Package ‘ConsensusClusterPlus’

October 2, 2018

Type Package

Imports Biobase, ALL, graphics, stats, utils, cluster

Title ConsensusClusterPlus

Version 1.44.0

Date 2015-12-29

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Description algorithm for determining cluster count and membership by stability evidence in unsupervised analysis

License GPL version 2

biocViews Software, Clustering

git_url https://git.bioconductor.org/packages/ConsensusClusterPlus

git_branch RELEASE_3_7

git_last_commit 2fbc71b

git_last_commit_date 2018-04-30

Date/Publication 2018-10-02

R topics documented:

ConsensusClusterPlus

Description

ConsensusClusterPlus function for determining cluster number and class membership by stability evidence. calcICL function for calculating cluster-consensus and item-consensus.
Usage

ConsensusClusterPlus(
  d=NULL, maxK = 3, reps=10, pItem=0.8, pFeature=1, clusterAlg="hc", title="untitled_consensus_cluster",
  innerLinkage="average", finalLinkage="average", distance="pearson", ml=NULL,
  tmyPal=NULL, seed=NULL, plot=NULL, writeTable=FALSE, weightsItem=NULL, weightsFeature=NULL, verbose=F,
)

calcICL(res,title="untitled_consensus_cluster",plot=NULL,writeTable=FALSE)

Arguments

d data to be clustered; either a data matrix where columns=items/samples and rows are features. For example, a gene expression matrix of genes in rows and microarrays in columns, or ExpressionSet object, or a distance object (only for cases of no feature resampling)
maxK integer value. maximum cluster number to evaluate.
reps integer value. number of subsamples.
pItem numerical value. proportion of items to sample.
pFeature numerical value. proportion of features to sample.
clusterAlg character value. cluster algorithm. 'hc' heirarchical (hclust), 'pam' for partitioning around medoids, 'km' for k-means upon data matrix, 'kmdist' for k-means upon distance matrices (former km option), or a function that returns a clustering. See example and vignette for more details.
title character value for output directory. Directory is created only if plot is not NULL or writeTable is TRUE. This title can be an absoulute or relative path.
innerLinkage heirarchical linkage method for subsampling.
finalLinkage heirarchical linkage method for consensus matrix.
distance character value. 'pearson': (1 - Pearson correlation), 'spearman' (1 - Spearman correlation), 'euclidean', 'binary', 'maximum', 'canberra', 'minkowski' or custom distance function.
ml optional. prior result, if supplied then only do graphics and tables.
tmyPal optional character vector of colors for consensus matrix
seed optional numerical value. sets random seed for reproducible results.
plot character value. NULL - print to screen, 'pdf', 'png', 'pngBMP' for bitmap png, helpful for large datasets.
writeTable logical value. TRUE - write output and log to csv.
weightsItem optional numerical vector. weights to be used for sampling items.
weightsFeature optional numerical vector. weights to be used for sampling features.
res result of consensusClusterPlus.
verbose boolean. If TRUE, print messages to the screen to indicate progress. This is useful for large datasets.
corUse optional character value. specifies how to handle missing data in correlation distances 'everything','pairwise.complete.obs', 'complete.obs' see cor() for description.
Details

ConsensusClusterPlus implements the Consensus Clustering algorithm of Monti, et al (2003) and extends this method with new functionality and visualizations. Its utility is to provide quantitative stability evidence for determining a cluster count and cluster membership in an unsupervised analysis.

ConsensusClusterPlus takes a numerical data matrix of items as columns and rows as features. This function subsamples this matrix according to pItem, pFeature, weightsItem, and weightsFeature, and clusters the data into 2 to maxK clusters by clusterArg clusteringAlgorithm. Agglomerative hierarchical (hclust) and kmeans clustering are supported by an option see above. For users wishing to use a different clustering algorithm for which many are available in R, one can supply their own clustering algorithm as a simple programming hook - see the second commented-out example that uses divisive hierarchical clustering.

For a detailed description of usage, output and images, see the vignette by: openVignette().

Value

ConsensusClusterPlus returns a list of length maxK. Each element is a list containing consensusMatrix (numerical matrix), consensusTree (hclust), consensusClass (consensus class assignments). ConsensusClusterPlus also produces images.


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References


Examples

# obtain gene expression data
library(Biobase)
data(geneData)
d=geneData
#median center genes
dc = sweep(d,1, apply(d,1,median))

# run consensus cluster, with standard options
rcc = ConsensusClusterPlus(dc,maxK=4,reps=100,pItem=0.8,pFeature=1,title="example",distance="pearson",clusterAlg="hc")

# same as above but with pre-computed distance matrix, useful for large datasets (>1,000's of items)
dt = as.dist(1-cor(dc,method="pearson"))
rcc2 = ConsensusClusterPlus(dt,maxK=4,reps=100,pItem=0.8,pFeature=1,title="example2",distance="pearson",clusterAlg="hc")

# k-means clustering
rcc3 = ConsensusClusterPlus(d, maxK=4, reps=100, pItem=0.8, pFeature=1, title="example3", distance="euclidean", clusterAlg="km")

### partition around medoids clustering with manhattan distance
rcc4 = ConsensusClusterPlus(d, maxK=4, reps=100, pItem=0.8, pFeature=1, title="example3", distance="manhattan", clusterAlg="pam")

### example of custom distance function as hook:
myDistFunc = function(x) { dist(x, method="manhattan")}
rcc5 = ConsensusClusterPlus(d, maxK=4, reps=100, pItem=0.8, pFeature=1, title="example3", distance="myDistFunc", clusterAlg="pam")

## example of clusterAlg as hook:
#library(cluster)
#dianaHook = function(this_dist, k){
#  tmp = diana(this_dist, diss=TRUE)
#  assignment = cutree(tmp, k)
#  return(assignment)
#}
#rcc6 = ConsensusClusterPlus(d, maxK=6, reps=25, pItem=0.8, pFeature=1, title="example", clusterAlg="dianaHook")

## ICL
resICL = calcICL(rcc, title="example")
Index

*Topic methods
  ConsensusClusterPlus, 1

calcICL (ConsensusClusterPlus), 1
ConsensusClusterPlus, 1