Package ‘paxtoolsr’

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Type Package

Title PaxtoolsR: Access Pathways from Multiple Databases through BioPAX and Pathway Commons

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License LGPL-3

Description The package provides a set of R functions for interacting with BioPAX OWL files using Paxtools and the querying Pathway Commons (PC) molecular interaction database that are hosted by the Computational Biology Center at Memorial Sloan-Kettering Cancer Center (MSKCC). Pathway Commons databases include: BIND, BioGRID, CORUM, CTD, DIP, DrugBank, HPRD, HumanCyc, IntAct, KEGG, MirTarBase, Panther, PhosphoSitePlus, Reactome, RECON, TRANSFAC.

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LazyData true

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**addAttributeList**  
Add attributes using a list of vectors to an igraph object

**Description**
Add attributes using a list of vectors to an igraph object

**Usage**
```
addAttributeList(g, attr, l)
```

**Arguments**
- `g`: an igraph object
- `attr`: the name of the attribute
- `l`: the list of vectors

**Value**
the modified igraph object

---

**convertSifnxIds**  
Convert IDs in a SIFNX

**Description**
Convert IDs in a SIFNX

**Usage**
```
convertSifnxIds(sifnx, participantType = "ProteinReference", idType = "NCBI Gene", mapping = NULL, naRm = TRUE)
```

**Arguments**
- `sifnx`: a SIFNX object (e.g. from the downloadPc2 function)
- `participantType`: the type of participant on which the conversion will occur. Important because not all ID types apply to all entities and otherwise those entities would be labeled as missing an ID.
- `idType`: an ID type for conversion (not used if mapping parameter used)
- `mapping`: a two column data.frame with columns mapping$PARTICIPANT (old IDs to convert from) and mapping$ID (new IDs to convert to)
- `naRm`: remove edges where NA's were introduced due to failed conversions

**Value**
a SIFNX list with nodes and edges. Only edges will have converted IDs
**convertToDF**

---

**convertSifToSpia**  
*Convert SIF Interaction Types to SPIA types*

**Description**

Convert SIF Interaction Types to SPIA types

**Usage**

`convertSifToSpia(edges)`

**Arguments**

- **edges**: a data.frame of interactions; must have `INTERACTION_TYPE` column

**Value**

the edges data.frame with the converted interaction types

---

**convertToDF**  
*Convert Results from readSifnx to data.frame*

**Description**

Convert Results from readSifnx to data.frame

**Usage**

`convertToDF(lst)`

**Arguments**

- **lst**: a list returned from readSifnx

**Value**

a list entries converted to data.frame
convertToDT  

Convert Results from readSifnx to data.table

Description

Convert Results from readSifnx to data.table

Usage

convertToDT(lst)

Arguments

lst  
a list returned from readSifnx

Details

The SIFNX format is an evolving format. Older datasets may not have all the columns this function expects. In these cases, the columns will be added with all NULL entries.

Value

a list entries converted to data.table

downloadFile  

Check Cache and Download File

Description

Check Cache and Download File

Usage

downloadFile(baseUrl, fileName, destDir = NULL,  
cacheEnv = "PAXTOOLSR_CACHE", verbose = FALSE)

Arguments

baseUrl  
a string, entire download URL except filename
fileName  
a string, the filename of file to be downloaded
destDir  
a string, the path where a file should be saved
cacheEnv  
a string, the environment variable that points to the specific cache
verbose  
show debugging information

Details

Description of file formats: http://www.pathwaycommons.org/pc2/formats
**downloadPc2**

*Download Pathway Commons files (uses menu and cache)*

**Description**

Download Pathway Commons files (uses menu and cache)

**Usage**

```r
downloadPc2(selectedFileName = NULL, destDir = NULL, returnNames = NULL, version = "current", verbose = FALSE)
```

**Arguments**

- `selectedFileName`: a string, a name of a file to skip the the interactive selection
- `destDir`: a string, the destination directory for the file to be downloaded (Default: NULL). If NULL, then file will be downloaded to cache directory file.path(Sys.getenv("HOME"), ".paxtoolsRCache")
- `returnNames`: return a vector of names matching the given regular expression
- `version`: a version number for a previous version of Pathway Commons data; versions 3 and above
- `verbose`: a flag to display debugging information (Default: FALSE)

**Value**

an R object using one of the read* methods provided in this package corresponding to the file downloaded

