

# Package ‘clusterProfiler’

December 1, 2025

**Type** Package

**Title** A universal enrichment tool for interpreting omics data

**Version** 4.18.2

**Maintainer** Guangchuang Yu <guangchuangyu@gmail.com>

**Description** This package supports functional characteristics of both coding and non-coding genomics data for thousands of species with up-to-date gene annotation. It provides a universal interface for gene functional annotation from a variety of sources and thus can be applied in diverse scenarios. It provides a tidy interface to access, manipulate, and visualize enrichment results to help users achieve efficient data interpretation. Datasets obtained from multiple treatments and time points can be analyzed and compared in a single run, easily revealing functional consensus and differences among distinct gene clusters.

**Depends** R (>= 4.2.0)

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**Suggests** AnnotationHub, BiocManager, jsonlite, readr, org.Hs.eg.db, quarto, testthat

**VignetteBuilder** quarto

**ByteCompile** true

**License** Artistic-2.0

**URL** <https://yulab-smu.top/contribution-knowledge-mining/>

**BugReports** <https://github.com/YuLab-SMU/clusterProfiler/issues>

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|                         |                                                                                 |
|-------------------------|---------------------------------------------------------------------------------|
| clusterProfiler-package | <i>clusterProfiler: A universal enrichment tool for interpreting omics data</i> |
|-------------------------|---------------------------------------------------------------------------------|

---

## Description

This package supports functional characteristics of both coding and non-coding genomics data for thousands of species with up-to-date gene annotation. It provides a universal interface for gene functional annotation from a variety of sources and thus can be applied in diverse scenarios. It provides a tidy interface to access, manipulate, and visualize enrichment results to help users achieve efficient data interpretation. Datasets obtained from multiple treatments and time points can be analyzed and compared in a single run, easily revealing functional consensus and differences among distinct gene clusters.

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## See Also

Useful links:

- <https://yulab-smu.top/contribution-knowledge-mining/>
- Report bugs at <https://github.com/YuLab-SMU/clusterProfiler/issues>

---

```
append_kegg_category  append_kegg_category
```

---

**Description**

add KEGG pathway category information

**Usage**

```
append_kegg_category(x)
```

**Arguments**

x                      KEGG enrichment result

**Details**

This function appends the KEGG pathway category information to KEGG enrichment result (either output of 'enrichKEGG' or 'gseKEGG')

**Value**

update KEGG enrichment result with category information

**Author(s)**

Guangchuang Yu

---

```
bitr
```

```
bitr
```

---

**Description**

Biological Id TRanslator

**Usage**

```
bitr(geneID, fromType, toType, OrgDb, drop = TRUE)
```

**Arguments**

|          |                |
|----------|----------------|
| geneID   | input gene id  |
| fromType | input id type  |
| toType   | output id type |
| OrgDb    | annotation db  |
| drop     | drop NA or not |

**Value**

data.frame

**Author(s)**

Guangchuang Yu

---

bitr\_kegg*bitr\_kegg*

---

**Description**

convert biological ID using KEGG API

**Usage**

```
bitr_kegg(geneID, fromType, toType, organism, drop = TRUE)
```

**Arguments**

|          |                                                                                    |
|----------|------------------------------------------------------------------------------------|
| geneID   | input gene id                                                                      |
| fromType | input id type                                                                      |
| toType   | output id type                                                                     |
| organism | supported organism, can be search using <code>search_kegg_organism</code> function |
| drop     | drop NA or not                                                                     |

**Value**

data.frame

**Author(s)**

Guangchuang Yu

---

browseKEGG*browseKEGG*

---

**Description**

open KEGG pathway with web browser

**Usage**

```
browseKEGG(x, pathID)
```

**Arguments**

|        |                                                                     |
|--------|---------------------------------------------------------------------|
| x      | an instance of <code>enrichResult</code> or <code>gseaResult</code> |
| pathID | pathway ID                                                          |

**Value**

url

**Author(s)**

Guangchuang Yu

compareCluster

*Compare gene clusters functional profile***Description**

Given a list of gene set, this function will compute profiles of each gene cluster.

**Usage**

```
compareCluster(
  geneClusters,
  fun = "enrichGO",
  data = "",
  source_from = NULL,
  ...
)
```

**Arguments**

|              |                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| geneClusters | a list of entrez gene id. Alternatively, a formula of type <code>Entrez~group</code> or a formula of type <code>Entrez   logFC ~ group</code> for "gseGO", "gseKEGG" and "GSEA". |
| fun          | One of "groupGO", "enrichGO", "enrichKEGG", "enrichDO" or "enrichPathway". Users can also supply their own function.                                                             |
| data         | if geneClusters is a formula, the data from which the clusters must be extracted.                                                                                                |
| source_from  | If using a custom function in "fun", provide the source package as a string here. Otherwise, the function will be obtained from the global environment.                          |
| ...          | Other arguments.                                                                                                                                                                 |

**Value**

A clusterProfResult instance.

