Package 'fakmct'

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Type Package

Title Fuzzy Adaptive Resonance Theory K-Means Clustering Technique

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Description
A set of function for clustering data observation with hybrid method Fuzzy ART and K-Means by Sengupta, Ghosh & Dan (2011) <doi:10.1080/0951192X.2011.602362>.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.2

URL <https://github.com/alfinurrahmah/fakmct>

Imports stats

Depends R (>= 3.5.0)

NeedsCompilation no

Repository CRAN

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R topics documented:

`choice_function` *Choice Function*

Description

Calculates the similarity between the input pattern I and all of saved categories.

Usage

```
choice_function(input, category_w, alpha)
```

Arguments

`input`	The input (vector) data observation
`category_w`	The current category weight
`alpha`	Choice parameter alpha > 0

Value

Returns the vector of Tj choice activation function

`fakmct` *Fuzzy Adaptive Resonance Theory (ART) K-Means Clustering Technique*

Description

Clustering data observation with hybrid method Fuzzy ART and K-Means

Usage

```
fakmct(
  input,
  rho,
  alpha,
  beta,
  w_init = NA,
  max_epochs = 1000,
  max_clusters = 1000,
  eps = 10^-6
)
```

Arguments

input	The input (vector) data observation. Should be numeric type of data.
rho	Vigilance parameter in (0,1)
alpha	Choice parameter alpha > 0
beta	Learning rate in (0,1)
w_init	Initial weight
max_epochs	Maximum number of iterations
max_clusters	Maximum number of clusters that allowed
eps	Tolerance with default is 10^-6

Value

labels	clusters label of each observations
size	the size of each clusters that have been formed
clusters	a list of observations in each clusters
centroids	cluster centroids that are calculated by the mean value of the objects in each clusters
weights	the model weight
params	parameters that have been saved in the function
num_clusters	number of cluster that have been formed
running.time	time for running function

Examples

```
library(fakmct)
# Using dataset iris
## load data
data.inputs = iris[,-5]
true.labels = as.numeric(unlist(iris$Species))

## run model data
ex.iris<-fakmct(data.inputs, alpha = 0.3, rho = 0.5, beta = 1, max_epochs = 50, max_clusters = 5)
ex.iris$labels
ex.iris$size
ex.iris$centroids
ex.iris$params

## plot data
plot(data.inputs, col = ex.iris$labels, pch = true.labels,
     main = paste0("Dataset: Iris"))

# Using data IPM 2019

## load simulate data IPM
data("simulatedataIPM")
dt <- simulatedataIPM
```

```
## run model data IPM
mod.fakm<-fakmct(dt, alpha = 0.3, rho = 0.5, beta = 0.1, max_epochs = 50, max_clusters = 5)
mod.fakm$labels
mod.fakm$size
mod.fakm$centroids
mod.fakm$params

## plot data IPM
plot(dt, col = mod.fakm$labels, pch=mod.fakm$labels, main = paste0("Dataset IPM"))
```

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fuzzy_and *Fuzzy And Function*

Description

Fuzzy And Function

Usage

```
fuzzy_and(inputA, inputB)
```

Arguments

inputA	First input vector
inputB	Second input vector. Must be of the same dimension as inputA.

Value

Returns the Fuzzy AND of two input values in a vector.

Examples

```
fuzzy_and(0, -1) # = -1
fuzzy_and(0, 1) # = 0
fuzzy_and(1, 2) # = 1
fuzzy_and(1, 1) # = 1
fuzzy_and(c(0.5, 0.75), c(1.5, 1)) # = c(0.5,0.75)
```

fuzzy_norm *Fuzzy Norm*

Description

Fuzzy Norm

Usage

```
fuzzy_norm(input)
```

Arguments

input	The input (vector) data observation

Value

Returns the Fuzzy norm results of input values

Examples

```
a = c(-1,-3,4,5)
fuzzy_norm(a) # = 13
```

linalg_norm *Linear Algebra for Euclidean distance*

Description

Linear Algebra for Euclidean distance

Usage

```
linalg_norm(inputA, inputB)
```

Arguments

inputA	First input vector
inputB	Second input vector. Must be of the same dimension as inputA.

Value

Returns the calculation results by squares of distances between two input values

Examples

```
a <- c(-3,-2,-1,3,3,2,3)
b <- c(-3,-2,-1,0,1,2,3)
linalg_norm(a,b) # = 3.605
```

match_function *Match function*

Description

Match function

Usage

```
match_function(input, category_w)
```

Arguments

input	The input (vector) data observation
category_w	The current category weight

Value

Returns the vector of match Sj that will be used to check the vigilance parameter

simulatedataIPM *Sample Data for simulate analysis data (Using IPM 2019)*

Description

A real data of Human Development Index (Indeks Pembangunan Manusia) of West Java, Indonesia 2019

Usage

```
simulatedataIPM
```

Format

A tibble with 27 observation as region and 4 column as variables, which are:

"AHH" a value of Life expectancy (Angka Harapan Hidup)

"HLS" a value of Expected Years of Schooling (Harapan Lama Sekolah)

"RLS" a value of Mean Years of Schooling (Rata-rata Lama Sekolah)

"Pengeluaran" a value of Expenditure (Pengeluaran)

Source

https://www.bps.go.id/

update_weight *Update weight*

Description

Update weight

Usage

```
update_weight(input, category_w, beta)
```

Arguments

input	The input (vector) data observation
category_w	The current category weight
beta	Learning rate in (0,1)

Value

Returns the updated weight

vigilance_check *Vigilance check*

Description

Vigilance check

Usage

```
vigilance_check(input, category_w, rho)
```

Arguments

input	The input (vector) data observation
category_w	The current category weight
rho	Vigilance parameter (0,1)

Value

Returns Boolean value (True or False) as a result of checking the match Sj vector passed the vigilance parameter or not

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