Package ‘ibh’

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Title Interaction Based Homogeneity for Evaluating Gene Lists
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Author Kircicegi Korkmaz, Volkan Atalay, Rengul Cetin Atalay.
Maintainer Kircicegi Korkmaz <e102771@ceng.metu.edu.tr>
Description This package contains methods for calculating Interaction Based Homogeneity to evaluate fitness of gene lists to an interaction network which is useful for evaluation of clustering results and gene list analysis. BioGRID interactions are used in the calculation. The user can also provide their own interactions.
License GPL (>= 2)
bioCViews QualityControl, DataImport, GraphAndNetwork, NetworkEnrichment

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Description

This package contains methods for evaluating Interaction Based Homogeneity for lists of genes. Given a gene list of n genes, we first form an adjacency matrix A whose rows and columns are genes in the list where

\[ A_{ij} = 1 \]

if genes i and j have an interaction in the network and

\[ A_{ij} = 0 \]

otherwise. The Interaction Based Homogeneity for a gene list

\[ L = \{g_1, g_2, ..., g_n\} \]

of size n is then calculated as:

\[ \text{InteractionBasedHomogeneity}(L) = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} A_{ij}}{n^2} \]

Details

- Package: ibh
- Type: Package
- Version: 1.0.0
- Date: 2011-01-19
- License: GPL (version 2 or newer)
- LazyLoad: yes

The user can provide his own interaction list or can use predefined gene lists which are created based on the BioGRID Interactions. Both gene lists and result of clustering methods such as kmeans or hclust can be used as inputs. Entrez identifiers, unique ids (systematic names) or official names can be used as gene/protein identifiers.

Author(s)

Kircicegi Korkmaz <e102771@ceng.metu.edu.tr>, Volkan Atalay <volkan@ceng.metu.edu.tr>, Rengul Cetin-Atalay <rengul@bilkent.edu.tr>

Maintainer: Kircicegi Korkmaz <e102771@ceng.metu.edu.tr>

References


Examples

require(simpIntLists)
findEntry

Find the index of an entry in an interaction list

Description

Find the index of an entry in an interaction list, used mostly for internal purposes

Usage

findEntry(interactionList, name)

Arguments

interactionList

list of interactions

name

name to be searched in the interaction list

Value

an integer that is the index of name in the interaction list
ibh

Calculate interaction based homogeneity for the given gene list according to the interaction list

Description

This function calculates interaction based homogeneity of the given gene list according to the interaction list.

Usage

ibh(interactionList, geneList)

Arguments

interactionList
List containing the interactions. For each gene/protein, there is an entry in the list with "name" containing name of the gene/protein and "interactors" containing the list of genes/proteins interacting with it.

geneList
List of genes/proteins for which interaction based homogeneity is evaluated.

Value

Interaction based homogeneity value as float

Author(s)

Kircicegi Korkmaz

See Also

ibhForMultipleGeneLists

Examples

require(simpIntLists)
data(ArabidopsisBioGRIDInteractionEntrezId)
findEntry(ArabidopsisBioGRIDInteractionEntrezId, 832179)

geneList <- list(839226, 817241, 824340, 832179, 818561, 831145, 838782, 826404);
ibh(ArabidopsisBioGRIDInteractionEntrezId, geneList);
ibhBioGRID

Calculate interaction based homogeneity for a gene list according to the BioGRID Interactions

Description

This function calculates interaction-based homogeneity for a gene list according to the BioGRID Interactions for seven organisms: Arabidopsis thaliana (arabidopsis), Caenorhabditis elegans (c.elegans), Drosophila melanogaster (fruitFly), Homo sapiens (human), Mus musculus (mouse), Saccharomyces cerevisiae (yeast), Schizosaccharomyces pombe (s.pombe). Unique IDs (systematic names), official names, or Entrez IDs can be used as identifier type.

Usage

ibhBioGRID(geneList, organism, idType = "EntrezId")

Arguments

geneList list of genes/proteins for which interaction based homogeneity is evaluated
organism Organism name. Can be one of 'arabidopsis', 'c.elegans', 'fruitFly', 'human', 'mouse', 'yeast', 's.pombe'.
idType Type of identifier used. Can be one of 'EntrezId', 'Official' and 'UniqueId'

Value

Float representing interaction based homogeneity for each list

References


See Also

ibh, ibhForMultipleGeneListsBioGRID

Examples

require(simpIntLists)
geneList <- list(839226, 817241, 824340, 832179, 818561, 831145, 838782, 826404);
ibhBioGRID(geneList, organism="arabidopsis", idType = "EntrezId");
geneList <- list("YJR151C", "YBL032W", "YAL040C", "YBL072C", "YCL050C", "YCR009C");
ibhBioGRID(geneList, organism="yeast", idType = "UniqueId");
ibhClusterEval  
Evaluate clustering with interaction based homogeneity

Description

This function calculated interaction based homogeneity for a clustering result.

Usage

ibhClusterEval(cluster, allGenesList, interactionList)

Arguments

cluster  
result of clustering

allGenesList  
list of genes in the same order of clustering object

interactionList  
list containing the interactions. For each gene/protein, the is an entry in the list with "name" containing name of the gen/protein and "interactors" containing the list of genes/proteins interacting with it.

Value

A vector of floats representing interaction based homogeneity for each cluster.

