

# Package ‘PFP’

June 28, 2022

**Type** Package

**Title** Pathway Fingerprint Framework in R

**Version** 1.4.0

**biocViews** Software, Pathways, RNASeq

**Description** An implementation of the pathway fingerprint framework that introduced in paper “Pathway Fingerprint: a novel pathway knowledge and topology based method for biomarker discovery and characterization”. This method provides a systematic comparisons between a gene set (such as a list of differentially expressed genes) and well-studied “basic pathway networks” (KEGG pathways), measuring the importance of pathways and genes for the gene set. The package is helpful for researchers to find the biomarkers and its function.

**Depends** R (>= 4.0)

**Imports** graph, igraph, KEGGgraph, clusterProfiler, ggplot2, plyr, tidy, magrittr, stats, methods, utils

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---

calc\_PFP\_score            *Get the pathway fingerprint of a gene\_list*

---

### Description

It can evaluate the performance of a gene list in the pathway networks.

### Usage

```
calc_PFP_score(  
  genes,  
  PFPRefnet,  
  lambda = 0.5,  
  coeff1 = 1,  
  coeff2 = 0.1,  
  statistic = TRUE,  
  bg_genelist = NULL,  
  adjust_method = "BH"  
)
```

### Arguments

genes,	a vector of characters
PFPRefnet,	A PFPRefnet class
lambda,	a numeric, the coefficient for keeping balance between the node_score and edge_score in PFP model
coeff1,	a numeric, the weight coefficient for directly connected score in PFP model
coeff2,	a numeric, the weight coefficient for indirectly connected score in PFP model
statistic,	a logical, whether to do the statistical test
bg_genelist,	a vector of characters, background gene set for the statistical test
adjust_method,	statistic test method for adjust the p_value. It could be "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".

### Details

The main part of pathway fingerprint. PFP is used to evaluate the performance of a gene\_list in some pathway networks by considering the genes' topological location in a pathway. Then we can get every gene's score and the pathway score is caculated by sum all genes' score. All pathways' scores combine the pathway fingerprint.

### Value

The score of PFP

**Examples**

```
data(gene_list_hsa)
data(PFPRefnet_hsa)
PFP <- calc_PFP_score(gene_list_hsa,PFPRefnet_hsa)
```

---

data_std	<i>A matrix of counts A dataset of gene expression profile, a large matrix with 21 rows and 2603 columns.</i>
----------	---

---

**Description**

A matrix of counts A dataset of gene expression profile, a large matrix with 21 rows and 2603 columns.

**Format**

Gene list obtained by differential gene analysis

**Examples**

```
data(data_std)
```

---

genes_score-methods	<i>The score of genes in PFP class</i>
---------------------	--

---

**Description**

This function extract the detail scores of every gene in the gene\_list by specific condition.

**Usage**

```
genes_score(
  object,
  index = NULL,
  index_type = c("pathway_id", "pathway_name", "slice")
)

## S4 method for signature 'PFP'
genes_score(
  object,
  index = NULL,
  index_type = c("pathway_id", "pathway_name", "slice")
)
```

### Arguments

object, PFP class  
index, character, indicating the groups to subset.  
index\_type, "pathway\_id", "pathway\_name", "slice"

### Value

a named vector of numeric scores

### See Also

[PFP-class](#)

### Examples

```
data(PFP_test1)  
genes_score <- genes_score(PFP_test1)
```

---

gene_list_hsa	<i>A gene list of human gene_list_hsa is a array of 40 genetic ENTREZID.</i>
---------------	--

---

### Description

A gene list of human gene\_list\_hsa is a array of 40 genetic ENTREZID.

### Format

Gene list obtained by differential gene analysis

### Examples

```
data(gene_list_hsa)
```

---

get\_asso\_net                      *merge the edges\_coexp and edges\_kegg*

---

### Description

This function will remove the co-expressed edges in edges\_coexp which also emerge in edges\_kegg.

