

Package ‘GDSArray’

April 17, 2025

Title Representing GDS files as array-like objects

Version 1.29.0

Description GDS files are widely used to represent genotyping or sequence data. The GDSArray package implements the ‘GDSArray’ class to represent nodes in GDS files in a matrix-like representation that allows easy manipulation (e.g., subsetting, mathematical transformation) in `_R_`. The data remains on disk until needed, so that very large files can be processed.

biocViews Infrastructure, DataRepresentation, Sequencing, GenotypingArray

Depends R (>= 3.5), gdsfmt, methods, BiocGenerics, DelayedArray (>= 0.5.32)

License GPL-3

Encoding UTF-8

URL <https://github.com/Bioconductor/GDSArray>

BugReports <https://github.com/Bioconductor/GDSArray/issues>

Imports tools, S4Vectors (>= 0.17.34), SNPRelate, SeqArray

RoxygenNote 7.3.1

VignetteBuilder knitr

Suggests testthat, knitr, markdown, rmarkdown, BiocStyle, BiocManager

git_url <https://git.bioconductor.org/packages/GDSArray>

git_branch devel

git_last_commit 72633ea

git_last_commit_date 2025-04-15

Repository Bioconductor 3.22

Date/Publication 2025-04-17

Author Qian Liu [aut],
Martin Morgan [aut],
Hervé Pagès [aut],
Xiuwen Zheng [aut, cre]

Maintainer Xiuwen Zheng <zhengx@u.washington.edu>

Contents

acquireGDS	2
extract_array	3
GDSFile-class	4
seed,GDSArray-method	5
Index	7

acquireGDS	<i>Acquire the GDS file connection in R in the gds.class class.</i>
------------	---

Description

Acquire a (possibly cached) `gds.class` object given it's path.

Usage

```
acquireGDS(path, type = NULL, ...)
```

```
releaseGDS(path, type = NULL, ...)
```

Arguments

<code>path</code>	String containing a path to a GDS file.
<code>type</code>	String containing the GDS file type. Case insensitive. Can be "seqgds" for a GDS file with sequencing data, or "snpgds" for a GDS file with SNP data. This argument was added for the VariantExperiment package for certain functionalities. By default is NULL, which returns a regular <code>gds.class</code> .
<code>...</code>	arguments to be passed to <code>openfn.gds()</code> inside <code>acquireGDS</code> .

Details

`acquireConn` will cache the `gds.class` object in the current R session to avoid repeated initialization. This improves efficiency for repeated calls. The cached `gds.class` object for any given path can be deleted by calling `releaseGDS` for the same path.

Value

For `acquireGDS`, by default returns a regular `gds.class` object, which are identical to that returned by `gdsfmt::openfn.gds(path)`. If `type` is not NULL, a `SeqVarGDSClass` that is identical to `SeqArray::seqOpen(path)`, or `SNPGDSFileClass` that is identical to `SNPRelate::snpgdsOpen(path)`. Both are inherited from `gds.class` but with additional checking and methods.

For `releaseGDS`, any existing `gds.class` object for the path is disconnected and cleared from cache, and NULL is invisibly returned. This is equivalent to that returned by `gdsfmt::closefn.gds()` except it take path as input. If `path=NULL`, all cached connections are removed.

Author(s)

Qian Liu

Examples

```
fn <- gdsExampleFileName()
gdscon <- acquireGDS(fn)
acquireGDS(fn) ## just re-uses the cache
acquireGDS(fn, type = "seqgds") ## construct a new GDS connection
releaseGDS(fn) ## clears the cache
```

extract_array	<i>GDSArray constructor and coercion methods.</i>
---------------	---

Description

`extract_array`: the function to extract data from a GDS file, by taking `GDSArraySeed` as input. This function is required by the `DelayedArray` for the seed contract.

`GDSArray`: The function to convert a gds file into the `GDSArray` data structure.

`GDSArray` example data

Usage

```
## S4 method for signature 'GDSArraySeed'
extract_array(x, index)

GDSArray(gdsfile, varname)

gdsExampleFileName(type = c("seqgds", "snpgds"))
```

Arguments

<code>x</code>	the <code>GDSArraySeed</code> object
<code>index</code>	An unnamed list of subscripts as positive integer vectors, one vector per dimension in <code>x</code> . Empty and missing subscripts (represented by <code>integer(0)</code> and <code>NULL</code> list elements, respectively) are allowed. The subscripts can contain duplicated indices. They cannot contain NAs or non-positive values.
<code>gdsfile</code>	Can be a <code>GDSArraySeed</code> , a character string of gds file name, or an "gds.class" R object.
<code>varname</code>	A character string specifying the gds array node to be read into <code>GDSArray</code> .
<code>type</code>	the type of gds file, available are "seqgds" for <code>SeqVarGDSClass</code> and "snpgds" for <code>SNPGDSFileClass</code> .

Value

`GDSArray` class object.

Examples

```
fn <- gdsExampleFileName("snpgds")
allnodes <- gdsnodes(fn) ## print all available gds nodes in fn.
allnodes
GDSArray(fn, "genotype")
GDSArray(fn, "sample.annot/pop.group")

fn1 <- gdsExampleFileName("seqgds")
allnodes1 <- gdsnodes(fn1) ## print all available gds nodes in fn1.
allnodes1
## GDSArray(fn1, "genotype/data")
GDSArray(fn1, "variant.id")
GDSArray(fn1, "sample.annotation/family")
GDSArray(fn1, "annotation/format/DP/data")
GDSArray(fn1, "annotation/info/DP")
gdsExampleFileName("snpgds")
gdsExampleFileName("seqgds")
```

GDSFile-class

GDSFile constructor and methods.

