

# Package ‘GIC’

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**Type** Package

**Title** A General Iterative Clustering Algorithm

**Version** 1.0.0

**Description** An iterative algorithm that improves the proximity matrix (PM) from a random forest (RF) and the resulting clusters as measured by the silhouette score.

**License** GPL-3

**Encoding** UTF-8

**Imports** randomForest,cluster,ggplot2

**RoxygenNote** 7.1.2

**NeedsCompilation** no

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**Repository** CRAN

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GIC

*A General Iterative Clustering Algorithm*

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**Description**

An algorithm improves the proximity matrix (PM) from a random forest (RF) and the resulting clusters from an arbitrary cluster algorithm, such as PAM, as measured by the `silhouette_score`. The first PM that uses unlabeled data is produced by one of many ways to provide psuedo labels for a RF. After running a cluster program on the resulting initial PM, cluster labels are obtained. These are used as labels with the same feature data to grow a new RF yielding an updated proximity matrix. This is entered into the clustering program and the process is repeated until convergence.

**Usage**

```
GIC(data,cluster,initial="breiman",ntree=500,
     label=sample(1:cluster,nrow(data),replace = TRUE))
```

**Arguments**

<code>data</code>	an input dataframe without label
<code>cluster</code>	The number of clusters in the solution
<code>initial</code>	A method to calculate initial cluters to begin the iteration (default <code>breiman</code> ). <code>breiman</code> : using Breimans' unsupervised method to find initial cluters, or <code>purpose</code> : using Siegel and her colleagues' purposeful clustering method to find initial cluters
<code>ntree</code>	the number of trees (default 500).
<code>label</code>	A truth set of labels, only required if <code>purpose</code> is used as the method to find the initial PM

**Details**

This code include Breimans' unsupervised method and Siegel and her colleagues' purposeful clustering method to calculate initial labels To input user specified initial labels, please use the function `initial`

**Value**

An object of class GIC, which is a list with the following components:

<code>PAM</code>	output final PAM information
<code>randomforest</code>	output final randomforest information
<code>clustering</code>	A vector of integers indicating the cluster to which each point is allocated.
<code>silhouette_score</code>	A value of mean silhouette score for clusters
<code>plot</code>	A scatter plot which X-axis, y-axis, and color are first important feature, second important feature, and final clusters, respectively.

## References

Breiman, L. (2001), Random Forests, *Machine Learning* 45(1), 5-32.

Siegel, C.E., Laska, E.M., Lin, Z., Xu, M., Abu-Amara, D., Jeffers, M.K., Qian, M., Milton, N., Flory, J.D., Hammamieh, R. and Daigle, B.J., (2021). Utilization of machine learning for identifying symptom severity military-related PTSD subtypes and their biological correlates. *Translational psychiatry*, 11(1), pp.1-12.

## Examples

```
data(iris)
##Using breiman's method
rs=GIC(iris[,1:4],3,ntree=100)
print(rs$clustering)
```

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iteration

*A General Iterative Clustering Algorithm*

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## Description

An algorithm that improves the proximity matrix (PM) from a random forest (RF) and the resulting clusters from an arbitrary cluster algorithm as measured by the silhouette score. The initial PM, that uses unlabeled data, is produced by one of many ways to provide psuedo labels for a RF. After running a cluster program on the resulting initial PM, cluster labels are obtained. These are used as labels with the same feature data to grow a new RF yielding an updated proximity matrix. This is entered into the clustering program and the process is repeated until convergence.

## Usage

```
iteration(data,initiallabel,ntree=500)
```

## Arguments

data	an input dataframe without label
initiallabel	a vector of label to begin with
ntree	the number of trees (default 500).

## Details

This code requires initial labels as input, which can be obtained by any method of the users choice. As an alternative, Breimans' unsupervised method or Siegel and her colleagues' purposeful clustering method to obtain initial labels, use the function GIC

**Value**

An object of class `iteration`, which is a list with the following components:

<code>PAM</code>	output final PAM information
<code>randomforest</code>	output final randomforest information
<code>clustering</code>	A vector of integers indicating the cluster to which each point is allocated.
<code>silhouette_score</code>	A value of mean silhouette score for clusters
<code>plot</code>	A scatter plot which X-axis, y-axis, and color are first important feature, second important feature, and final clusters, respectively.

**References**

Breiman, L. (2001), Random Forests, *Machine Learning* 45(1), 5-32.

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**Examples**

```
data(iris)
##Using KMEANS to find initial label
cl=kmeans(iris[,1:4],3)
##Doing GIC to find final clustering
rs=iteration(iris[,1:4],cl$cluster,ntree=100)
print(rs$clustering)
```

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