**Examples**

```r
## Not run:
downloadPc2()
downloadPc2(returnNames="ext.*sif")
downloadPc2("PathwayCommons.8.inoh.GSEA.hgnc.gmt.gz", verbose=TRUE)
## End(Not run)
```
downloadSignedPC  

**Description**

Download a SIF file containing only signed interactions

**Usage**

downloadSignedPC(destDir = NULL)

**Arguments**

destDir  
a string, the destination directory for the file to be downloaded (Default: NULL).  
If NULL, then file will be downloaded to cache directory file.path(Sys.getenv("HOME"), 
".paxtoolsRCache")

**Value**

a SIF containing interactions that are considered signed (i.e. interactions causing an increase on decrease in a molecular species)

**Examples**

# downloadSignedPC()

extractIds  

**Description**

Extract IDs from an Extended SIF

**Usage**

extractIds(nodes, participantType = "ProteinReference", 
idType = "hgnc symbol")

**Arguments**

nodes  
extended SIF nodes entries as a data.table (from convertToDT)

participantType  
a vector of types of participants to search; useful to only search protein (ProteinReference) or small molecule (SmallMoleculeReference) related entries.

idType  
the type of ID to search for; case-insensitive

**Details**

IMPORTANT: Only the first matching ID will be returned. In some cases, multiple IDs will exist.
The function `fetch` retrieves a set of IDs from a BioPAX OWL file.

**Description**

This function will create a subsetted object with specified URIs.

**Usage**

```r
fetch(inputFile, outputFile = NULL, idList)
```

**Arguments**

- `inputFile`: a string of the name of the input BioPAX OWL file.
- `outputFile`: a string with the name of the output BioPAX OWL file.
- `idList`: a vector of IDs from the BioPAX OWL file.

**Details**

Only entities in the input BioPAX file will be used in the fetch. IDs used must be URIs for the entities of interest. Additional properties such as cross-references for fetched entities will be included in the output.

**Value**


**Examples**

```r
outFile <- tempfile()
ids <- c("http://identifiers.org/uniprot/P36894", "http://identifiers.org/uniprot/Q13873")
results <- fetch(system.file("extdata", "REACT_12034-3.owl", package="paxtoolsr"), outFile, ids)
```
filterSif

**Keep interactions in SIF network based on certain criteria**

**Description**

Keep interactions in SIF network based on certain criteria

**Usage**

```r
filterSif(sif, interactionTypes = NULL, dataSources = NULL, ids = NULL, edgelist = NULL)
```

**Arguments**

- `sif`: a binary SIF as a data.frame with three columns: "PARTICIPANT_A", "INTERACTION_TYPE", "PARTICIPANT_B"
- `interactionTypes`: a vector of interaction types to be kept (List of interaction types: http://www.pathwaycommons.org/pc2/formats)
- `dataSources`: a vector of data sources to be kept
- `ids`: a vector of IDs to be kept
- `edgelist`: a two-column data.frame where each row is an interaction to be kept. Directionality is ignored (e.g. Edge A B will return interactions A B and B A from SIF)

**Value**

filtered interactions with three columns: "PARTICIPANT_A", "INTERACTION_TYPE", "PARTICIPANT_B". The intersection of multiple filters is returned. The return class is the same as the input: data.frame or data.table

**Examples**

```r
results <- readSif(system.file("extdata", "test_sif.txt", package="paxtoolsr"))
intTypes <- c("controls-state-change-of", "controls-expression-of", "catalysis-precedes")
filteredNetwork <- filterSif(results, intTypes)

tmp <- readSifnx(system.file("extdata", "test_sifnx_250.txt", package="paxtoolsr"))
results <- filterSif(tmp$edges, dataSources=c("INOH", "KEGG"))
results <- filterSif(tmp$edges, ids=c("CHEBI:17640", "MCM3"))
results <- filterSif(tmp$edges, dataSources=c("IntAct"), ids=c("CHEBI:17640", "MCM3"))

tmp <- readSifnx(system.file("extdata", "test_sifnx_250.txt", package="paxtoolsr"))
edgelist <- read.table(system.file("extdata", "test_edgelist.txt", package="paxtoolsr"), sep="\t", header=FALSE, stringsAsFactors=FALSE)
results <- filterSif(tmp$edges, edgelist=edgelist)
```
**getCacheFiles**  
*List files in cache directory*

**Description**  
List files in cache directory

**Usage**  
getCacheFiles()

**Value**  
a vector of the files in the cache directory

**Examples**  
getCacheFiles()

---

**getErrorMessage**  
*Get Error Message for a Pathway Commons Error*

**Description**  
Get Error Message for a Pathway Commons Error

**Usage**  
gErrorMessage(code)

**Arguments**  

code  
a three digit numerical error code

**Value**  
an error message for the code

**Examples**  
results <- getErrorMessage("452")
getNeighbors

Get the neighbors of a set of IDs in a BioPAX file

Description

This function retrieves a set of neighbors for a set of IDs in a BioPAX file.

