

# Package ‘BiocPkgTools’

April 15, 2020

**Type** Package

**Title** Collection of simple tools for learning about Bioc Packages

**Version** 1.4.6

**Date** 2020-03-14

**Description** Bioconductor has a rich ecosystem of metadata around packages, usage, and build status. This package is a simple collection of functions to access that metadata from R. The goal is to expose metadata for data mining and value-added functionality such as package searching, text mining, and analytics on packages.

**Depends** htmlwidgets

**Imports** BiocFileCache, BiocManager, biocViews, tibble, methods, rlang, tidyselect, stringr, rvest, rex, dplyr, xml2, rappdirs, readr, httr, htmltools, DT, tools, utils, igraph, tidyr, jsonlite, gh, RBGL, graph, magrittr

**VignetteBuilder** knitr

**Suggests** BiocStyle, knitr, rmarkdown, testthat, tm, SnowballC, pdftools, visNetwork, clipr, blastula, kableExtra

**License** MIT + file LICENSE

**BugReports** <https://github.com/seandavi/BiocPkgTools/issues/new>

**URL** <https://github.com/seandavi/BiocPkgTools>

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.0

**SystemRequirements** mailsend-go

**biocViews** Software, Infrastructure

**git\_url** <https://git.bioconductor.org/packages/BiocPkgTools>

**git\_branch** RELEASE\_3\_10

**git\_last\_commit** 43e56c1

**git\_last\_commit\_date** 2020-03-16

**Date/Publication** 2020-04-14

**Author** Shian Su [aut, ctb],  
 Lori Shepherd [ctb],  
 Marcel Ramos [ctb],  
 Felix Ernst [ctb],  
 Charlotte Soneson [ctb],  
 Martin Morgan [ctb],  
 Vince Carey [ctb],  
 Sean Davis [aut, cre]

**Maintainer** Sean Davis <seandavi@gmail.com>

## R topics documented:

biocBuildEmail . . . . .	2
biocBuildReport . . . . .	4
biocDownloadStats . . . . .	4
biocExplore . . . . .	5
biocPkgList . . . . .	5
BiocPkgTools . . . . .	6
BiocPkgTools-cache . . . . .	7
buildPkgDependencyDataFrame . . . . .	8
buildPkgDependencyIgraph . . . . .	9
CRANstatus . . . . .	10
dataciteXMLGenerate . . . . .	11
firstInBioc . . . . .	11
generateBiocPkgDOI . . . . .	12
getBiocVignette . . . . .	13
getPackageInfo . . . . .	14
get_bioc_data . . . . .	14
githubDetails . . . . .	15
githubURLParts . . . . .	16
inducedSubgraphByPkgs . . . . .	16
pkgCombDependencyGain . . . . .	17
pkgDepImports . . . . .	18
pkgDepMetrics . . . . .	18
problemPage . . . . .	19
subgraphByDegree . . . . .	19
<b>Index</b>	<b>21</b>

---

biocBuildEmail

*Create and copy e-mail package notification template to clipboard*

---

## Description

The `biocBuildEmail` function provides a template for notifying maintainers of errors in the Bioconductor Build System (BBS). This convenience function returns the body of the email from a template within the package and provides a copy in the clipboard.

**Usage**

```

biocBuildEmail(
  pkg,
  version = c("release", "devel"),
  PS = character(1L),
  emailTemplate = .getTemplatePath(),
  core.name = NULL,
  core.email = NULL,
  core.id = NULL,
  textOnly = FALSE,
  dry.run = TRUE,
  resend = FALSE
)

sentHistory()

```

**Arguments**

pkg	character(1) The name of the package in trouble
version	character() A vector indicating which version of Bioconductor the package is failing in (either 'release' or 'devel'; defaults to both)
PS	character(1) Postscript, an additional note to the recipient of the email (i.e., the package maintainer)
emailTemplate	character(1) The path to the email template. The default path lies in the 'inst' package folder.
core.name	character(1) The full name of the core team member
core.email	character(1) The Roswell Park email of the core team member
core.id	character(1) The internal identifier for the Roswell employee. This ID usually matches <code>^[A-Z]2[0-9]5</code> for more recent identifiers.
textOnly	logical(1) Whether to return the text of the email only. This avoids the use of the 'blastula' package and adds the text to the system clipboard if the 'clipr' package is installed (default: FALSE)
dry.run	logical(1) Display the email without sending to the recipient. It only works for HTML email reports and ignored when <code>'textOnly=TRUE'</code>
resend	logical(1) Whether to force a resend of the email

**Value**

A character string of the email

**sentHistory**

Check the history of emails sent

---

biocBuildReport      *Tidy Bioconductor build report results*

---

### Description

The online Bioconductor build reports are great for humans to look at, but they are not easily computable. This function scrapes HTML and text files available from the build report online pages to generate a tidy data frame version of the build report.