### Usage

```
get_asso_net(
  edges_coexp,
  edges_kegg,
  file_dir = NULL,
  if_symbol = TRUE,
  trans_fun = trans_edges_id,
  from_type = "ENTREZID",
  to_type = "SYMBOL",
  gene_info_db = NULL
)
```

### Arguments

edges_coexp,	a data.frame whose colnames is "source", "target", "weight", "pathway", "edge_type".
edges_kegg,	a data.frame whose colnames is "source", "target", "weight", "pathway", "edge_type".
file_dir,	a character, the root to save the result of nodes & edges.
if_symbol,	a logical, whether to translate the gene id type. Default is TRUE.
trans_fun,	a function, when if_symbol is <i>TRUE</i> , it will use the trans_fun function to translate the gene ids. Default is trans_edges_id.
from_type,	a character, the parameter in trans_fun. It is the type of gene ID, "ENSEMBL", "GO", "SYMBOL" and so on.
to_type,	a character, the parameter in trans_fun. It is the type of gene ID, "ENSEMBL", "GO", "SYMBOL" and so on.
gene_info_db,	an AnnotationDb-object for gene annotation, such as "org.Hs.eg.db".

### Details

This function will remove the co-expressed edges in edges\_coexp which also emerge in edges\_kegg. It will return a list contains two data.frames. One is the merged data. Another is the nodes information of the edges.

### Value

the nodes information of the edges.

## Examples

```
data(PFPRefnet_hsa)
data(data_std)
data(PFP_test1)
rank1 <- rank_PFP(object = PFP_test1, total_rank = TRUE)
pathway_select <- refnet_info(rank1)[1, "id"]
gene_test <- pathways_score(rank1)$genes_score[[pathway_select]]$ENTREZID
edges_coexp <- get_exp_cor_edges(gene_test, data_std)
gene_list2 <- unique(c(edges_coexp$source, edges_coexp$target))
edges_kegg <- get_bg_related_kegg(gene_list2,
                                PFPRefnet=PFPRefnet_hsa,
                                rm_duplicated = TRUE)
```

---

get\_bg\_related\_kegg    *get\_bg\_related\_kegg*

---

## Description

This function will select all genes in all kegg pathways which are directly connected with the genes in `gene_list`

## Usage

```
get_bg_related_kegg(gene_list, PFPRefnet, rm_duplicated = FALSE)
```

## Arguments

`gene_list`,        a vector of characters, refers to genes ids  
`PFPRefnet`,        an object of PFPRefnet class, it contains all kegg pathways.  
`rm_duplicated`,    a logical, whether to remove the duplicated kegg edges in different pathways.  
                    Defalut is *FALSE*

## Details

It will return a data.frame which can be translated a graph or network. In the data.frame, `source` refers to the genes in `gene_list`, `target` refers to the directly connected genes in kegg, `weight` is 0.5, no real means, `pathway` refers to the pathway which the edge emerge and `edge_type` is "kegg". Note, if `rm_duplicated` is *FALSE*, it may return many duplicated edges, which will be complex when plotting a network. If `rm_duplicated` is *TRUE*, it will retain the first pathway which contains the duplicated edge.

## Value

the related kegg network.

**Examples**

```
data(PFPRefnet_hsa)
data(gene_list_hsa)
edges_kegg <- get_bg_related_kegg(gene_list_hsa,
                                 PFPRefnet=PFPRefnet_hsa,
                                 rm_duplicated = TRUE)
```

---

```
get_exp_cor_edges      get co-expression genes
```

---

**Description**

compute the correlation coefficient of gene expression data, return the most related genes

**Usage**

```
get_exp_cor_edges(
  gene_list,
  data_std,
  method = "spearman",
  num = 5,
  cor_threshold = NULL
)
```

**Arguments**

gene_list,	a vector of characters
data_std,	a matrix of data, such as gene expression data, whose rownames are gene names or ids and colnames are sample names
method,	a character, which method to compare the correlation of gene expression data it could be "pearson", "kendall", "spearman", "spearman" is default
num,	an integer, the top number of co-expressed genes to choose, 5 is default
cor_threshold,	a numeric, the threshold of the correlation coefficient to choose, default is <i>NULL</i>

**Details**

This function computes the correlation coefficient of gene expression data between `gene_list` and `data_std`, it will return a `data.frame` which can be translated a graph or network. In the `data.frame`, `source` refers to the genes in `gene_list`, `target` refers to the top coexpressed genes, `weight` refers to the correlated coefficient of genes in `source` and `target`, `pathway` is "uncertain" and `edge_type` is "coexp". Note, when choosing the top co-expressed genes, we will use the `num` param if the `cor_threshold` param is *NULL*. If not, we will choose the `cor_threshold` param.

**Value**

the coexp of edges.