**Author(s)**

Guangchuang Yu <https://yulab-smu.top>

**See Also**

[compareClusterResult-class], [groupGO], [enrichGO], [enrichKEGG], [enrichDO][DOSE::enrichDO], [enrichPathway][ReactomePA::enrichPathway]

**Examples**

```
## Not run:
data(gcSample)
xx <- compareCluster(gcSample, fun="enrichKEGG",
                     organism="hsa", pvalueCutoff=0.05)
as.data.frame(xx)
# plot(xx, type="dot", caption="KEGG Enrichment Comparison")
dotplot(xx)

## formula interface
mydf <- data.frame(Entrez=c('1', '100', '1000', '100101467',
                           '100127206', '100128071'),
                  logFC = c(1.1, -0.5, 5, 2.5, -3, 3),
                  group = c('A', 'A', 'A', 'B', 'B', 'B'),
                  othergroup = c('good', 'good', 'bad', 'bad', 'good', 'bad'))
xx.formula <- compareCluster(Entrez~group, data=mydf,
                             fun='groupG0', OrgDb='org.Hs.eg.db')
as.data.frame(xx.formula)

## formula interface with more than one grouping variable
xx.formula.twogroups <- compareCluster(Entrez~group+othergroup, data=mydf,
                                       fun='groupG0', OrgDb='org.Hs.eg.db')
as.data.frame(xx.formula.twogroups)

## End(Not run)
```

---

|         |                                                              |
|---------|--------------------------------------------------------------|
| DataSet | <i>Datasets gcSample contains a sample of gene clusters.</i> |
|---------|--------------------------------------------------------------|

---

**Description**

Datasets gcSample contains a sample of gene clusters.

Datasets kegg\_species contains kegg species information

Datasets kegg\_category contains kegg pathway category information

Datasets DE\_GSE8057 contains differential expressed genes obtained from GSE8057 dataset

---

|               |                      |
|---------------|----------------------|
| download_KEGG | <i>download_KEGG</i> |
|---------------|----------------------|

---

**Description**

download the latest version of KEGG pathway/module

**Usage**

```
download_KEGG(species, keggType = "KEGG", keyType = "kegg")
```

**Arguments**

|          |                                               |
|----------|-----------------------------------------------|
| species  | species                                       |
| keggType | one of 'KEGG' or 'MKEGG'                      |
| keyType  | supported keyType, see <code>bitr_kegg</code> |

**Value**

list

**Author(s)**

Guangchuang Yu

---

|        |               |
|--------|---------------|
| dropGO | <i>dropGO</i> |
|--------|---------------|

---

**Description**

drop GO term of specific level or specific terms (mostly too general).

**Usage**

```
dropGO(x, level = NULL, term = NULL)
```

**Arguments**

|       |                                                         |
|-------|---------------------------------------------------------|
| x     | an instance of 'enrichResult' or 'compareClusterResult' |
| level | GO level                                                |
| term  | GO term                                                 |

**Value**

modified version of x

**Author(s)**

Guangchuang Yu

---

*enrichDAVID**enrichDAVID*

---

**Description**

enrichment analysis by DAVID

**Usage**

```
enrichDAVID(  
  gene,  
  idType = "ENTREZ_GENE_ID",  
  universe,  
  minGSSize = 10,  
  maxGSSize = 500,  
  annotation = "GOTERM_BP_FAT",  
  pvalueCutoff = 0.05,  
  pAdjustMethod = "BH",  
  qvalueCutoff = 0.2,  
  species = NA,  
  david.user  
)
```

**Arguments**

|               |                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gene          | input gene                                                                                                                                                                                               |
| idType        | id type                                                                                                                                                                                                  |
| universe      | background genes. If missing, the all genes listed in the database (eg TERM2GENE table) will be used as background.                                                                                      |
| minGSSize     | minimal size of genes annotated for testing                                                                                                                                                              |
| maxGSSize     | maximal size of genes annotated for testing                                                                                                                                                              |
| annotation    | david annotation                                                                                                                                                                                         |
| pvalueCutoff  | adjusted pvalue cutoff on enrichment tests to report                                                                                                                                                     |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                                                                                                             |
| qvalueCutoff  | qvalue cutoff on enrichment tests to report as significant. Tests must pass i) pvalueCutoff on unadjusted pvalues, ii) pvalueCutoff on adjusted pvalues and iii) qvalueCutoff on qvalues to be reported. |
| species       | species                                                                                                                                                                                                  |
| david.user    | david user                                                                                                                                                                                               |

**Value**

A enrichResult instance

**Author(s)**

Guangchuang Yu

enricher

*enricher***Description**

A universal enrichment analyzer

**Usage**

```
enricher(
  gene,
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  universe = NULL,
  minGSSize = 10,
  maxGSSize = 500,
  qvalueCutoff = 0.2,
  gson = NULL,
  TERM2GENE,
  TERM2NAME = NA
)
```

