

Package ‘kmodR’

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Type Package

Title K-Means with Simultaneous Outlier Detection

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Description An implementation of the 'k-means--' algorithm proposed by Chawla and Gionis, 2013 in their paper, ```k-means-- : A unified approach to clustering and outlier detection. SIAM International Conference on Data Mining (SDM13)"`, <[doi:10.1137/1.9781611972832.21](https://doi.org/10.1137/1.9781611972832.21)> and using 'ordering' described by Howe, 2013 in the thesis, "Clustering and anomaly detection in tropical cyclones". Useful for creating (potentially) tighter clusters than standard k-means and simultaneously finding outliers inexpensively in multidimensional space.

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Suggests testthat

Encoding UTF-8

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Description

An implementation of the 'k-means-' algorithm proposed by Chawla and Gionis, 2013 in their paper, "k-means- : A unified approach to clustering and outlier detection. SIAM International Conference on Data Mining (SDM13)", doi: [10.1137/1.9781611972832.21](https://doi.org/10.1137/1.9781611972832.21) and using 'ordering' described by Howe, 2013 in the thesis, "Clustering and anomaly detection in tropical cyclones".

Useful for creating (potentially) tighter clusters than standard k-means and simultaneously finding outliers inexpensively in multidimensional space.

Usage

```
kmod(
  X,
  k = 5,
  l = 0,
  i_max = 100,
  conv_method = "delta_C",
  conv_error = 0,
  allow_empty_c = FALSE
)
```

Arguments

X	matrix of numeric data or an object that can be coerced to such a matrix (such as a data frame with numeric columns only).
k	the number of clusters (default = 5)
l	the number of outliers (default = 0)
i_max	the maximum number of iterations permissible (default = 100)
conv_method	character: the method used to assess if kmod has converged (default = "delta_C")
conv_error	numeric: the tolerance permissible when assessing convergence (default = 0)
allow_empty_c	logical: set whether empty clusters are permissible (default = FALSE)

Value

kmod returns a list comprising the following components

k the number of clusters specified

l the number of outliers specified

C the set of cluster centroids

C_sizes cluster sizes

C_ss the sum of squares for each cluster

L the set of outliers
L_dist_sqr the distance squares for each outlier to C
L_index the index of each outlier in the supplied dataset
XC_dist_sqr_assign the distance square and cluster assignment of each point in the supplied dataset
within_ss the within cluster sum of squares (excludes outliers)
between_ss the between cluster sum of squares
tot_ss the total sum of squares
iterations the number of iterations taken to converge

Examples

```
# a 2-dimensional example with 2 clusters and 5 outliers
x <- rbind(matrix(rnorm(100, sd = 0.3), ncol = 2),
           matrix(rnorm(100, mean = 1, sd = 0.3), ncol = 2))
colnames(x) <- c("x", "y")
(c1 <- kmod(x, 2, 5))

# cluster a dataset with 8 clusters and 0 outliers
x <- kmod(x, 8)
```

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