### Examples

```
data(data_std)
data(PFP_test1)
rank1 <- rank_PFP(object = PFP_test1, total_rank = TRUE)
pathway_select <- refnet_info(rank1)[1, "id"]
gene_test <- pathways_score(rank1)$genes_score[[pathway_select]]$ENTREZID
edges_coexp <- get_exp_cor_edges(gene_test, data_std)
```

---

`get_pathway_info`      *get pathway info of a species in KEGG*

---

### Description

This function helps get pathway info of a species in KEGG.

### Usage

```
get_pathway_info(spec)
```

### Arguments

`spec`,                    a character, refers to the species in KEGG. hsa, mmu...

### Details

, get pathway info of a species in KEGG. It will return a data.frame.

### Value

a data.frame whose colnames contains "index", "id", "name" and "group"

### Examples

```
pathway_info <- get_pathway_info("hsa")
```

---

get_PFPRefnet	<i>get a PFPRefnet for a species</i>
---------------	--------------------------------------

---

**Description**

This function helps update the latest PFPRefnet object for a species

**Usage**

```
get_PFPRefnet(spec, file_root = ".", test_mode = FALSE)
```

**Arguments**

spec,	a character, refers to the species in KEGG. hsa, mmu...
file_root,	a character, file dir to download the kgml files.
test_mode,	please set whether to test this function.

**Details**

, gupdate the latest PFPRefnet object for a species in KEGG. It will return a PFPRefnet object.

**Value**

a PFPRefnet object.

**Examples**

```
PFPRefnet1 <- get_PFPRefnet("hsa", ".", test_mode=TRUE)
```

---

group-methods	<i>group information of PFPRefnet</i>
---------------	---------------------------------------

---

**Description**

This function contains names of basic groups of the networks and group number, as well as the size of each group

**Usage**

```
group(object)

## S4 method for signature 'PFPRefnet'
group(object)
```

**Arguments**

object, PFPRefnet class

**Value**

a list contains names of basic groups of the networks and group number, as well as the size of each group

**See Also**

[PFPRefnet-class](#)

**Examples**

```
data(PFPRefnet_hsa)
group <- group(PFPRefnet_hsa)
```

---

kegg_download	<i>download kegg KGML files</i>
---------------	---------------------------------

---

**Description**

This function will download all kegg KGML files assigned by spec.

**Usage**

```
kegg_download(spec, file_root = ".", test_mode = FALSE)
```

**Arguments**

spec, a character, refers to the species names in kegg, such as "hsa", "mmu"...

file\_root, a character, refers to the root you want to save kegg pathway kgml files in.

test\_mode, please set whether to test this function.

**Details**

Downloading all kegg KGML files assigned by spec from <https://www.kegg.jp/kegg/xml/>, which may take tens of minutes.

**Value**

the kegg KGML files

**Examples**

```
kegg_download(spec, file_root=".", test_mode=TRUE)
```

---

network-methods      *Basic pathway networks of PFPreRefnet class*

---

**Description**

This function extract the basic networks of PFPreRefnet class.

**Usage**

```
network(object)

## S4 method for signature 'PFPreRefnet'
network(object)
```

**Arguments**

object,              PFPreRefnet class

**Value**

a graphNEL list of all basic networks

**See Also**

[PFPreRefnet-class](#)

**Examples**

```
data(PFPreRefnet_hsa)
network <- network(PFPreRefnet_hsa)
```

---

net\_info-methods      *Basic pathway networks information of PFPreRefnet class*

---

**Description**

This function extract the basic networks information of PFPreRefnet class.

**Usage**

```
net_info(object)

## S4 method for signature 'PFPreRefnet'
net_info(object)
```

**Arguments**

object, PFPRefnet class

**Value**

a dataframe contains basic networks' information

**See Also**

[PFPRefnet-class](#)

**Examples**

```
data(PFPRefnet_hsa)
net_info <- net_info(PFPRefnet_hsa)
```

---

net\_names-methods      *Names of basic networks*

---

**Description**

This function extract the network names of PFPRefnet.

**Usage**

```
net_names(object)

## S4 method for signature 'PFPRefnet'
net_names(object)
```

**Arguments**

object, PFPRefnet class

**Value**

a vector contains pathway names

**See Also**

[PFPRefnet-class](#)

**Examples**

```
data(PFPRefnet_hsa)
net_names <- net_names(PFPRefnet_hsa)
```

---

pathways\_score-methods

*Basic pathway networks scores of PFP class*

---

### Description

This function can extract the details in pathway fingerprint scores.