**Arguments**

|               |                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gene          | a vector of gene id                                                                                                                                                                                      |
| pvalueCutoff  | adjusted pvalue cutoff on enrichment tests to report                                                                                                                                                     |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                                                                                                             |
| universe      | background genes. If missing, the all genes listed in the database (eg TERM2GENE table) will be used as background.                                                                                      |
| minGSSize     | minimal size of genes annotated for testing                                                                                                                                                              |
| maxGSSize     | maximal size of genes annotated for testing                                                                                                                                                              |
| qvalueCutoff  | qvalue cutoff on enrichment tests to report as significant. Tests must pass i) pvalueCutoff on unadjusted pvalues, ii) pvalueCutoff on adjusted pvalues and iii) qvalueCutoff on qvalues to be reported. |
| gson          | a GSON object, if not NULL, use it as annotation data.                                                                                                                                                   |
| TERM2GENE     | user input annotation of TERM TO GENE mapping, a data.frame of 2 column with term and gene. Only used when gson is NULL.                                                                                 |
| TERM2NAME     | user input of TERM TO NAME mapping, a data.frame of 2 column with term and name. Only used when gson is NULL.                                                                                            |

**Value**

A enrichResult instance

**Author(s)**

Guangchuang Yu <https://yulab-smu.top>

---

|          |                                                                                                                                                 |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| enrichGO | <i>GO Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment GO categories after FDR control.</i> |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------|

---

## Description

GO Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment GO categories after FDR control.

## Usage

```
enrichGO(
  gene,
  OrgDb,
  keyType = "ENTREZID",
  ont = "MF",
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  universe,
  qvalueCutoff = 0.2,
  minGSSize = 10,
  maxGSSize = 500,
  readable = FALSE,
  pool = FALSE
)
```

## Arguments

|               |                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gene          | a vector of entrez gene id.                                                                                                                                                                              |
| OrgDb         | OrgDb                                                                                                                                                                                                    |
| keyType       | keytype of input gene                                                                                                                                                                                    |
| ont           | One of "BP", "MF", and "CC" subontologies, or "ALL" for all three.                                                                                                                                       |
| pvalueCutoff  | adjusted pvalue cutoff on enrichment tests to report                                                                                                                                                     |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                                                                                                             |
| universe      | background genes. If missing, the all genes listed in the database (eg TERM2GENE table) will be used as background.                                                                                      |
| qvalueCutoff  | qvalue cutoff on enrichment tests to report as significant. Tests must pass i) pvalueCutoff on unadjusted pvalues, ii) pvalueCutoff on adjusted pvalues and iii) qvalueCutoff on qvalues to be reported. |
| minGSSize     | minimal size of genes annotated by Ontology term for testing.                                                                                                                                            |
| maxGSSize     | maximal size of genes annotated for testing                                                                                                                                                              |
| readable      | whether mapping gene ID to gene Name                                                                                                                                                                     |
| pool          | If ont='ALL', whether pool 3 GO sub-ontologies                                                                                                                                                           |

## Value

An `enrichResult` instance.

**Author(s)**

Guangchuang Yu <https://yulab-smu.top>

**See Also**

[enrichResult-class], [compareCluster]

**Examples**

```
## Not run:
data(geneList, package = "DOSE")
de <- names(geneList)[1:100]
yy <- enrichG0(de, 'org.Hs.eg.db', ont="BP", pvalueCutoff=0.01)
head(yy)

## End(Not run)
```

---

enrichKEGG

*KEGG Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment KEGG categories with FDR control.*

---

**Description**

KEGG Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment KEGG categories with FDR control.

**Usage**

```
enrichKEGG(
  gene,
  organism = "hsa",
  keyType = "kegg",
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  universe,
  minGSSize = 10,
  maxGSSize = 500,
  qvalueCutoff = 0.2,
  use_internal_data = FALSE
)
```

**Arguments**

|               |                                                                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| gene          | a vector of entrez gene id.                                                                                                                      |
| organism      | supported organism listed in ' <a href="https://www.genome.jp/kegg/catalog/org_list.html">https://www.genome.jp/kegg/catalog/org_list.html</a> ' |
| keyType       | one of "kegg", 'ncbi-geneid', 'ncbi-proteinid' and 'uniprot'                                                                                     |
| pvalueCutoff  | adjusted pvalue cutoff on enrichment tests to report                                                                                             |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                                                     |
| universe      | background genes. If missing, the all genes listed in the database (eg TERM2GENE table) will be used as background.                              |

minGSSize      minimal size of genes annotated by Ontology term for testing.  
 maxGSSize      maximal size of genes annotated for testing  
 qvalueCutoff    qvalue cutoff on enrichment tests to report as significant. Tests must pass i)  
                   pvalueCutoff on unadjusted pvalues, ii) pvalueCutoff on adjusted pvalues  
                   and iii) qvalueCutoff on qvalues to be reported.  
 use\_internal\_data  
                   logical, use KEGG.db or latest online KEGG data

### Value

A `enrichResult` instance.

### Author(s)

Guangchuang Yu <https://yulab-smu.top>

### See Also

[`enrichResult-class`], [`compareCluster`]

### Examples

```
## Not run:
data(geneList, package='DOSE')
de <- names(geneList)[1:100]
yy <- enrichKEGG(de, pvalueCutoff=0.01)
head(yy)

## End(Not run)
```

---

|             |                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| enrichMKEGG | <i>KEGG Module Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment KEGG Module categories with FDR control.</i> |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|

---

### Description

KEGG Module Enrichment Analysis of a gene set. Given a vector of genes, this function will return the enrichment KEGG Module categories with FDR control.