Usage

getNeighbors(inputFile, outputFile = NULL, idList)

Arguments

- inputFile: a string with the name of the input BioPAX OWL file
- outputFile: a string with the name of the output BioPAX OWL file
- idList: a vector of IDs from the BioPAX OWL file

Details

Only entities in the input BioPAX file will be searched for neighbors. IDs used must be URIs for the entities of interest.

Value

an XMLInternalDocument representing a BioPAX OWL file

Examples

```r
outFile <- tempfile()
results <- getNeighbors(system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr"), outFile, c("HTTP://WWW.REACTOME.ORG/BIOPAX/48887#PROTEIN2360_1_9606", "HTTP://WWW.REACTOME.ORG/BIOPAX/48887#PROTEIN1631_1_9606"))
```

getPc

Get Pathway Commons BioPAX elements

Description

This command retrieves full pathway information for a set of elements such as pathway, interaction or physical entity given the RDF IDs.

Usage

getc(uri, format = "BIOPAX", verbose = FALSE)
**getPcUrl**

**Arguments**

- `uri`: a vector that includes valid/existing BioPAX element’s URI (RDF ID; for utility classes that were "normalized", such as entity references and controlled vocabularies, it is usually a Idntifiers.org URL. Multiple IDs are allowed per query, for example, c("http://identifiers.org/uniprot/Q06609", "http://identifiers.org/uniprot/Q549Z0")
- `format`: output format (Default: BIOPAX). Valid options can be found using `pcFormats`
- `verbose`: a boolean, display the command used to query Pathway Commons

**Details**

Get commands only retrieve the BioPAX elements that are directly mapped to the ID. Use the "traverse query to traverse BioPAX graph and obtain child/owner elements.

Information on MIRIAM and Identifiers.org [http://www.pathwaycommons.org/pc2/#miriam](http://www.pathwaycommons.org/pc2/#miriam)

**Value**

- a XMLInternalDocument object

**See Also**

- `pcFormats`

**Examples**

```r
uri <- "http://identifiers.org/uniprot/O14503"
results <- getPc(uri)

uri <- c("http://identifiers.org/uniprot/O14503", "http://identifiers.org/uniprot/Q9P2X7")
results <- getPc(uri, verbose=TRUE)
```

---

**getPcUrl**

Get base Pathway Commons URL

**Description**

Get base Pathway Commons URL

**Usage**

`getPcUrl()`

**Details**

paxtoolsr will support versions Pathway Commons 5 and later. Old versions of the webservice will not be operational. Users can parse older BioPAX outputs as an alternative.

**Value**

- a string with base Pathway Commons URL
**getShortestPathSif**  
*Get the shortest between two IDs (HGNC or CHEBI)*

**Description**  
Get the shortest between two IDs (HGNC or CHEBI)

**Usage**  
```r  
getShortestPathSif(sif, idA, idB, mode = c("all", "out", "in"),  
                   weights = NULL, filterFun, ...)  
```

**Arguments**

- `sif`: a SIF network
- `idA`: HGNC or CHEBI (CHEBI:XXXXX) ID
- `idB`: HGNC or CHEBI (CHEBI:XXXXX) ID
- `mode`: see `shortest_paths()` in igraph
- `weights`: see `shortest_paths()` in igraph
- `filterFun`: a function to filter multiple paths of the same length
- `...`: additional arguments passed on to `filterFun`

**Value**  
a data.frame representing a SIF network

---

**getSifInteractionCategories**  
*Get a list of categories of SIF interactions*

**Description**  
Get a list of categories of SIF interactions

**Usage**  
```r  
getSifInteractionCategories()  
```

**Details**  
Description of interaction types: http://www.pathwaycommons.org/pc2/formats Categories provided: BetweenProteins, BetweenProteinsOther (often from high-throughput experiments), BetweenProteinSmallMolecule, BetweenSmallMolecules, SignedInteractions
graphPc

Value
a list of interactions in categories

Examples
sifCat <- getSifInteractionCategories()
sifCat[['BetweenProteins']]

---

graphPc

Get Pathway Commons BioPAX elements

Description
This function will retrieve a set of BioPAX elements given a graph query match.