### Usage

```
pathways_score(object)
```

```
## S4 method for signature 'PFP'  
pathways_score(object)
```

### Arguments

object,            PFP class

### Value

as list, details in pathway fingerprint scores.

### See Also

[PFP-class](#)

### Examples

```
data(PFP_test1)  
pathways_score <- pathways_score(PFP_test1)
```

---

pathway\_info

*pathway\_info pathway\_info is dataframe of the information of pathway, 539rows, 4columns.*

---

### Description

pathway\_info pathway\_info is dataframe of the information of pathway, 539rows, 4columns.

### Format

a list

### Examples

```
data(pathway_info)
```

---

pathway_info_hsa	<i>pathway_info pathway_info is dataframe of the information of pathway, 539rows, 4columns.</i>
------------------	---

---

**Description**

pathway\_info pathway\_info is dataframe of the information of pathway, 539rows, 4columns.

**Format**

a list pathway\_info\_hsa pathway\_info\_hsa is dataframe of the information of pathway, 539rows, 4columns. The main data is about human.

**Examples**

```
data(pathway_info_hsa)
```

---

PFP	<i>The NFP package</i>
-----	------------------------

---

**Description**

This package implementation the applications of network finger print method.

---

PFP-class	PFP-class
-----------	-----------

---

**Description**

An S4 object for storing pathway fingerprint scores information.

**Slots**

pathways\_score, a list contains PFP\_score, stats\_test, genes\_score. PFP\_score is a numeric score indicating the performance of a gene\_list in some pathways.stats\_test is a statistic test for the PFP\_score. genes\_score is the detail scores of every gene in the gene\_list.

refnet\_info, a data.frame, which contains the specific information of pathway networks. Just be the same as [net\\_info](#) in [PFPRefnet-class](#), including the index, id, name, group and species.

**method**

- `pathways_score`, `signature(object = "PFP")`: extract the pathways score
- `refnet_info`, `signature(object = "PFP")`: extract the pathway networks information
- `PFP_score`, `signature(object = "PFP")`: extract the PFP score
- `stats_test`, `signature(object = "PFP")`: extract `p_value` & `p_adj_value`
- `genes_score`, `signature(object = "PFP", index=NULL, index_type = c("pathway_id", "pathway_name", "slice"))`: extract the genes score
- `refnet_names`, `signature(object = "PFP")`: extract the refnet names
- `sub_PFP`, `signature(object = "PFP", group_name = NULL, index = NULL, index_type = c("slice", "pathway_id"))`: subset of PFP object
- `show_PFP`, `signature(object = "PFP")`: display methods for S4 classes PFP
- `plot_PFP`, `signature(object, type = "character", p_size = "numeric", l_size = 'numeric')`: plot the Pathway Fingerprint.
- `rank_PFP` `signature(object = "PFP", total_rank = FALSE, decreasing=TRUE)` sort the PFP score.

**See Also**

[pathways\\_score-methods](#), [refnet\\_info-methods](#), [PFP\\_score-methods](#), [stats\\_test-methods](#), [genes\\_score-methods](#), [refnet\\_names-methods](#), [sub\\_PFP-methods](#), [show\\_PFP-methods](#), [plot\\_PFP-methods](#), [rank\\_PFP-methods](#),

**Examples**

```
data(PFP_test1)
PFP_test1
```

---

PFPretnet-class

PFPretnet-class

---

**Description**

An S4 object for storing PFP reference network information.

**Value**

a object of PFPretnet class



## Slots

`network`, object of graphNEL list represents the basic networks.

`net_info`, a dataframe which contains the index, id, name, group and species. It contains the information of the pathway networks, whose row number is the same with `network`.

#' @section method:

- `network`, signature(object = "PFPreRefnet"): extract networks of PFPreRefnet
- `net_info`, signature(object = "PFPreRefnet"): extract net information of PFPreRefnet
- `group`, signature(object = "PFPreRefnet"): extract group information
- `net_names`, signature(object = "PFPreRefnet"): the names of basic networks
- `subnet`, signature(object = "PFPreRefnet"): subset basic networks, e.g. a group of a networks or some networks of some given groups
- `show_net`, signature(object = "PFPreRefnet"): display methods for S4 classes PFPreRefnet, see also [show\\_net](#)

## See Also

[network-methods](#), [net\\_info-methods](#), [group-methods](#), [net\\_names-methods](#), [subnet-methods](#), [show\\_net-methods](#),