### Usage

```
biocBuildReport(version = as.character(BiocManager::version()))
```

### Arguments

**version**      character(1) the version number as used to access the online build report. For example, "3.6". The default is the "current version" as specified in `BiocManager::version`. Note that this is a `character()` variable, not a number.

### Value

A `tbl_df` object with columns `pkg`, `version`, `author`, `commit`, `date`, `node`, `stage`, and `result`.

### Examples

```
# Set the stage--what version of Bioc am
# I using?
BiocManager::version()

latest_build = biocBuildReport()
head(latest_build)
```

---

biocDownloadStats      *Get Bioconductor download statistics*

---

### Description

Get Bioconductor download statistics

### Usage

```
biocDownloadStats()
```

### Details

Note that Bioconductor package download stats are not version-specific.

### Value

A `data.frame` of download statistics for all Bioconductor packages, in tidy format

**Examples**

```
biocDownloadStats()
```

---

biocExplore	<i>Explore Bioconductor packages interactively</i>
-------------	--

---

**Description**

Explore Bioconductor packages through an interactive bubble plot. Click on bubbles to bring up additional information about the package. Size and proximity to center of a bubble is based on the downloads the package has in the past month.

**Usage**

```
biocExplore(top = 500L, ...)
```

**Arguments**

top	maximum number of packages displayed in any biocView
...	parameters passed to <code>htmlwidgets::createWidget()</code>

**Value**

A bubble plot of Bioconductor packages

---

biocPkgList	<i>Get full Bioconductor software package listing, with details</i>
-------------	---

---

**Description**

The BiocViews-generated VIEWS file is available for Bioconductor release and devel repositories. It contains quite a bit more information from the package DESCRIPTION files than the PACKAGES file. In particular, it contains biocViews annotations and URLs for vignettes and developer URLs.

**Usage**

```
biocPkgList(  
  version = BiocManager::version(),  
  repo = "BioCsoft",  
  addBiocViewParents = TRUE  
)
```

**Arguments**

version	The requested Bioconductor version. Will default to use the BiocManager defaults (ie., <code>version()</code> ).
repo	The requested bioconductor repository. The default will be the Bioconductor software repository: BioCsoft. Available repos include: "BioCsoft", "BioCann", "BioCexp", "BioCworkflows", and "CRAN". Note that not all repos are available for all versions, particularly older versions (but who would use those, right?).
addBiocViewParents	<code>logical()</code> , whether to add all biocViews parents to biocViews annotations.

**Details**

Since packages are annotated with the most specific views, the default functionality here is to add parent terms for all views for each package. For example, in the bioCsoft repository, all packages will have at least "Software" added to their biocViews. If one wants to stick to only the most specific terms, set `addBiocViewParents` to `FALSE`.

**Value**

An object of class `tbl_df`.

**Examples**

```
bpkgl = biocPkgList()
bpkgl
unlist(bpkgl[[1, 'Depends']])

# Get a list of all packages that
# import "GEOquery"
library(dplyr)
bpkgl %>%
  filter(Package=='GEOquery') %>%
  pull(c('importsMe'))
```

---

BiocPkgTools

*BiocPkgTools: Examine and analyze Bioconductor package metadata*


---

**Description**

Bioconductor has a rich ecosystem of metadata around packages, usage, and build status. This package is a simple collection of functions to access that metadata from R. The goal is to expose metadata for data mining and value-added functionality such as package searching, text mining, and analytics on packages.

**For developers**

The `biocBuildReport` function returns a computable form of the Bioconductor Build Report.

**For users**

The `biocDownloadStats` function gets Bioconductor download stats, allowing users to quickly find commonly used packages. The `biocPkgList` is useful for getting a complete listing of all Bioconductor packages.

**Infrastructure**

Bioconductor packages all have Digital Object Identifiers (DOIs). This package contains basic infrastructure for creating, updating, and de-referencing DOIs.

---

BiocPkgTools-cache      *Manage cache for BiocPkgTools*

---

**Description**

Managing user data is important to allow use of email functions such as ‘`biocBuildEmail`’ and made easy with ‘`BiocFileCache`’.