Usage
graphPc(kind, source, target = NULL, direction = NULL, limit = NULL, format = NULL, datasource = NULL, organism = NULL, verbose = FALSE)

Arguments
- **kind**: graph query. Valid options can be found using `pcGraphQueries` See Details for information on graph queries.
- **source**: source object’s URI/ID. Multiple source URIs/IDs are allowed per query, for example c("http://identifiers.org/uniprot/Q06609", "http://identifiers.org/uniprot/Q549Z0") See a note about MIRIAM and Identifiers.org in details
- **target**: [Required for PATHSFROMTO graph query] target URI/ID. Multiple target URIs are allowed per query; for example c("http://identifiers.org/uniprot/Q06609", "http://identifiers.org/uniprot/Q549Z0") See a note about MIRIAM and Identifiers.org in details
- **direction**: [Optional, for NEIGHBORHOOD and COMMONSTREAM algorithms] - graph search direction. Valid options: `pcDirections`
- **limit**: graph query search distance limit (default: 1).
- **format**: output format. Valid options: `pcFormats`
- **datasource**: datasource filter (same as for ‘search’).
- **organism**: organism filter (same as for ‘search’).
- **verbose**: a boolean, display the command used to query Pathway Commons

Value
depending on the the output format a different object may be returned. `pcFormats`

See Also
- `pcFormats`, `pcDirections`
idMapping

Examples

source <- "http://identifiers.org/uniprot/O14503"
#results <- graphPc(source=source, kind="neighborhood", format="EXTENDED_BINARY_SIF")

idMapping

Map IDs to Primary Uniprot or ChEBI IDs

Description

Unambiguously maps, e.g., HGNC gene symbols, NCBI Gene, RefSeq, ENS*, and secondary UniProt identifiers to the primary UniProt accessions, or - ChEBI and PubChem IDs to primary ChEBI. You can mix different standard ID types in one query.

Usage

idMapping(ids, verbose = FALSE)

Arguments

ids a vector of IDs
verbose a boolean, display the command used to query Pathway Commons

Details

This is a specific id-mapping (not general-purpose) for reference proteins and small molecules; it was first designed for internal use, such as to improve BioPAX data integration and allow for graph queries accept not only URIs but also standard IDs. The mapping tables were derived exclusively from Swiss-Prot (DR fields) and ChEBI data (manually created tables and other mapping types and sources can be added in the future versions if necessary).

Value

a list of where each entry is a HGNC symbol provided and the each value is a primary UniProt or ChEBI ID.

Examples

genes <- c("BRCA2", "TP53")
#results <- idMapping(genes)
**integrateBiopax**  
*Integrate two BioPAX OWL files (DEPRECATED)*

**Description**
This function merges two BioPAX OWL files.

**Usage**
```
integrateBiopax(inputFile1, inputFile2, outputFile = NULL)
```

**Arguments**
- `inputFile1`: a string of the name of the input BioPAX OWL file
- `inputFile2`: a string of the name of the input BioPAX OWL file
- `outputFile`: a string of the name of the output integrated BioPAX OWL file

**Details**
This method is deprecated. Use `mergeBiopax` instead.

**Value**
an XMLInternalDocument representing a BioPAX OWL file

**See Also**
`mergeBiopax`

**Examples**
```
outFile <- tempfile()
results <- integrateBiopax(system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr"),
                          system.file("extdata", "dna_replication.owl", package="paxtoolsr"),
                          outFile)
```

---

**loadSifInIgraph**  
*Load SIF as igraph Network*

**Description**
Load SIF as igraph Network

**Usage**
```
loadSifInIgraph(sif, directed = TRUE)
```
Arguments

sif  
a binary SIF as a data.frame with three columns: "PARTICIPANT_A", "INTERACTION_TYPE", "PARTICIPANT_B"
directed  
a boolean weather the returned graph should be directed (DEFAULT: TRUE)

Details

Users are likely to run into issues if the input SIF has factor levels

Value

a directed igraph network with interaction types

Examples

```
results <- readSif(system.file("extdata", "test_sif.txt", package="paxtoolsr"))
g <- loadSifInIgraph(results)
```

mapValues

Map values from One Vector to Another

Description

Map values from One Vector to Another

Usage

```
mapValues(data, oldValue, newValue)
```

Arguments

data  
a vector of strings where values will be replaced
oldValue  
a vector that matches values in the data vector
newValue  
a vector of new values that will replace the old values

Value

return the vector with the mapped values. If there was no corresponding entry then replace it with an NA.