## Examples

```
data(PFPreRefnet_hsa)
PFPreRefnet_hsa
```

---

PFPreRefnet\_hsa

*Pathway fingerprint data of human*

---

## Description

A dataset containing the pathway maps of KEGG PFPreRefnet\_hsa is a PFPreRefnet class with `network` (a list of length 338), `net_info`

## Format

A PFPreRefnet object, more details see [PFPreRefnet-class](#)

## See Also

[PFPreRefnet-class](#)

## Examples

```
data(PFPreRefnet_hsa)
```

---

PFPRefnet\_mmu      *Pathway fingerprint data of mouse*

---

### Description

A dataset containing the pathway maps of KEGG PFPRefnet\_mmu a PFPRefnet class with network(a list of length 334), net\_info (a dataframe, 334rows and 5 columns), the main data is about mouse.

### Format

A PFPRefnet object, more details see [PFPRefnet-class](#)

### See Also

[PFPRefnet-class](#)

### Examples

```
data(PFPRefnet_mmu)
```

---

PFP\_score-methods      *The score of PFP*

---

### Description

This function can extract the PFP\_score of PFP.

### Usage

```
PFP_score(object)

## S4 method for signature 'PFP'
PFP_score(object)
```

### Arguments

object,      PFP class

### Value

the PFP\_score

### See Also

[PFP-class](#)

**Examples**

```
data(PFP_test1)
PFP_score <- PFP_score(PFP_test1)
```

---

PFP_test1	<i>PFP_test1</i>
-----------	------------------

---

**Description**

A dataset of PFP class a PFP class with pathways\_score(a list of length 3), refnet\_info (a dataframe, 338rows and 3 columns), the main data is about human.

**Format**

A PFPRefnet object,

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test1)
```

---

PFP_test2	<i>PFP_test2</i>
-----------	------------------

---

**Description**

A dataset of PFP class

**Format**

A PFPRefnet object,

**Details**

a PFP class with pathways\_score(a list of length 3), refnet\_info (a dataframe, 338rows and 3 columns), the main data is about human.

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test2)
```

---

plot\_PFP-methods      *Plot PFP results*

---

### Description

Function for visualization PFP results.

### Usage

```
plot_PFP(  
  object,  
  type = c("matchstick", "line", "point"),  
  p_size = 1,  
  l_size = 0.5  
)  
  
## S4 method for signature 'PFP'  
plot_PFP(  
  object,  
  type = c("matchstick", "line", "point"),  
  p_size = 1,  
  l_size = 0.5  
)
```

### Arguments

object,	PFP class
type,	types of the visaulization of <i>PFP</i> object, 'matchstick', 'line', 'point'. Default is 'matchstick'.
p_size,	point size of plot, default is 1.
l_size,	line size of plot, default is 0.5.

### Value

a plot of PFP

### See Also

[PFP-class](#)

### Examples

```
data(PFP_test1)  
plot_PFP(PFP_test1,'line', p_size = 1, l_size = 0.5)
```

---

plot_PFPlist	<i>Plot multiple PFPs.</i>
--------------	----------------------------

---

**Description**

Function for visualization multiple PFPs.

**Usage**

```
plot_PFPlist(object, l_size = 0.5)
```

**Arguments**

object,	PFP a list of PFP.
l_size,	line size of plot, default is 0.5.

**Value**

plot the PFP list

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test1)
pfp_list <- list(a=PFP_test1)
plot_PFPlist(pfp_list)
```

---

rank_PFP-methods	<i>rank PFPscore</i>
------------------	----------------------

---

**Description**

rank the PFP object by the value of PFP\_score.

**Usage**

```
rank_PFP(  
  object,  
  total_rank = FALSE,  
  decreasing = TRUE,  
  thresh_slot = "p_adj_value",  
  thresh_value = 0.05  
)
```

```
## S4 method for signature 'PFP'  
rank_PFP(  
  object,  
  total_rank = FALSE,  
  decreasing = TRUE,  
  thresh_slot = "p_adj_value",  
  thresh_value = 0.05  
)
```

### Arguments

object,	PFP class
total_rank,	a logical, whether to rank in total range,the default is <i>TRUE</i>
decreasing,	a logical, Sorting method, the default is <i>TRUE</i>
thresh_slot,	a character, it could be 'p_value' or 'p_adj_value', it means the threshold slot to choose for select the significant pathway. Default is 'p_adj_value'.It also could be <i>NULL</i> ,it means that you don't want to select the significant pathway and you will select all pathways.
thresh_value,	a numeric, threshold value of 'p_value' or 'p_adjust_value' for pathway selection

### Value

a ranked PFP object.

### See Also

[PFP-class](#)

### Examples