**Usage**

```
setCache(
  directory = rappdirs::user_cache_dir("BiocPkgTools"),
  verbose = TRUE,
  ask = interactive()
)

pkgToolsCache(...)
```

**Arguments**

directory	The file location where the cache is located. Once set future downloads will go to this folder.
verbose	Whether to print descriptive messages
ask	logical (default TRUE when interactive session) Confirm the file location of the cache directory
...	For <code>pkgToolsCache</code> , arguments are passed to <code>setCache</code>

**pkgToolsCache**

Get the directory location of the cache. It will prompt the user to create a cache if not already created. A specific directory can be used via `setCache`.

**setCache**

Specify the directory location of the data cache. By default, it will go to the user’s home/.cache and "appname" directory as specified by `user_cache_dir`. (default appname: `pkgToolsCache`)

---

`buildPkgDependencyDataFrame`*Work with Bioconductor package dependencies*

---

## Description

Bioconductor is built using an extensive set of core capabilities and data structures. This leads to package developers depending on other packages for interoperability and functionality. This function extracts package dependency information from `biocPkgList` and returns a `data.frame` that can be used for analysis and to build graph structures of package dependencies.

## Usage

```
buildPkgDependencyDataFrame(  
  dependencies = c("Depends", "Imports", "Suggests"),  
  ...  
)
```

## Arguments

`dependencies` `character()` vector including one or more of "Depends", "Imports", or "Suggests". Default is to include all possibilities.

`...` parameters passed along to `biocPkgList`

## Value

A `data.frame` (also a `tbl_df`) of S3 class "biocDepDF" including columns "Package", "dependency", and "edgetype".

## Note

This function requires network access.

## See Also

See [buildPkgDependencyIgraph](#), [biocPkgList](#).

## Examples

```
# performs a network call, so must be online.  
library(BiocPkgTools)  
depdf = buildPkgDependencyDataFrame()  
head(depdf)  
library(dplyr)  
# filter to include only "Imports" type  
# dependencies  
imports_only = depdf %>% filter(edgetype=='Imports')  
  
# top ten most imported packages  
imports_only %>% select(dependency) %>%  
  group_by(dependency) %>% tally() %>%  
  arrange(desc(n))
```



```
# Bioconductor packages doing the largest
# amount of importing
largest_importers = imports_only %>%
  select(Package) %>%
  group_by(Package) %>% tally() %>%
  arrange(desc(n))

# not sure what these packages do. Join
# to their descriptions
biocPkgList() %>% select(Package, Description) %>%
  left_join(largest_importers) %>% arrange(desc(n)) %>%
  head()
```

---

buildPkgDependencyIgraph

*Work with package dependencies as a graph*

---

## Description

Package dependencies represent a directed graph (though Bioconductor dependencies are not an acyclic graph). This function simply returns an igraph graph from the package dependency data frame from a call to [buildPkgDependencyDataFrame](#) or any tidy data frame with rows of (Package, dependency) pairs. Additional columns are added as igraph edge attributes (see [graph\\_from\\_data\\_frame](#)).

## Usage

```
buildPkgDependencyIgraph(pkgDepDF)
```

## Arguments

pkgDepDF            a tidy data frame. See description for details.

## Value

An igraph directed graph. See the igraph package for details of what can be done.

## See Also

See [buildPkgDependencyDataFrame](#), [graph\\_from\\_data\\_frame](#), [inducedSubgraphByPkgs](#), [subgraphByDegree](#), [igraph-es-indexing](#), [igraph-vs-indexing](#)

## Examples

```
library(igraph)

pkg_dep_df = buildPkgDependencyDataFrame()

# at this point, filter or join to manipulate
# dependency data frame as you see fit.

g = buildPkgDependencyIgraph(pkg_dep_df)
g
```

```
# Look at nodes and edges
head(V(g)) # vertices
head(E(g)) # edges

# subset graph by attributes

head(sort(degree(g, mode='in'), decreasing=TRUE))
head(sort(degree(g, mode='out'), decreasing=TRUE))
```

---

CRANstatus

*Check the CRAN build report page and email a notification*


---

## Description

The CRANstatus function allows users to check the status of a package and send an email report of any failures.