Examples

```
data <- c("A", "B", "C", "X", "Y", "Z")
oldValue <- LETTERS[1:20]
newValue <- letters[1:20]
results <- mapValues(data, oldValue, newValue)
```
mergeBiopax  

Merges two BioPAX OWL files

**Description**

This function merges two BioPAX OWL files.

**Usage**

```r
mergeBiopax(inputFile1, inputFile2, outputFile = NULL)
```

**Arguments**

- `inputFile1`: a string of the name of the input BioPAX OWL file.
- `inputFile2`: a string of the name of the input BioPAX OWL file.
- `outputFile`: a string of the name of the output merged BioPAX OWL file (Optional).

**Details**

Only entities that share IDs will be merged. No additional merging occurs on cross-references. Merging may result in warning messages caused as a result of redundant actions being checked against by the Java library; these messages may be ignored.

**Value**


**Examples**

```r
outFile <- tempfile()
results <- mergeBiopax(system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr"),
                       system.file("extdata", "dna_replication.owl", package="paxtoolsr"),
                       outFile)
```

---

**pcDirections**  

Acceptable Pathway Commons Directions

**Description**

A simple function to see valid options.

**Usage**

```r
pcDirections()
```
Details

- BOTHSTREAM where the current entity can either be the source or target of an interaction
- DOWNSTREAM where the current entity can only be the source
- UPSTREAM where the current entity can only be the target

Value

acceptable Pathway Commons directions

Examples

pcDirections()
pcGraphQueries  

Acceptable Pathway Commons Graph Queries

**Description**

A simple function to see valid options

**Usage**

`pcGraphQueries()`

**Details**

- **COMMONSTREAM** searches common downstream or common upstream of a specified set of entities based on the given directions within the boundaries of a specified length limit
- **NEIGHBORHOOD** searches the neighborhood of given source set of nodes
- **PATHSBETWEEN** finds the paths between specific source set of states or entities within the boundaries of a specified length limit
- **PATHSFROMTO** finds the paths from a specific source set of states or entities to a specific target set of states or entities within the boundaries of a specified length limit

**Value**

acceptable Pathway Commons graph queries

**Examples**

`pcGraphQueries()`

---

processPcRequest  

Process Pathway Commons request in various formats

**Description**

Process Pathway Commons request in various formats

**Usage**

`processPcRequest(content, format)`

**Arguments**

- `content`  
  a string, content to be processed
- `format`  
  a string, the type of format

**Value**

an R object using one of the read* methods provided in this package corresponding to the format
See Also

cfFormats

Examples

efileName <- system.file("extdata", "test_biopax.owl", package="paxtoolsr")
content <- readChar(efileName, file.info(efileName)$size)
results <- processPcRequest(content, "BIOPAX")

---

readBiopax

Description

Read BioPAX files as XML documents

Usage

readBiopax(inputFile)

Arguments

inputFile an inputFile

Value

an XMLInternalDocument

Examples

results <- readBiopax(system.file("extdata", "biopax3-short-metabolic-pathway.owl", package="paxtoolsr"))

---

readGmt

Description

Read in gene sets from GMT files

Usage

readGmt(inputFile)

Arguments

inputFile an inputFile
Value
a named list where each entry corresponds to a gene set

Examples
```
results <- readGmt(system.file("extdata", "test_gsea.gmt", package="paxtoolsr"))
```

readSbgn
Read SBGN files as XML documents

Description
Read SBGN files as XML documents

Usage
```
readSbgn(inputFile)
```

Arguments
inputFile an inputFile

Value
an XMLInternalDocument

Examples
```
results <- readSbgn(system.file("extdata", "test_sbgn.xml", package="paxtoolsr"))
```

readSif
Read in a binary SIF file

Description
Read in a binary SIF file

Usage
```
readSif(inputFile)
```

Arguments
inputFile an inputFile

Value
a data.frame with the interactions in the binary SIF format
Examples

```r
results <- readSif(system.file("extdata", "test_sif.txt", package="paxtoolsr"))
```

---

**readSifnx**  
*Read in a Extended SIF file*

**Description**  
Read in a Extended SIF file

**Usage**

```r
readSifnx(inputFile, asDT = TRUE)
```

**Arguments**

- `inputFile`: an inputFile
- `asDT`: TODO

**Details**

SIFNX files from Pathway Commons commonly come a single file that includes a tab-delimited sections for nodes and another for edges. The sections are separated by an empty lines. These sections must be split before they are read.