```
data(PFP_test1)  
rank_PFP(PFP_test1,  
  total_rank=FALSE,  
  decreasing=TRUE,  
  thresh_slot="p_adj_value",  
  thresh_value = 0.05)
```

---

refnet\_info-methods    *Basic network information of PFP class*

---

### Description

This function extract the detail information of reference pathway networks.

**Usage**

```
refnet_info(object)

## S4 method for signature 'PFP'
refnet_info(object)
```

**Arguments**

```
object,          PFP class
```

**Value**

detail information of reference pathway networks

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test1)
refnet_info <- refnet_info(PFP_test1)
```

---

refnet\_names-methods *Names of basic networks*

---

**Description**

This function extract the reference pathway network names of PFP.

**Usage**

```
refnet_names(object)

## S4 method for signature 'PFP'
refnet_names(object)
```

**Arguments**

```
object,          PFPRefnet class
```

**Value**

a vector contains pathway names

**Examples**

```
data(PFP_test1)
refnet_names <- refnet_names(PFP_test1)
```

---

result\_PFP-methods      *result of the PFP object.*

---

### Description

get the result of the PFP object.

### Usage

```
result_PFP(object, thresh_slot = NULL, thresh_value = 0.05)
```

```
## S4 method for signature 'PFP'
```

```
result_PFP(object, thresh_slot = NULL, thresh_value = 0.05)
```

### Arguments

`object`,            PFP class

`thresh_slot`,      a character, it could be 'p\_value' or 'p\_adj\_value', it means the threshold slot to choose for select the significant pathway. Default is *NULL*, it means that you don't want to select the significant pathway and you will select all pathways.

`thresh_value`,    a numeric, threshold value of 'p\_value' or 'p\_adjust\_value' for pathway selection, Default is 0.05.

### Value

the scores and the information of PFP object.

### See Also

[PFP-class](#)

### Examples

```
data(PFP_test1)
result_PFP(PFP_test1,
           thresh_slot="p_adj_value",
           thresh_value = 0.05)
```



---

show_net	<i>Show an Object</i>
----------	-----------------------

---

**Description**

show method short for PFPretnet object

**Usage**

```
show_net(object)
```

```
## S4 method for signature 'PFPretnet'  
show_net(object)
```

**Arguments**

object,           PFPretnet object

**Value**

show the network

**See Also**

[PFPretnet-class](#)

**Examples**

```
data(PFPretnet_hsa)  
show_net(PFPretnet_hsa)
```

---

show_PFP	<i>The show_PFP generic function</i>
----------	--------------------------------------

---

**Description**

Show a short summary for PFP object.

**Usage**

```
show_PFP(object)
```

```
## S4 method for signature 'PFP'  
show_PFP(object)
```

**Arguments**

object,            PFP object

**Value**

show the PFP

**Examples**

```
data(PFP_test1)
show_PFP(PFP_test1)
```

---

stats\_test-methods      *The P value of PFP*

---

**Description**

This function can extract the result of statistical analysis

**Usage**

```
stats_test(object)

## S4 method for signature 'PFP'
stats_test(object)
```

**Arguments**

object,            PFP class

**Value**

Statistical test result of each pathway score

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test1)
stats_test <- stats_test(PFP_test1)
```

---

`subnet-methods`*Subset the basic networks*

---

**Description**

Extract or Replace parts of the PFPRefnet.

**Usage**

```
subnet(  
  object,  
  group_name = NULL,  
  index = NULL,  
  index_type = c("slice", "pathway_id", "pathway_name")  
)  
  
## S4 method for signature 'PFPRefnet'  
subnet(  
  object,  
  group_name = NULL,  
  index = NULL,  
  index_type = c("slice", "pathway_id", "pathway_name")  
)
```

**Arguments**

<code>object</code> ,	PFPRefnet class.
<code>group_name</code> ,	character, indicating the groups to subset.
<code>index</code> ,	NULL or a list contains slice/numeric, character, specifying elements to extract. This parameter' length must be the same as <code>group_name</code> . Default is <i>NULL</i> , indicating extract all the networks of a group. See <i>details</i> for more information.
<code>index_type</code> ,	character, the type pf index, which could be "slice","id","name".

**Details**

This function help users to extract the specific networks for customized analysis, which could be of entire group networks or some part of a specific group networks.

Note, the `index` argument is only worked while the `group_name` argument is consideration, which means `group_name` is not *NULL*. And the length must be the same as `group_name`. Default is *NULL*, indicating extract the entire group basic networks.

**Value**

sub the network

**See Also**

[PFPretnet-class](#)

**Examples**