## Usage

```
CRANstatus(
  pkg,
  core.name = NULL,
  core.email = NULL,
  core.id = NULL,
  to.mail = "maintainer@bioconductor.org",
  dry.run = TRUE,
  emailTemplate = .getTemplatePath("cranreport")
)
```

## Arguments

pkg	character(1) The name of the package in trouble
core.name	character(1) The full name of the core team member
core.email	character(1) The Roswell Park email of the core team member
core.id	character(1) The internal identifier for the Roswell employee. This ID usually matches <code>^[A-Z]2[0-9]5</code> for more recent identifiers.
to.mail	The email of the CRAN report recipient
dry.run	logical(1) Display the email without sending to the recipient. It only works for HTML email reports and ignored when <code>textOnly=TRUE</code>
emailTemplate	character(1) The path to the email template. The default path lies in the <code>'inst'</code> package folder.

---

dataciteXMLGenerate    *Bioc datacite XML generator*

---

**Description**

Bioc datacite XML generator

**Usage**

```
dataciteXMLGenerate(pkg)
```

**Arguments**

pkg                    The name of a Bioconductor package

**Value**

An XML element

---

firstInBioc            *When did a package enter Bioconductor?*

---

**Description**

This function uses the biocDownloadStats data to *\*approximate\** when a package entered Bioconductor. Note that the download stats go back only to 2009.

**Usage**

```
firstInBioc(download_stats)
```

**Arguments**

download\_stats    a data.frame from [biocDownloadStats](#)

**Examples**

```
dls <- biocDownloadStats()
tail(firstInBioc(dls))
```

---

generateBiocPkgDOI      *Generate a DOI for a Bioconductor package*

---

## Description

This function makes calls out to the EZID API (v2) described here: <https://ezid.lib.purdue.edu/doc/apidoc.2.html>. The function creates a new DOI for a Bioconductor package (cannot already exist). The target URL for the DOI is the short Bioconductor package URL.

## Usage

```
generateBiocPkgDOI(pkg, authors, pubyear, testing = TRUE)
```

## Arguments

pkg	character(1) package name
authors	character vector of authors (will be "pasted" together)
pubyear	integer(1) publication year
testing	logical(1) If true, will use the apitest user with the password apitest. These DOIs will expire. The same apitest:apitest combination can be used to login to the EZID website for doing things using the web interface. If false, the Bioconductor-specific user credentials should be in the correct environment variables

## Details

The login information for the "real" Bioconductor account should be stored in the environment variables "EZID\_USERNAME" and "EZID\_PASSWORD".

The GUI is available here: <https://doi.datacite.org/>.

## Value

The DOI as a character(1) vector.

## Examples

```
## Not run:  
x = generateBiocPkgDOI('RANDOM_TEST_PACKAGE', 'Sean Davis', 1972)  
  
## End(Not run)
```

---

`getBiocVignette`*Download a Bioconductor vignette*

---

## Description

The actual vignette path is available using [biocPkgList](#).

## Usage

```
getBiocVignette(  
  vignettePath,  
  destfile = tempfile(),  
  version = BiocManager::version()  
)
```

## Arguments

<code>vignettePath</code>	character(1) the additional path information to get to the vignette
<code>destfile</code>	character(1) the file location to store the vignette
<code>version</code>	character(1) such as "3.7", defaults to user version

## Value

character(1) The filename of the downloaded vignette

## Examples

```
x = biocPkgList()  
tmp = getBiocVignette(x$vignettes[[1]][1])  
tmp  
  
## Not run:  
library(pdftools)  
y = pdf_text(tmp)  
y = paste(y, collapse=" ")  
library(tm)  
v = VCorpus(VectorSource(y))  
library(magrittr)  
  
v <- v %>%  
  tm_map(stripWhitespace) %>%  
  tm_map(content_transformer(tolower)) %>%  
  tm_map(removeWords, stopwords("english")) %>%  
  tm_map(stemDocument)  
dtm = DocumentTermMatrix(v)  
inspect(DocumentTermMatrix(v,  
  list(dictionary = as.character(x$Package))))  
  
## End(Not run)
```

---

getPackageInfo	<i>Generate needed information to create DOI from a package directory.</i>
----------------	--

---

**Description**

Generate needed information to create DOI from a package directory.

**Usage**

```
getPackageInfo(dir)
```

**Arguments**

dir                    character(1) Path to package

**Value**

A data.frame

---

get_bioc_data	<i>Get data from Bioconductor</i>
---------------	-----------------------------------

---

**Description**

Get data from Bioconductor

**Usage**

```
get_bioc_data()
```

**Value**

A JSON string containing Bioconductor package details

**Examples**

```
bioc_data <- get_bioc_data()
```

---

githubDetails	<i>Get package details from GitHub</i>
---------------	--

---

### Description

For packages that live on GitHub, we can mine further details. This function returns the GitHub details for the listed packages.

