of a TLE object.
- **tleplot**: Plots a two-dimensional scatterplot with clusters and outliers marked by colors.

Author(s)

P. Neytchev, P. Filzmoser, R. Patnaik, A. Eisl and R. Boubela, 
http://www.statistik.tuwien.ac.at/public/filz/

References

Methods for Function TLE in Package ‘tlemix’

Description

Methods for function TLE in Package ‘tlemix’

Methods

kStar = "numeric", kTrim = "numeric", data = "ANY", nit = "numeric", mslvl = "numeric", result = "ANY", cit = "numeric",
TLE method

tleplot

2D Scatterplot with cluster membership indications

Description

The tleplot method for TLE-class objects gives a scatterplot of 2-dimensional mixture data after a trimmed likelihood estimation was performed.

Usage

tleplot(object, data, ...)

Arguments

object object of class TLE (TLE-class)
data 2-dimensional data frame
... further graphical parameters for the plot function

Details

A 2-dimensional data frame is represented as a scatterplot. For each cluster identified by the method TLE a different colour is used for indication purposes. Outliers are depicted as black triangles.

Author(s)

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