**Value**

a list with nodes and edges entries

**Examples**

```r
results <- readSifnx(system.file("extdata", "test_sifnx.txt", package="paxtoolsr"))
chebiIds <- lapply(results$nodesUniXref, function(x) { x[which(grepl("CHEBI", x))] })
```

---

**searchListOfVectors**  
*Search List of Vectors*

**Description**

Search List of Vectors

**Usage**

```r
searchListOfVectors(q, lst)
```

**Arguments**

- `q`: query vector
- `lst`: list of vectors to search
Details

Taken from: http://stackoverflow.com/questions/11002391/fast-way-of-getting-index-of-match-in-list

Value

A list of vectors with the same length as the query vector, each list entry will have indicies for lst where there was a match with the query vector. Return NA if there were no matches.

Examples

```
lst <- list(1:3, 3:5, 3:7)
q <- c(3, 5)
results <- searchListOfVectors(q, lst)
names(results) <- q

lst <- list(LETTERS[1:3], LETTERS[3:5], LETTERS[3:7])
q <- c("C", "E")
searchListOfVectors(q, lst)

lst <- list(LETTERS[3], LETTERS[4:6])
q <- "C"
searchListOfVectors(q, lst)

lst <- list(LETTERS[3], LETTERS[4:6])
q <- c("C")
searchListOfVectors(q, lst)

lst <- list(LETTERS[3], LETTERS[4:6])
q <- c("C", "E")
searchListOfVectors(q, lst)

lst <- list(LETTERS[3], LETTERS[4:6])
q <- "Z"
searchListOfVectors(q, lst)
```

Description

This command provides a text search using the Lucene query syntax.

Usage

```
searchPc(q, page = 0, datasource = NULL, organism = NULL, type = NULL, verbose = FALSE)
```
Arguments

- **q**: a keyword, name, external identifier, or a Lucene query string.
- **page**: an integer giving the search result page number (N>=0, default: 0)
- **datasource**: a vector that is a filter by data source (use names or URIs of pathway data sources or of any existing Provenance object). If multiple data source values are specified, a union of hits from specified sources is returned. For example, datasource as c(“reactome”, “pid”) returns hits associated with Reactome or PID.
- **organism**: a vector that is an organism filter. The organism can be specified either by official name, e.g. "homo sapiens" or by NCBI taxonomy id, e.g. "9606". Similar to data sources, if multiple organisms are declared a union of all hits from specified organisms is returned. For example organism as c("9606", "10016") returns results for both human and mice. Only humans, "9606" is officially supported.
- **type**: BioPAX class filter. See Details.
- **verbose**: a boolean, display the command used to query Pathway Commons

Details

Indexed fields were selected based on most common searches. Some of these fields are direct BioPAX properties, others are composite relationships. All index fields are (case-sensitive):comment, ecnumber, keyword, name, pathway, term, xrefdb, xrefid, dataSource, and organism. The pathway field maps to all participants of pathways that contain the keyword(s) in any of its text fields. This field is transitive in the sense that participants of all sub-pathways are also returned. Finally, keyword is a transitive aggregate field that includes all searchable keywords of that element and its child elements - e.g. a complex would be returned by a keyword search if one of its members has a match. Keyword is the default field type. All searches can also be filtered by data source and organism. It is also possible to restrict the domain class using the 'type' parameter. This query can be used standalone or to retrieve starting points for graph searches. Search strings are case insensitive unless put inside quotes.