### Usage

```
enrichMKEGG(
  gene,
  organism = "hsa",
  keyType = "kegg",
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  universe,
  minGSSize = 10,
  maxGSSize = 500,
  qvalueCutoff = 0.2
)
```

**Arguments**

|               |                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gene          | a vector of entrez gene id.                                                                                                                                                                              |
| organism      | supported organism listed in 'https://www.genome.jp/kegg/catalog/org_list.html'                                                                                                                          |
| keyType       | one of "kegg", 'ncbi-geneid', 'ncbi-proteinid' and 'uniprot'                                                                                                                                             |
| pvalueCutoff  | adjusted pvalue cutoff on enrichment tests to report                                                                                                                                                     |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                                                                                                             |
| universe      | background genes. If missing, the all genes listed in the database (eg TERM2GENE table) will be used as background.                                                                                      |
| minGSSize     | minimal size of genes annotated by Ontology term for testing.                                                                                                                                            |
| maxGSSize     | maximal size of genes annotated for testing                                                                                                                                                              |
| qvalueCutoff  | qvalue cutoff on enrichment tests to report as significant. Tests must pass i) pvalueCutoff on unadjusted pvalues, ii) pvalueCutoff on adjusted pvalues and iii) qvalueCutoff on qvalues to be reported. |

**Value**

A enrichResult instance.

---

|          |                 |
|----------|-----------------|
| enrichPC | <i>enrichPC</i> |
|----------|-----------------|

---

**Description**

ORA analysis for Pathway Commons

**Usage**

```
enrichPC(gene, ...)
```

**Arguments**

|      |                                                                                     |
|------|-------------------------------------------------------------------------------------|
| gene | a vector of genes (either hgnc symbols or uniprot IDs)                              |
| ...  | additional parameters, see also the parameters supported by the enricher() function |

**Details**

This function performs over-representation analysis using Pathway Commons

**Value**

A enrichResult instance

---

**enrichWP***enrichWP*

---

**Description**

ORA analysis for WikiPathways

**Usage**

```
enrichWP(gene, organism, ...)
```

**Arguments**

|          |                                                                                                  |
|----------|--------------------------------------------------------------------------------------------------|
| gene     | a vector of entrez gene id                                                                       |
| organism | supported organisms, which can be accessed via the <code>get_wp_organisms()</code> function      |
| ...      | additional parameters, see also the parameters supported by the <code>enricher()</code> function |

**Details**

This function performs over-representation analysis using WikiPathways

**Value**

A `enrichResult` instance

**Author(s)**

Guangchuang Yu

---

**getPPI***getPPI*

---

**Description**

getPPI

**Usage**

```
getPPI(  
  x,  
  ID = 1,  
  taxID = "auto",  
  required_score = NULL,  
  network_type = "functional",  
  add_nodes = 0,  
  show_query_node_labels = 0,  
  output = "igraph"  
)
```

**Arguments**

|                        |                                                                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| x                      | an 'enrichResult' object or a vector of proteins, e.g. 'c("PTCH1", "TP53", "BRCA1", "BRCA2")'                                              |
| ID                     | ID or index to extract genes in the enriched term(s) if 'x' is an 'enrichResult' object                                                    |
| taxID                  | NCBI taxon identifiers (e.g. Human is 9606, see: [STRING organisms](https://string-db.org/cgi/input.pl?input_page_active_form=organisms)). |
| required_score         | threshold of significance to include a interaction, a number between 0 and 1000 (default depends on the network)                           |
| network_type           | network type: functional (default), physical                                                                                               |
| add_nodes              | adds a number of proteins with to the network based on their confidence score (default:1)                                                  |
| show_query_node_labels | when available use submitted names in the preferredName column when (0 or 1) (default:0)                                                   |
| output                 | one of 'data.frame' or 'igraph'                                                                                                            |

**Details**

[Getting the STRING network interactions](https://string-db.org/cgi/help.pl?sessionId=btsvnCeNrBk7).

**Value**

a 'data.frame' or an 'igraph' object

**Author(s)**

Yonghe Xia and modified by Guangchuang Yu

---

getTaxID

getTaxID

---

**Description**

Convert species scientific name to taxonomic ID

**Usage**

```
getTaxID(species)
```

**Arguments**

|         |                              |
|---------|------------------------------|
| species | scientific name of a species |
|---------|------------------------------|

**Value**

taxonomic ID

**Author(s)**

Guangchuang Yu

---

`getTaxInfo`*getTaxInfo*

---

**Description**

Query taxonomy information from ‘stringdb’ or ‘ensembl’ web services

**Usage**

```
getTaxInfo(species, source = "stringdb")
```

**Arguments**

|         |                                |
|---------|--------------------------------|
| species | scientific name of a species   |
| source  | one of ‘stringdb’ or ‘ensembl’ |

**Value**

a ‘data.frame’ of query information

**Author(s)**

Guangchuang Yu

---

`get_wp_organisms`*get\_wp\_organism*

---

**Description**

list supported organism of WikiPathways

**Usage**

```
get_wp_organisms()
```

**Details**

This function extracts information from ‘<https://data.wikipathways.org/current/gmt/>’ and lists all supported organisms

**Value**

supported organism list

**Author(s)**

Guangchuang Yu

---

`Gff2GeneTable`*Gff2GeneTable*

---

**Description**

read GFF file and build gene information table

**Usage**

```
Gff2GeneTable(gffFile, compress = TRUE)
```

**Arguments**

|                       |                      |
|-----------------------|----------------------|
| <code>gffFile</code>  | GFF file             |
| <code>compress</code> | compress file or not |

**Details**

given a GFF file, this function extracts information from it and save it in working directory

**Value**

file save.