```
data(PFPretnet_hsa)
subnet <- subnet(PFPretnet_hsa)
```

---

sub\_PFP-methods      *subset of PFP object*

---

**Description**

This function extract the subsets of PFP-class.

**Usage**

```
sub_PFP(
  object,
  group_name = NULL,
  index = NULL,
  index_type = c("slice", "pathway_id", "pathway_name")
)

## S4 method for signature 'PFP'
sub_PFP(
  object,
  group_name = NULL,
  index = NULL,
  index_type = c("slice", "pathway_id", "pathway_name")
)
```

**Arguments**

object,	PFP class
group_name,	the group name in kegg
index,	the index of pathway, NULL or a list contains slice/numeric, character, specifying elements to extract. This parameter' length must be the same as group_name. Default is <i>NULL</i> , indicating extract all the networks of a group. See <i>details</i> for more information.
index_type,	the index type,such as "slice","pathway_id","pathway_name"

**Details**

This function help users to extract the specific networks PFPscores for customized analysis, which could be of entire group PFP or some part of a specific group PFP.

Note, the index argument is only worked while the group\_name argument is consideration, which means group\_name is not *NULL*. And the length must be the same as group\_name. Default is *NULL*, indicating extract the entire PFP.

**Value**

a PFP object contains just the selected elements.

**See Also**

[PFP-class](#)

**Examples**

```
data(PFP_test1)
PFP_test1
```

---

trans_edges_id	<i>trans_edges_id</i>
----------------	-----------------------

---

**Description**

translate the id name in edges\_data

**Usage**

```
trans_edges_id(
  edges_data,
  from_type = "ENTREZID",
  to_type = "SYMBOL",
  gene_info_db = NULL
)
```

**Arguments**

edges_data,	the edges_data to translate, it can be the data.frame got from <a href="#">get_exp_cor_edges</a> or <a href="#">get_asso_net</a> , or a data.frame contains the same colnames with them.
from_type,	a character,the type of gene ID, "ENSEMBL","GO","SYMBOL" and so on.
to_type,	a character,the type of gene ID, "ENSEMBL","GO","SYMBOL" and so on.
gene_info_db,	a gene

### Details

Translate the id name in edges\_data. Note, the from\_type must be consistent with the genes id type in edges\_data. The gene\_info\_db must be consistent with the species in edges\_data

### Value

the id of the edges.

### Examples

```
data(PFPretnet_hsa)
data(gene_list_hsa)
edges_kegg <- get_bg_related_kegg(gene_list_hsa,
                                  PFPretnet=PFPretnet_hsa,
                                  rm_duplicated = TRUE)
```

---

trans\_graph2PFPretnet *translate graph\_list to PFPretnet class*

---

### Description

This function will translate all graphs in graph\_list to a [PFPretnet-class](#) object.

### Usage

```
trans_graph2PFPretnet(graph_list, pathway_info)
```

### Arguments

graph\_list, a list of [graphNEL](#).  
pathway\_info, a data.frame, which contains all kegg pathways "index", "id", "name", "group", "species"

### Details

translating all graphs in graph\_list to a [PFPretnet-class](#) object. The pathway\_info can be designed by yourself, but the colnames must be "index", "id", "name", "group" and "species".

### Value

a PFPretnet

### Examples

```
data(PFPretnet_hsa)
PFPretnet_hsa
```

---

trans_xml2graph	<i>translate kgml files to graphNEL</i>
-----------------	---

---

**Description**

This function will translate all kegg KGML files in path `file_dir`.

**Usage**

```
trans_xml2graph(file_dir, test_mode = FALSE)
```

**Arguments**

`file_dir`, a character, refers to the `file_path` where kegg KGML files are stored.  
`test_mode`, please set whether to test this function.

**Details**

transform all KEGG KGML files downloaded by the function `kegg_download()` in path `file_dir` to the graphNEL object

**Value**

a list of graphNEL

**Examples**

```
trans_xml2graph(file_dir, test=TRUE)
```

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