BioPAX classes can be found at [http://www.pathwaycommons.org/pc2/#biopax_types](http://www.pathwaycommons.org/pc2/#biopax_types)

Value

an XMLInternalDocument with results

Examples

```r
query <- "Q06609"
#results <- searchPc(query)

query <- "glycolysis"
#results <- searchPc(query, type="Pathway")
```

Description

Extension on testthat code
Usage

skip_on_bioc()

Value

A boolean or NULL is returned

splitSifnxByPathway  Splits SIFNX entries into individual pathways

Description

Splits SIFNX entries into individual pathways

Usage

splitSifnxByPathway(edges, parallel = FALSE)

Arguments

edges a data.frame with SIF content with the additional column "PATHWAY_NAMES".
"PATHWAY_NAMES" should include pathway names delimited with a semi-colon ";".

parallel a boolean that will parallelize the process; requires foreach/doSNOW/parallel packages

Details

This method can be slow; ~1.5 minutes for 150K+ rows. Has a parallelized method to speed things up.

Value

a list of where each entry is a vector of row indicies for a given pathway

summarize  Summarize a BioPAX file

Description

This function provides a summary of BioPAX classes.

Usage

summarize(inputFile)

Arguments

inputFile a string of the name of the input BioPAX OWL file
summarizeSif

Details

BioPAX classes are defined by the BioPAX specification: http://www.biopax.org/

Value

list with BioPAX class counts

Examples

```
summary <- summarize(system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr"))
```

```r
summarizeSif

Summarize a SIF Network

Description

Summarize a SIF Network

Usage

summarizeSif(sif)

Arguments

sif

a binary SIF as a data.frame with three columns: "PARTICIPANT_A", "INTERACTION_TYPE", "PARTICIPANT_B"

Value

a list containing a count of the unique genes in the SIF and counts for the interaction types in the network

Examples

```
results <- readSif(system.file("extdata", "test_sif.txt", package="paxtoolsr"))
summarizeSif(results)
```
toGSEA

**Converts a BioPAX OWL file to a GSEA GMT gene set**

**Description**

This function converts pathway information stored as BioPAX files into the GSEA .gmt format.

**Usage**

toGSEA(inputFile, outputFile = NULL, database, crossSpeciesCheckFlag)

**Arguments**

- **inputFile**
  - a string of the name of the input OWL file
- **outputFile**
  - a string of the name of the output file
- **database**
  - a string of the name of the identifier type to be included (e.g. "HGNC Symbol")
- **crossSpeciesCheckFlag**
  - a boolean that ensures participant protein is from same species

**Details**

The GSEA GMT format is a tab-delimited format where each row represents a gene set. The first column is the gene set name. The second column is a brief description. Other columns for each row contain genes in the gene set; these rows may be of unequal lengths.

**Value**

see readGmt()

**Examples**

```r
crossSpeciesCheckFlag=TRUE)
```

---

toLevel3

**Convert a PSIMI or older BioPAX OWL file to BioPAX Level 3**

**Description**

This file will convert PSIMI or older BioPAX objects to BioPAX Level 3

**Usage**

toLevel3(inputFile, outputFile = NULL)
topPathways

Arguments

inputFile a string of the name of the input file
outputFile a string of the name of the output BioPAX OWL file

Value

an XMLInternalDocument representing a BioPAX OWL file

Examples

inputFile <- system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr")
outFile <- tempfile()
results <- toLevel3(inputFile, outFile)

topPathways Retrieve top pathways

Description

This command returns all "top" pathways.

Usage

topPathways(datasource = NULL, organism = NULL, verbose = FALSE)

Arguments

datasource filter by data source (same as for 'search').
organism organism filter (same as for 'search').
verbose a boolean, display the command used to query Pathway Commons

Details

Pathways that are neither 'controlled' nor 'pathwayComponent' of another process.

Value

a data.frame with the following columns:

• uri URI ID for the pathway
• biopaxClass the type of BioPAX object
• name a human readable name
• dataSource the dataSource for the pathway
• organism an organism identifier
• pathway URI ID for the pathway

Examples

datasource <- "panther"
#results <- topPathways(datasource=datasource)
### toSBGN

**Convert a BioPAX OWL file to SBGNML**

**Description**

This function will convert a BioPAX OWL file into the Systems Biology Graphical Notation (SBGN) Markup Language (SBGNML) XML representation.

**Usage**

```r
toSBGN(inputFile, outputFile = NULL)
```

**Arguments**

- `inputFile` a string of the name of the input BioPAX OWL file
- `outputFile` a string of the name of the output SBGNML file

**Details**

Objects in the SBGNML format are laid out using a Compound Spring Embedder (CoSE) layout.

**Value**

see `readSbgn()`

**References**


**Examples**