**Author(s)**

Yu Guangchuang

---

`go2ont`*go2ont*

---

**Description**

convert goid to ontology (BP, CC, MF)

**Usage**

```
go2ont(goid)
```

**Arguments**

|                   |                    |
|-------------------|--------------------|
| <code>goid</code> | a vector of GO IDs |
|-------------------|--------------------|

**Value**

data.frame

**Author(s)**

Guangchuang Yu

---

`go2term`*go2term*

---

**Description**

convert goid to descriptive term

**Usage**

```
go2term(goid)
```

**Arguments**

`goid` a vector of GO IDs

**Value**

data.frame

**Author(s)**

Guangchuang Yu

---

`gofilter`*gofilter*

---

**Description**

filter GO enriched result at specific level

**Usage**

```
gofilter(x, level = 4)
```

**Arguments**

`x` output from `enrichGO` or `compareCluster`

`level` GO level

**Value**

updated object

**Author(s)**

Guangchuang Yu

---

|         |                                                                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| groupGO | <i>Functional Profile of a gene set at specific GO level. Given a vector of genes, this function will return the GO profile at a specific level.</i> |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|

---

## Description

Functional Profile of a gene set at specific GO level. Given a vector of genes, this function will return the GO profile at a specific level.

## Usage

```
groupGO(  
  gene,  
  OrgDb,  
  keyType = "ENTREZID",  
  ont = "CC",  
  level = 2,  
  readable = FALSE  
)
```

## Arguments

|          |                                                                 |
|----------|-----------------------------------------------------------------|
| gene     | a vector of entrez gene id.                                     |
| OrgDb    | OrgDb                                                           |
| keyType  | key type of input gene                                          |
| ont      | One of "MF", "BP", and "CC" subontologies.                      |
| level    | Specific GO Level.                                              |
| readable | if readable is TRUE, the gene IDs will mapping to gene symbols. |

## Value

A groupGOResult instance.

## Author(s)

Guangchuang Yu <https://yulab-smu.top>

## See Also

[groupGOResult-class], [compareCluster]

## Examples

```
data(gcSample)  
yy <- groupGO(gcSample[[1]], 'org.Hs.eg.db', ont="BP", level=2)  
head(summary(yy))  
#plot(yy)
```

---

|                     |                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|
| groupGOResult-class | <i>Class "groupGOResult" This class represents the result of functional Profiles of a set of gene at specific GO level.</i> |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|

---

**Description**

Class "groupGOResult" This class represents the result of functional Profiles of a set of gene at specific GO level.

**Slots**

result GO classification result  
 ontology Ontology  
 level GO level  
 organism one of "human", "mouse" and "yeast"  
 gene Gene IDs  
 readable logical flag of gene ID in symbol or not.

**Author(s)**

Guangchuang Yu <https://yulab-smu.top>

**See Also**

[compareClusterResult], [compareCluster], [groupGO]

---

GSEA

*GSEA*

---

**Description**

a universal gene set enrichment analysis tools

**Usage**

```
GSEA(
  geneList,
  exponent = 1,
  minGSSize = 10,
  maxGSSize = 500,
  eps = 1e-10,
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  gson = NULL,
  TERM2GENE,
  TERM2NAME = NA,
  verbose = TRUE,
  seed = FALSE,
  by = "fgsea",
  ...
)
```

**Arguments**

|               |                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------|
| geneList      | order ranked geneList                                                                                                    |
| exponent      | weight of each step                                                                                                      |
| minGSSize     | minimal size of each geneSet for analyzing                                                                               |
| maxGSSize     | maximal size of genes annotated for testing                                                                              |
| eps           | This parameter sets the boundary for calculating the p value.                                                            |
| pvalueCutoff  | adjusted pvalue cutoff                                                                                                   |
| pAdjustMethod | one of "holm", "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none"                                             |
| gson          | a GSON object, if not NULL, use it as annotation data.                                                                   |
| TERM2GENE     | user input annotation of TERM TO GENE mapping, a data.frame of 2 column with term and gene. Only used when gson is NULL. |
| TERM2NAME     | user input of TERM TO NAME mapping, a data.frame of 2 column with term and name. Only used when gson is NULL.            |
| verbose       | logical                                                                                                                  |
| seed          | logical                                                                                                                  |
| by            | one of 'fgsea' or 'DOSE'                                                                                                 |
| ...           | other parameter                                                                                                          |

**Value**

gseaResult object

**Author(s)**

Guangchuang Yu <https://yulab-smu.top>

---

gseGO

*gseGO*


---

**Description**

Gene Set Enrichment Analysis of Gene Ontology

**Usage**

```
gseGO(
  geneList,
  ont = "BP",
  OrgDb,
  keyType = "ENTREZID",
  exponent = 1,
  minGSSize = 10,
  maxGSSize = 500,
  eps = 1e-10,
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  verbose = TRUE,
```

```

    seed = FALSE,
    by = "fgsea",
    ...
)