### Usage

```
githubDetails(pkgs, sleep = 0)
```

### Arguments

pkgs	a character() vector of username/repo for one or more GitHub repos, such as 'seandavi/GEOquery'.
sleep	numeric() denoting the number of seconds to sleep between GitHub API calls. Since GitHub rate limits its APIs, it might be necessary to either use small chunks of packages iteratively or to supply a non-zero argument here. See the 'details' section for a better solution using GitHub tokens.

### Details

The `gh` function is used to do the fetching. If the number of packages supplied to this function is large (>40 or so), it is possible to run into problems with API rate limits. The `gh` package uses the environment variable "GITHUB\_PAT" (for personal access token) to authenticate and then provide higher rate limits. If you run into problems with rate limits, set `sleep` to some small positive number to slow queries. Alternatively, create a Personal Access Token on GitHub and register it. See the `gh` package for details.

### Examples

```
pkglist = biocPkgList()

# example of "pkgs" format.
head(pkglist$URL)

gh_list = githubURLParts(pkglist$URL)
gh_list = gh_list[!is.null(gh_list$user_repo),]

head(gh_list$user_repo)

ghd = githubDetails(gh_list$user_repo[1:5])
lapply(ghd, '[["', "stargazers")
```

---

githubURLParts	<i>Extract GitHub user and repo name from GitHub URL</i>
----------------	--

---

**Description**

Extract GitHub user and repo name from GitHub URL

**Usage**

```
githubURLParts(urls)
```

**Arguments**

urls                    A character() vector of URLs

**Value**

A data.frame with four columns:

- urlThe original GitHub URL
- user\_repoThe GitHub "username/repo", combined
- userThe GitHub username
- repoThe GitHub repo name

**Examples**

```
# find GitHub URL details for
# Bioconductor packages
bpgl = biocPkgList()
urldetails = githubURLParts(bpgl$URL)
urldetails = urldetails[!is.na(urldetails$url),]
head(urldetails)
```

---

inducedSubgraphByPkgs	<i>Return a minimal subgraph based on package name(s)</i>
-----------------------	---

---

**Description**

Find the subgraph induced by including specific packages. The induced subgraph is the graph that includes the named packages and all edges connecting them. This is useful for a developer, for example, to examine her packages and their intervening dependencies.

**Usage**

```
inducedSubgraphByPkgs(g, pkgs, pkg_color = "red")
```



**Arguments**

<code>g</code>	an igraph graph, typically created by <a href="#">buildPkgDependencyIgraph</a>
<code>pkgs</code>	character() vector of packages to include. Package names not included in the graph are ignored.
<code>pkg_color</code>	character(1) giving color of named packages. Other packages in the graph that fall in connecting paths will be colored as the igraph default.

**Examples**

```
library(igraph)
g = buildPkgDependencyIgraph(buildPkgDependencyDataFrame())
g2 = inducedSubgraphByPkgs(g, pkgs=c('GenomicFeatures',
  'TCGAbiolinksGUI', 'BiocGenerics', 'org.Hs.eg.db', 'minfi', 'limma'))
g2
V(g2)

plot(g2)
```

---

`pkgCombDependencyGain` *Calculate dependency gain achieved by excluding combinations of packages*

---

**Description**

Calculate dependency gain achieved by excluding combinations of packages

**Usage**

```
pkgCombDependencyGain(pkg, depdf, maxNbr = 3L)
```

**Arguments**

<code>pkg</code>	character, the name of the package for which we want to estimate the dependency gain
<code>depdf</code>	a tidy data frame with package dependency information obtained through the function <a href="#">buildPkgDependencyDataFrame</a>
<code>maxNbr</code>	numeric, the maximal number of direct dependencies to leave out simultaneously

**Value**

A data frame with three columns: `ExclPackages` (the excluded direct dependencies), `NbrExcl` (the number of excluded direct dependencies), `DepGain` (the dependency gain from excluding these direct dependencies)

**Author(s)**

Charlotte Soneson

**Examples**

```

depdf <- buildPkgDependencyDataFrame(
  dependencies=c("Depends", "Imports"),
  repo=c("BioCsoft", "CRAN")
)
pcd <- pkgCombDependencyGain('GEOquery', depdf, maxNbr = 3L)
head(pcd[order(pcd$DepGain, decreasing = TRUE), ])

```

---

pkgDepImports	<i>Report package imported functionality</i>
---------------	--

---

**Description**

Function adapted from 'itdepends::dep\_usage\_pkg' at <https://github.com/r-lib/itdepends>

**Usage**

```
pkgDepImports(pkg)
```

**Arguments**

pkg	character() name of the package for which we want to obtain metrics on its dependency burden.
-----	---

**Value**

A tidy data frame with different metrics on the package dependency burden.