```r
outFile <- tempfile()
results <- toSBGN(system.file("extdata", "biopax3-short-metabolic-pathway.owl", package="paxtoolsr"), outFile)
```

### toSif

**Convert a BioPAX OWL file to SIF**

**Description**

Convert a BioPAX OWL file to a binary SIF file.

**Usage**

```r
toSif(inputFile, outputFile = NULL)
```
toSifnx

Arguments

inputFile a string of the name of the input BioPAX OWL file
outputFile a string of the name of the output SIF file (Optional)

Details

Information on SIF conversion is provided on the Pathway Commons site: http://www.pathwaycommons.org/pc2/

Value

see readSif()

Examples

outFile <- tempfile()
results <- toSif(system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr"), outFile)

toSifnx

Converts BioPAX OWL file to extended binary SIF representation

Description

Converts BioPAX OWL file to extended binary SIF representation

Usage

toSifnx(inputFile, outputFile = tempfile())

Arguments

inputFile a string with the name of the input BioPAX OWL file
outputFile a string with the name of the output file for SIFNX information

Details

Information on SIF conversion is provided on the Pathway Commons site: http://www.pathwaycommons.org/pc2/

Value

see readSifnx()

Examples

inputFile <- system.file("extdata", "raf_map_kinase_cascade_reactome.owl", package="paxtoolsr")
results <- toSifnx(inputFile=inputFile)
traverse

Access Pathway Commons using XPath-type expressions

Description

This command provides XPath-like access to the Pathway Commons.

Usage

traverse(uri, path, verbose = FALSE)

Arguments

uri a BioPAX element URI - specified similarly to the 'GET' command above). Multiple IDs are allowed (uri=...&uri=...&uri=...).

path a BioPAX property path in the form of property1[:type1]/property2[:type2]; see properties, inverse properties, Paxtools, org.biopax.paxtools.controller.PathAccessor.

verbose a boolean, display the command used to query Pathway Commons

Details

With traverse users can explicitly state the paths they would like to access. The format of the path query is in the form: [Initial Class][property1][classRestriction(optional)][property2]... A "*" sign after the property instructs path accessor to transitively traverse that property. For example, the following path accessor will traverse through all physical entity components within a complex: "Complex/component*/entityReference/xref:UnificationXref" The following will list display names of all participants of interactions, which are components (pathwayComponent) of a pathway (note: pathwayOrder property, where same or other interactions can be reached, is not considered here): "Pathway/pathwayComponent:Interaction/participant*/displayName" The optional parameter classRestriction allows to restrict/filter the returned property values to a certain subclass of the range of that property. In the first example above, this is used to get only the Unification Xrefs. Path accessors can use all the official BioPAX properties as well as additional derived classes and parameters in paxtools such as inverse parameters and interfaces that represent anonymous union classes in OWL. (See Paxtools documentation for more details).

Value

an XMLInternalDocument with results

References

Paxtools Documentation: http://www.biopax.org/m2site/

Examples

uri <- "http://identifiers.org/uniprot/P38398"
#results <- traverse(uri=uri, path="ProteinReference/organism/displayName")
validate

Validate BioPAX files

Description

This function validates BioPAX files for errors.

Usage

validate(inputFile, outputFile = NULL, type = c("xml", "html", "biopax"),
        autoFix = FALSE, onlyErrors = FALSE, maxErrors = NULL,
        notStrict = FALSE)

Arguments

inputFile a string of the name of the input BioPAX OWL file
outputFile a string of the name of the output file containing validation results
type a string denoting the type of output: xml (default), html, biopax
autoFix a boolean that determines if the input file should be fixed automatically. Errors
         that can be automatically fixed include generating displayName properties from
         names, inferring organism, and inferring dataSource
onlyErrors a boolean of whether to only display errors
maxErrors a integer denoting the number of errors to return
notStrict a boolean of whether to be strict in validation (default: FALSE)

Details

See the publication by Rodchenkov, et al. for information on the BioPAX validator. See http://
biopax.baderlab.org/validator for additional information on validator. See http://biopax.
baderlab.org/validator/errorTypes.html for information on error types.

Value

an XMLInternalDocument is returned if type is set to "xml" otherwise the location of the outputfile
is returned.

References

nih.gov/pubmed/23918249

Examples

outFile <- tempfile()
rawDoc <- validate(system.file("extdata", "raf_map_kinase_cascade_reactome.owl",
                          package="paxtoolsr"), onlyErrors=TRUE)
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