Instruction for Cauchy mixture model

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12/6/2018

1. Determine number of components of Cauchy mixture model

```
library(MMt)
n = 100 # number of sample
mu = c(-1,0,1) # location parameters
sigma = c(0.1, 0.1, 0.1) # scale parameters
lambda = c(0.2, 0.3, 0.5) # weight parameters
seed = 27695 # random seed
m = 10 # initial guess number of components
a = -10 # historgam  begins from
b = 10 # histogram end with
```

2. Create Cauchy mixture data

```
x = rmixcauchy(n, mu, sigma, lambda, seed)
# pmixcauchy(x, mu, sigma, lambda)
# degree of overlapping
DOL(mu, sigma, lambda)
```

```
## [1] 0.1000119
```

```
# the measure of between components dispersion
BCD(mu, sigma, lambda)
```

```
## [1] 0.3199272
```

3. Pdf function of Cauchy

```
cauchy_pdf_function = function(z){1/(pi*(1+z^2))}
```

4. Model result

```
result = NI_QCP(x, m, cauchy_pdf_function, threshold = 0.001, weight_omit = 0.01)
```

```
## Loading required package: changepoint
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Successfully loaded changepoint package version 2.2.2
##  NOTE: Predefined penalty values changed in version 2.2.  Previous penalty values with a postfix 1 i
```

```
## Loading required package: Rsolnp
```

5. Number of components and the estimate of parameters

```
component_estimate = result$k
mu_estimate = result$mu
sigma_estimate = result$sigma
lambda_estimate = result$lambda
```

6. Histogram of data with estimate parameters

```
plot_cauchy(x, mu_estimate, sigma_estimate, lambda_estimate, a, b)
```