```

### Arguments

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| geneList      | order ranked geneList                                              |
| ont           | one of "BP", "MF", and "CC" subontologies, or "ALL" for all three. |
| OrgDb         | OrgDb                                                              |
| keyType       | keytype of gene                                                    |
| exponent      | weight of each step                                                |
| minGSSize     | minimal size of each geneSet for analyzing                         |
| maxGSSize     | maximal size of genes annotated for testing                        |
| eps           | This parameter sets the boundary for calculating the p value.      |
| pvalueCutoff  | pvalue Cutoff                                                      |
| pAdjustMethod | pvalue adjustment method                                           |
| verbose       | print message or not                                               |
| seed          | logical                                                            |
| by            | one of 'fgsea' or 'DOSE'                                           |
| ...           | other parameter                                                    |

### Value

gseaResult object

### Author(s)

Yu Guangchuang

---

gseKEGG

*gseKEGG*

---

### Description

Gene Set Enrichment Analysis of KEGG

### Usage

```

gseKEGG(
  geneList,
  organism = "hsa",
  keyType = "kegg",
  exponent = 1,
  minGSSize = 10,
  maxGSSize = 500,
  eps = 1e-10,
  pvalueCutoff = 0.05,

```

```
pAdjustMethod = "BH",
verbose = TRUE,
use_internal_data = FALSE,
seed = FALSE,
by = "fgsea",
...
)
```

**Arguments**

|                   |                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| geneList          | order ranked geneList                                                                                                                            |
| organism          | supported organism listed in ' <a href="https://www.genome.jp/kegg/catalog/org_list.html">https://www.genome.jp/kegg/catalog/org_list.html</a> ' |
| keyType           | one of "kegg", 'ncbi-geneid', 'ncib-proteinid' and 'uniprot'                                                                                     |
| exponent          | weight of each step                                                                                                                              |
| minGSSize         | minimal size of each geneSet for analyzing                                                                                                       |
| maxGSSize         | maximal size of genes annotated for testing                                                                                                      |
| eps               | This parameter sets the boundary for calculating the p value.                                                                                    |
| pvalueCutoff      | pvalue Cutoff                                                                                                                                    |
| pAdjustMethod     | pvalue adjustment method                                                                                                                         |
| verbose           | print message or not                                                                                                                             |
| use_internal_data | logical, use KEGG.db or latest online KEGG data                                                                                                  |
| seed              | logical                                                                                                                                          |
| by                | one of 'fgsea' or 'DOSE'                                                                                                                         |
| ...               | other parameter                                                                                                                                  |

**Value**

gseaResult object

**Author(s)**

Yu Guangchuang

---

|                 |                 |
|-----------------|-----------------|
| <i>gseMKEGG</i> | <i>gseMKEGG</i> |
|-----------------|-----------------|

---

**Description**

Gene Set Enrichment Analysis of KEGG Module

**Usage**

```

gseMKEGG(
  geneList,
  organism = "hsa",
  keyType = "kegg",
  exponent = 1,
  minGSSize = 10,
  maxGSSize = 500,
  eps = 1e-10,
  pvalueCutoff = 0.05,
  pAdjustMethod = "BH",
  verbose = TRUE,
  seed = FALSE,
  by = "fgsea",
  ...
)

```

**Arguments**

|               |                                                                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| geneList      | order ranked geneList                                                                                                                            |
| organism      | supported organism listed in ' <a href="https://www.genome.jp/kegg/catalog/org_list.html">https://www.genome.jp/kegg/catalog/org_list.html</a> ' |
| keyType       | one of "kegg", 'ncbi-geneid', 'ncib-proteinid' and 'uniprot'                                                                                     |
| exponent      | weight of each step                                                                                                                              |
| minGSSize     | minimal size of each geneSet for analyzing                                                                                                       |
| maxGSSize     | maximal size of genes annotated for testing                                                                                                      |
| eps           | This parameter sets the boundary for calculating the p value.                                                                                    |
| pvalueCutoff  | pvalue Cutoff                                                                                                                                    |
| pAdjustMethod | pvalue adjustment method                                                                                                                         |
| verbose       | print message or not                                                                                                                             |
| seed          | logical                                                                                                                                          |
| by            | one of 'fgsea' or 'DOSE'                                                                                                                         |
| ...           | other parameter                                                                                                                                  |

**Value**

gseaResult object

**Author(s)**

Yu Guangchuang

---

|       |              |
|-------|--------------|
| gsePC | <i>gsePC</i> |
|-------|--------------|

---

**Description**

GSEA analysis for Pathway Commons

**Usage**

```
gsePC(geneList, ...)
```

**Arguments**

|          |                                                                                 |
|----------|---------------------------------------------------------------------------------|
| geneList | a ranked gene list                                                              |
| ...      | additional parameters, see also the parameters supported by the GSEA() function |

**Details**

This function performs GSEA using Pathway Commons

**Value**

A gseaResult instance

---

|       |              |
|-------|--------------|
| gseWP | <i>gseWP</i> |
|-------|--------------|