---

pkgDepMetrics	<i>Report package dependency burden</i>
---------------	---

---

**Description**

Elaborate a report on the dependency burden of a given package.

**Usage**

```
pkgDepMetrics(pkg, depdf)
```

**Arguments**

pkg	character() name of the package for which we want to obtain metrics on its dependency burden.
depdf	a tidy data frame with package dependency information obtained through the function <code>buildPkgDependencyDataFrame</code>

**Value**

A tidy data frame with different metrics on the package dependency burden.

---

problemPage	<i>generate hyperlinked HTML for build reports for Bioc packages</i>
-------------	--

---

### Description

This is a quick way to get an HTML report of a developer's packages. The function is keyed to filter based on maintainer name.

### Usage

```
problemPage(authorPattern = "V.*Carey", ver = "devel", includeOK = FALSE)
```

### Arguments

authorPattern	character(1) regexp used with <code>grep()</code> to filter author field of package DESCRIPTION for listing
ver	character(1) version tag for Bioconductor
includeOK	logical(1) include entries from the build report that are listed as "OK". Default FALSE will result in only those entries that are in WARNING or ERROR state.

### Value

DT::datatable call; if assigned to a variable, must evaluate to get the page to appear

### Author(s)

Vince Carey

### Examples

```
if (interactive()) problemPage()
```

---

subgraphByDegree	<i>Subset graph by degree</i>
------------------	-------------------------------

---

### Description

While the `inducedSubgraphByPkgs` returns the subgraph with the minimal connections between named packages, this function takes a vector of package names, a degree (1 or more) and returns the subgraph(s) that are within degree of the package named.

### Usage

```
subgraphByDegree(g, pkg, degree = 1, ...)
```

**Arguments**

<code>g</code>	an igraph graph, typically created by <a href="#">buildPkgDependencyIgraph</a>
<code>pkg</code>	character(1) package name from which to measure degree.
<code>degree</code>	integer(1) degree, limit search for adjacent vertices to this degree.
<code>...</code>	passed on to <a href="#">distances</a>

**Value**

An igraph graph, with only nodes and their edges within degree of the named package

**Examples**

```
g = buildPkgDependencyIgraph(buildPkgDependencyDataFrame())
g2 = subgraphByDegree(g, 'GEOquery')
g2
```

# Index

## \*Topic **Internal**

- generateBiocPkgDOI, [12](#)
- getPackageInfo, [14](#)

- biocBuildEmail, [2](#)
- biocBuildReport, [4](#), [6](#)
- biocDownloadStats, [4](#), [7](#), [11](#)
- biocExplore, [5](#)
- biocPkgList, [5](#), [7](#), [8](#), [13](#)
- BiocPkgTools, [6](#)
- BiocPkgTools-cache, [7](#)
- buildPkgDependencyDataFrame, [8](#), [9](#), [17](#), [18](#)
- buildPkgDependencyIgraph, [8](#), [9](#), [17](#), [20](#)

- CRANstatus, [10](#)

- dataciteXMLGenerate, [11](#)
- distances, [20](#)

- firstInBioc, [11](#)

- generateBiocPkgDOI, [12](#)
- get\_bioc\_data, [14](#)
- getBiocVignette, [13](#)
- getPackageInfo, [14](#)
- gh, [15](#)
- githubDetails, [15](#)
- githubURLParts, [16](#)
- graph\_from\_data\_frame, [9](#)

- inducedSubgraphByPkgs, [9](#), [16](#), [19](#)

- pkgCombDependencyGain, [17](#)
- pkgDepImports, [18](#)
- pkgDepMetrics, [18](#)
- pkgToolsCache (BiocPkgTools-cache), [7](#)
- problemPage, [19](#)

- sentHistory (biocBuildEmail), [2](#)
- setCache (BiocPkgTools-cache), [7](#)
- subgraphByDegree, [9](#), [19](#)

- user\_cache\_dir, [7](#)