

# Package ‘moc.gapbk’

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**Type** Package

**Title** Multi-Objective Clustering Algorithm Guided by a-Priori Biological Knowledge

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**Description** Implements the Multi-Objective Clustering Algorithm Guided by a-Priori Biological Knowledge (MOC-GaPBK) which was proposed by Parraga-Alava, J. et. al. (2018) <[doi:10.1186/s13040-018-0178-4](https://doi.org/10.1186/s13040-018-0178-4)>.

**Depends** R (>= 3.2.5)

**License** GPL-2

**Encoding** UTF-8

**Imports** stats, amap, nsga2R, foreach, parallel, doParallel, utils, doSNOW, doMPI

**RoxygenNote** 7.2.3

**Suggests** knitr, rmarkdown

**NeedsCompilation** no

**Repository** CRAN

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 moc.gabk

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*Perform the Multi-Objective Clustering Algorithm Guided by a-Priori Biological Knowledge (MOC-GaPBK)*


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## Description

This function receives two distance matrices and it performs the MOC-GaPBK.

## Usage

```

moc.gabk(
  dmatrix1,
  dmatrix2,
  num_k,
  generation = 50,
  pop_size = 10,
  rat_cross = 0.8,
  rat_muta = 0.01,
  tour_size = 2,
  neighborhood = 0.1,
  local_search = FALSE,
  cores = 2
)

```

## Arguments

dmatrix1	A distance matrix. It should have the same dimensions that dmatrix2. It is mandatory.
dmatrix2	A distance matrix. It should have the same dimensions that dmatrix1. It is mandatory.
num_k	The number k of groups represented by medoids in each individual. It is mandatory.
generation	Number of generations to be performed by MOC-GaPBK. By default 50.
pop_size	Size of population. By default 10.
rat_cross	Probability of crossover. By default 0.80.
rat_muta	Probability of mutation. By default 0.01.
tour_size	Size of tournament. By default 2.
neighborhood	Percentage of neighborhood. A real value between 0 and 1. It is computed as neighborhood*pop_size to determine the size of neighborhood. By default 0.10.
local_search	A boolean value indicating whether the local searches procedures (PR and PLS) are computed. By default <i>FALSE</i> .
cores	Number of cores to be used to compute the local searches procedures. By default 2.

## Details

MOC-GaPBK is a method proposed by Parraga-Alava, J. et. al. 2018. It carries out the discovery of clusters using NSGA-II algorithm along with Path-Relinking (PR) and Pareto Local Search (PLS) as intensification and diversification strategies, respectively. The algorithm uses as objective functions two versions of the Xie-Beni validity index, i.e., a version for each distance matrix (dmatrix1, dmatrix2). More details about this compute can be found in: <<https://doi.org/10.1186/s13040-018-0178-4>>. MOC-GaPBK yield a set of the best clustering solutions from a multi-objective point of views.

## Value

population	The population of medoids including the objective functions values and order by Pareto ranking and crowding distance values.
matrix.solutions	A matrix with results of clustering. Each column represents a clustering solution available in Pareto front.
clustering	A list containing named vectors of integers from 1:k representing the cluster to which each object is assigned.

## Author(s)

Jorge Parraga-Alava, Marcio Dorn, Mario Inostroza-Ponta

## References

- J. Parraga-Alava, M. Dorn, M. Inostroza-Ponta (2018). *A multi-objective gene clustering algorithm guided by apriori biological knowledge with intensification and diversification strategies*. *BioData Mining*, 11(1) 1-16.
- K. Deb, A. Pratap, S. Agarwal, T. Meyarivan (2002). *A fast and elitist multiobjective genetic algorithm: NSGA-II*. *IEEE Transactions on Evolutionary Computation*, 6(2) 182-197.
- F. Glover (1997). *Tabu Search and Adaptive Memory Programming - Advances, Applications and Challenges*. *Interfaces in Computer Science and Operations Research: Advances in Metaheuristics, Optimization, and Stochastic Modeling Technologies*. 1-75.
- J. Dubois-Lacoste, M. Lopez-Ibanez, Stutzle, T. (2015). *Anytime Pareto local search*. *European Journal of Operational Research*, 243(2) 369-385.

## Examples

```
##Generates a data matrix of dimension 50X20

library("amap")
library("moc.gabk")

x <- matrix(runif(50 * 20, min = -5, max = 10), nrow = 50, ncol = 20)

##Compute two distance matrices

dmatrix1<- as.matrix(amap::Dist(x, method = "euclidean"))
```

```
dmatrix2<- as.matrix(omap::Dist(x, method = "correlation"))  
  
##Performs MOC-GaPBK with 5 cluster  
  
example<-moc.gabk(dmatrix1, dmatrix2, 5)  
  
example$population  
example$matrix.solutions  
example$clustering
```

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