---

**Description**

GSEA analysis for WikiPathways

**Usage**

```
gseWP(geneList, organism, ...)
```

**Arguments**

|          |                                                                                 |
|----------|---------------------------------------------------------------------------------|
| geneList | ranked gene list                                                                |
| organism | supported organisms, which can be accessed via the get_wp_organisms() function  |
| ...      | additional parameters, see also the parameters supported by the GSEA() function |

**Details**

This function performs GSEA using WikiPathways

**Value**

A `gseaResult` instance

**Author(s)**

Guangchuang Yu

---

`gson_GO`

*gson\_KEGG*

---

**Description**

download the latest version of KEGG pathway and stored in a 'GSON' object

**Usage**

```
gson_GO(OrgDb, keytype = "ENTREZID", ont = "BP")
```

**Arguments**

|                      |                                    |
|----------------------|------------------------------------|
| <code>OrgDb</code>   | <code>OrgDb</code>                 |
| <code>keytype</code> | keytype of genes.                  |
| <code>ont</code>     | one of "BP", "MF", "CC", and "ALL" |

**Value**

a 'GSON' object

---

`gson_KEGG`

*gson\_KEGG*

---

**Description**

download the latest version of KEGG pathway and stored in a 'GSON' object

**Usage**

```
gson_KEGG(species, KEGG_Type = "KEGG", keyType = "kegg")
```

**Arguments**

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| <code>species</code>   | species                                                       |
| <code>KEGG_Type</code> | one of "KEGG" and "MKEGG"                                     |
| <code>keyType</code>   | one of "kegg", 'ncbi-geneid', 'ncib-proteinid' and 'uniprot'. |

**Value**

a 'GSON' object

**Author(s)**

Guangchuang Yu

gson\_KEGG\_mapper

*Build KEGG annotation for novel species using KEGG Mapper***Description**

KEGG Mapper service can annotate protein sequences for novel species with KO database, and KO annotation need to be converted into Pathway or Module annotation, which can then be used in ‘clusterProfiler’

**Usage**

```
gson_KEGG_mapper(
  file,
  format = c("BLAST", "Ghost", "Kofam"),
  type = c("pathway", "module"),
  species = NULL,
  ...
)
```

**Arguments**

|         |                                                                                            |
|---------|--------------------------------------------------------------------------------------------|
| file    | the name of the file which comes from the KEGG Mapper service, see Details for file format |
| format  | string indicate format of KEGG Mapper result                                               |
| type    | string indicate annotation database                                                        |
| species | your species, NULL if ignored                                                              |
| ...     | pass to gson::gson()                                                                       |

**Details**

File is a two-column dataset with K numbers in the second column, optionally preceded by the user's identifiers in the first column. This is consistent with the output files of automatic annotation servers, BlastKOALA, GhostKOALA, and KofamKOALA. KOALA (KEGG Orthology And Links Annotation) is KEGG's internal annotation tool for K number assignment of KEGG GENES using SSEARCH computation. BlastKOALA and GhostKOALA assign K numbers to the user's sequence data by BLAST and GHOSTX searches, respectively, against a nonredundant set of KEGG GENES. KofamKOALA is a new member of the KOALA family available at GenomeNet using the HMM profile search, rather than the sequence similarity search, for K number assignment. see <https://www.kegg.jp/blastkoala/>, <https://www.kegg.jp/ghostkoala/> and <https://www.genome.jp/tools/kofamkoala/> for more information.

**Value**

a gson instance

**Examples**

```
## Not run:
file = system.file('extdata', "kegg_mapper_blast.txt", package='clusterProfiler')
gson_KEGG_mapper(file, format = "BLAST", type = "pathway")

## End(Not run)
```

---

|         |                |
|---------|----------------|
| gson_WP | <i>gson_WP</i> |
|---------|----------------|

---

**Description**

Download the latest version of WikiPathways data and stored in a 'GSON' object

**Usage**

```
gson_WP(organism)
```

**Arguments**

|          |                                                                                             |
|----------|---------------------------------------------------------------------------------------------|
| organism | supported organism, which can be accessed via the <code>get_wp_organisms()</code> function. |
|----------|---------------------------------------------------------------------------------------------|

---

|        |               |
|--------|---------------|
| idType | <i>idType</i> |
|--------|---------------|

---

**Description**

list ID types supported by annoDb

**Usage**

```
idType(OrgDb = "org.Hs.eg.db")
```

**Arguments**

|       |               |
|-------|---------------|
| OrgDb | annotation db |
|-------|---------------|

**Value**

character vector

**Author(s)**

Guangchuang Yu

---

|         |                |
|---------|----------------|
| ko2name | <i>ko2name</i> |
|---------|----------------|

---

**Description**

convert ko ID to descriptive name

**Usage**

ko2name(ko)

**Arguments**

ko                      ko ID

**Value**

data.frame

**Author(s)**

guangchuang yu

---

|              |                     |
|--------------|---------------------|
| merge_result | <i>merge_result</i> |
|--------------|---------------------|

---

**Description**

merge a list of enrichResult objects to compareClusterResult

**Usage**

merge\_result(enrichResultList)