Examples

require(yeastCC)
require(stats)
data(yeastCC)
require(simpIntLists)
data(YeastBioGRIDInteractionUniqueId)

subset <- exprs(yeastCC)[1:50,]
d <- dist(subset, method="euclidean")
k <- kmeans(d, 3);
ibhClusterEval(k$cluster, rownames(subset),
YeastBioGRIDInteractionUniqueId)

ibhClusterEvalBioGRID  
Evaluate clustering with interaction based homogeneity using BioGRID Interactions

Description

This function calculated interaction based homogeneity for a clustering result to the BioGRID Interactions for seven organisms: Arabidopsis thaliana (arabidopsis), Caenorhabditis elegans (c.elegans), Drosophila melanogaster (fruitFly), Homo sapiens (human), Mus musculus (mouse), Saccharomyces cerevisae (yeast), Schizosaccharomyces pombe (s.pombe). Unique ids (systematic names), official names or Entrez ids can be used as identifier type.
ibhForMultipleGeneLists

Usage

ibhClusterEvalBioGRID(cluster, allGenesList, organism, idType = "EntrezId")

Arguments

cluster result of clustering
allGenesList list of genes in the same order of clustering object
organism organism name, can be one of 'arabidopsis', 'c.elegans', 'fruitFly', 'human', 'mouse', 'yeast', 's.pombe'.
idType type of identifier, can be one of 'EntrezId', 'Official' and 'UniqueId'.

Value

A vector of floats representing interaction based homogeneity for each cluster

References


Examples

require(yeastCC)
require(stats)
require(simpIntLists)
data(yeastCC)
subset <- exprs(yeastCC)[1:50,]
d <- dist(subset,method="euclidean")
k <- kmeans(d, 3);
ibhClusterEvalBioGRID(k$cluster, rownames(subset), organism="yeast", idType="UniqueId")

ibhForMultipleGeneLists

Calculate interaction based homogeneity for multiple gene lists according to the interaction list

Description

This function calculated interactions based homogeneity for multiple gene lists according to the interaction list

Usage

ibhForMultipleGeneLists(interactionList, listofGeneList)
ibhForMultipleGeneListsBioGRID

Calculate interaction based homogeneity for multiple gene lists according to the BioGRID Interactions

Description

This function calculated interactions based homogeneity for multiple gene lists according to the BioGRID Interactions for seven organisms: Arabidopsis thaliana (arabidopsis), Caenorhabditis elegans (c.elegans), Drosophila melanogaster (fruitFly), Homo sapiens (human), Mus musculus (mouse), Saccharomyces cerevisiae (yeast), Schizosaccharomyces pombe (s.pombe). Unique ids (systematic names), official names or Entrez ids can be used as identifier type.

Usage

```r
ibhForMultipleGeneListsBioGRID(listGeneList, organism, idType = "EntrezId")
```
**Arguments**

`listOfGeneList` List of list of genes/proteins for which interaction based homogeneity is evaluated.

`organism` Organism name. Can be one of 'arabidopsis', 'c.elegans', 'fruitFly', 'human', 'mouse', 'yeast', 's.pombe'.

`idType` Type of identifier. Can be one of 'EntrezId', 'Official' and 'UniqueId'.

**Value**

A vector of floats representing interaction based homogeneity for each list.

**References**


**See Also**

`ibh`

**Examples**

```r
require(simpIntLists)
listOfGeneList <- list(list(839226, 817241, 824340, 832179, 818561, 831145, 838782, 826404),
                        list(832018, 839226, 839226, 838824))
ibhForMultipleGeneListsBioGRID(listOfGeneList,
                                organism="arabidopsis", idType = "EntrezId")
listOfGeneList <- list(list("YJR151C", "YBL032W", "YAL040C", "YBL072C", "YCL050C", "YCR009C"),
                        list("YDR063W", "YDR074W", "YDR080W", "YDR247W", "YGR183C", "YHL033C"), list("YOL068C", "YOL015W", "YOL009C", "YOL004W", "YOR065W" ))
ibhForMultipleGeneListsBioGRID(listOfGeneList,
                                organism="yeast", idType = "UniqueId")
```

**Usage**

```r
readDirectedInteractionsFromCsv(fileName, sepValue, headerValue)
```
readUndirectedInteractionsFromCsv

Arguments

fileName
name of the CSV file containing the interactions

sepValue
the same as "sep" in read.csv function, it is the value of the field separator character.

headerValue
whether the CSV file has a header or not, TRUE if the file has a header row, FALSE otherwise

Value

A list containing the interactions. For each gene/protein, there is an entry in the list with "name" containing name of the gene/protein and "interactors" containing the list of genes/proteins interacting with it.

Author(s)

Kircicegi Korkmaz

Examples

```r
## interactionList <- readDirectedInteractionsFromCsv("Arabidopsis_BioGRID-1.72.entrezid.csv"," ", FALSE);
```

Description

This function reads the undirected interactions from a csv file and creates the interaction list. The csv file must contain two names: first gene/protein name, second the interactor.

Usage

`readUndirectedInteractionsFromCsv(fileName, sepValue, headerValue)`

Arguments

fileName
name of the CSV file containing the interactions

sepValue
the same as "sep" in read.csv function, it is the value of the field separator character.

headerValue
whether the CSV file has a header or not, TRUE if the file has a header row, FALSE otherwise

Value

A list containing the interactions. For each gene/protein, there is an entry in the list with "name" containing name of the gene/protein and "interactors" containing the list of genes/proteins interacting with it.
Author(s)

Kircicegi Korkmaz

Examples

```r
## interactionList <- readUndirectedInteractionsFromCsv("Arabidopsis_BioGRID-3.1.72.entrezid.csv", ",", FALSE)
```
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