Description

GDSFile: GDSFile is a light-weight class to represent a GDS file. It has the '\$' completion method to complete any possible gds nodes. If the slot of 'current_path' in 'GDSFile' object represent a valid gds node, it will return the 'GDSArray' of that node directly. Otherwise, it will return the 'GDSFile' object with an updated 'current_path'.

GDSFile: the GDSFile class constructor.

gdsfile: filename slot getter for GDSFile object.

gdsfile<=: filename slot setter for GDSFile object.

gdsnodes: to get the available gds nodes from a gds file name or a GDSFile object.

Usage

```
GDSFile(file, current_path = "")

## S4 method for signature 'GDSFile'
gdsfile(object)

gdsfile(object) <- value

## S4 method for signature 'GDSFile'
x$name

## S4 method for signature 'ANY'
gdsnodes(x, node)
```

Arguments

file	the GDS file path.
current_path	the current path to the closest gds node.
object	GDSFile object.
value	the new gds file path
x	a character string for the GDS file name or a GDSFile object.
name	the name of gds node
node	the node name of a gds file or GDSFile object.

Value

gdsfile: the file path of corresponding GDSfile object.

\$: a GDSFile with updated @current_path, or GDSArray object if the current_path is a valid gds node.

gdsnodes: a character vector of all available gds nodes within the related GDS file and the specified node.

Examples

```
fn <- gdsExampleFileName("seqgds")
gf <- GDSFile(fn)
gdsfile(gf)
fn <- gdsExampleFileName("seqgds")
gdsnodes(fn)
gdsnodes(fn, "annotation/info")
fn1 <- gdsExampleFileName("snpgds")
gdsnodes(fn1)
gdsnodes(fn1, "sample.annot")
gf <- GDSFile(fn)
gdsnodes(gf)
gdsnodes(gf, "genotype")
gdsfile(gf)
```

seed, GDSArray-method *GDSArraySeed or GDSArray related methods, slot getters and setters.*

Description

dim, dimnames: dimension and dimnames of object contained in the GDS file.

seed: the GDSArraySeed getter for GDSArray object.

seed<-: the GDSArraySeed setter for GDSArray object.

gdsfile: on-disk location of GDS file represented by this object.

Usage

```
## S4 method for signature 'GDSArray'
seed(x)

## S4 replacement method for signature 'GDSArray'
seed(x) <- value

gdsfile(object)

## S4 method for signature 'GDSArraySeed'
gdsfile(object)

## S4 method for signature 'GDSArray'
gdsfile(object)

## S4 method for signature 'DelayedArray'
gdsfile(object)
```

Arguments

x	the GDSArray and GDSArraySeed objects.
value	the new GDSArraySeed for the GDSArray object.
object	GDSArray, GDSMatrix, GDSArraySeed, GDSFile or SummarizedExperiment object.

Value

dim: the integer vector of dimensions for GDSArray or GDSArraySeed objects.

dimnames: the unnamed list of dimension names for GDSArray and GDSArraySeed objects.

seed: the GDSArraySeed of GDSArray object.

gdsfile: the character string for the gds file path.

Examples

```
fn <- gdsExampleFileName("snpgds")
ga <- GDSArray(fn, "sample.annot/pop.group")
dim(ga)
dimnames(ga)
type(ga)
seed(ga)
dim(seed(ga))
gdsfile(ga)
```

Index

\$,GDSFile-method (GDSFile-class), 4
acquireGDS, 2
coerce (extract_array), 3
coerce, ANY, GDSMatrix-method
 (extract_array), 3
coerce, GDSArray, GDSMatrix-method
 (extract_array), 3
coerce, GDSMatrix, GDSArray-method
 (extract_array), 3
extract_array, 3
extract_array, GDSArraySeed-method
 (extract_array), 3
GDSArray (extract_array), 3
GDSArray-class (extract_array), 3
GDSArray-data (extract_array), 3
GDSArray-method (extract_array), 3
gdsExampleFileName (extract_array), 3
GDSFile (GDSFile-class), 4
gdsfile (seed, GDSArray-method), 5
gdsfile, DelayedArray-method
 (seed, GDSArray-method), 5
gdsfile, GDSArray-method
 (seed, GDSArray-method), 5
gdsfile, GDSArraySeed-method
 (seed, GDSArray-method), 5
GDSFile, gdsfile-method (GDSFile-class),
 4
gdsfile, GDSFile-method (GDSFile-class),
 4
GDSFile-class, 4
GDSFile-constructor (GDSFile-class), 4
GDSFile-method (GDSFile-class), 4
gdsfile<- (GDSFile-class), 4
gdsfile<-, GDSFile-method
 (GDSFile-class), 4
GDSMatrix (extract_array), 3
GDSMatrix-class (extract_array), 3
gdsnodes (GDSFile-class), 4
gdsnodes, ANY-method (GDSFile-class), 4
gdsnodes, GDSFile-method
 (GDSFile-class), 4
matrixClass, GDSArray-method
 (extract_array), 3
releaseGDS (acquireGDS), 2
seed, GDSArray-method, 5
seed<-, GDSArray-method
 (seed, GDSArray-method), 5