**Arguments**

enrichResultList  
a list of enrichResult objects

**Value**

a compareClusterResult instance

**Author(s)**

Guangchuang Yu

---

plotGOgraph

*plotGOgraph*


---

**Description**

plot GO graph

**Usage**

```
plotGOgraph(
  x,
  firstSigNodes = 10,
  useInfo = "all",
  sigForAll = TRUE,
  useFullNames = TRUE,
  ...
)
```

**Arguments**

|               |                                                                                                |
|---------------|------------------------------------------------------------------------------------------------|
| x             | output of enrichGO or gseGO                                                                    |
| firstSigNodes | number of significant nodes (rectangle nodes in the graph)                                     |
| useInfo       | additional info                                                                                |
| sigForAll     | if TRUE the score/p-value of all nodes in the DAG is shown, otherwise only score will be shown |
| useFullNames  | logical                                                                                        |
| ...           | additional parameter of showSigOfNodes, please refer to topGO                                  |

**Value**

GO DAG graph

**Author(s)**

Guangchuang Yu

---

read.gmt.pc

*read.gmt.pc*


---

**Description**

Parse gmt file from Pathway Common

**Usage**

```
read.gmt.pc(gmtfile, output = "data.frame")
```

**Arguments**

|         |                               |
|---------|-------------------------------|
| gmtfile | A gmt file                    |
| output  | one of 'data.frame' or 'GSON' |

**Details**

This function parse gmt file downloaded from Pathway common

**Value**

A data.frame or A GSON object depends on the value of 'output'

---

|           |                                             |
|-----------|---------------------------------------------|
| reexports | <i>Objects exported from other packages</i> |
|-----------|---------------------------------------------|

---

**Description**

These objects are imported from other packages. Follow the links below to see their documentation.

**DOSE** [enrichDO](#), [geneID](#), [geneInCategory](#), [gseDO](#), [gsfilter](#), [setReadable](#)  
**dplyr** [arrange](#), [filter](#), [group\\_by](#), [mutate](#), [n](#), [rename](#), [select](#), [slice](#), [summarise](#)  
**enrichplot** [cnetplot](#), [dotplot](#), [emapplot](#), [goplot](#), [gseaplot](#), [heatplot](#), [ridgeplot](#)  
**GOSemSim** [buildGOMap](#), [read.blast2go](#), [read.gaf](#)  
**gson** [read.gmt](#), [read.gmt.wp](#)  
**magrittr** [%<>%](#), [%>%](#)

---

|                      |                             |
|----------------------|-----------------------------|
| search_kegg_organism | <i>search_kegg_organism</i> |
|----------------------|-----------------------------|

---

**Description**

search kegg organism, listed in [https://www.genome.jp/kegg/catalog/org\\_list.html](https://www.genome.jp/kegg/catalog/org_list.html)

**Usage**

```
search_kegg_organism(
  str,
  by = "scientific_name",
  ignore.case = FALSE,
  use_internal_data = TRUE
)
```

**Arguments**

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| str               | string                                                   |
| by                | one of 'kegg.code', 'scientific_name' and 'common_name'  |
| ignore.case       | TRUE or FALSE                                            |
| use_internal_data | logical, use kegg_species.rda or latest online KEGG data |

**Value**

data.frame

**Author(s)**

Guangchuang Yu

---

simplify

*simplify method*

---

**Description**

simplify output from enrichGO and gseGO by removing redundancy of enriched GO terms

simplify output from compareCluster by removing redundancy of enriched GO terms

**Usage**

```
## S4 method for signature 'enrichResult'
simplify(
  x,
  cutoff = 0.7,
  by = "p.adjust",
  select_fun = min,
  measure = "Wang",
  semData = NULL
)

## S4 method for signature 'gseaResult'
simplify(
  x,
  cutoff = 0.7,
  by = "p.adjust",
  select_fun = min,
  measure = "Wang",
  semData = NULL
)

## S4 method for signature 'compareClusterResult'
simplify(
  x,
  cutoff = 0.7,
  by = "p.adjust",
  select_fun = min,
  measure = "Wang",
  semData = NULL
)
```

**Arguments**

|            |                                                                          |
|------------|--------------------------------------------------------------------------|
| x          | output of enrichGO                                                       |
| cutoff     | similarity cutoff                                                        |
| by         | feature to select representative term, selected by 'select_fun' function |
| select_fun | function to select feature passed by 'by' parameter                      |
| measure    | method to measure similarity                                             |
| semData    | GOSemSimDATA object                                                      |

**Value**

updated enrichResult object  
updated compareClusterResult object

**Author(s)**

Guangchuang Yu  
Gwang-Jin Kim and Guangchuang Yu

**References**

issue #28 <https://github.com/GuangchuangYu/clusterProfiler/issues/28>  
issue #162 <https://github.com/GuangchuangYu/clusterProfiler/issues/162>

---

|             |                    |
|-------------|--------------------|
| uniprot_get | <i>uniprot_get</i> |
|-------------|--------------------|

---

**Description**

retrieve annotation data from uniprot

**Usage**

```
uniprot_get(taxID)
```

**Arguments**

|       |             |
|-------|-------------|
| taxID | taxonomy ID |
|-------|-------------|

**Value**

gene table data frame

**Author(s)**

guangchuang yu

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