

Package ‘gifti’

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Type Package

Title Reads in 'Neuroimaging' 'GIFTI' Files with Geometry Information

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Description Functions to read in the geometry format under the 'Neuroimaging' 'Informatics' Technology Initiative ('NifTI'), called 'GIFTI' <<https://www.nitrc.org/projects/gifti/>>. These files contain surfaces of brain imaging data.

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Imports xml2 (>= 1.1.1), base64enc, R.utils, tools, utils

Suggests rgl, grDevices, testthat, knitr, rmarkdown, covr

BugReports <https://github.com/muschellij2/gifti/issues>

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

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NeedsCompilation no

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convert_binary_datatype

Convert Binary Data Type

Description

Converts a data type to the size and what for `readBin`, necessary for Base64Binary and GZipBase64Binary formats

Usage

```
convert_binary_datatype(
  datatype = c("NIFTI_TYPE_UINT8", "NIFTI_TYPE_INT32", "NIFTI_TYPE_UINT32",
              "NIFTI_TYPE_FLOAT32")
)
```

Arguments

datatype data type from GIFTI image

Value

List of length 2: with elements of size and what

Examples

```
convert_binary_datatype()
convert_binary_datatype('NIFTI_TYPE_INT32')
testthat::expect_error(convert_binary_datatype('NIFTI_TYPE_BLAH'))
```

convert_endian	<i>Convert Endian from GIFTI</i>
----------------	----------------------------------

Description

Converts Endian format from GIFTI

Usage

```
convert_endian(endian)
```

Arguments

endian	character passed from GIFTI XML
--------	---------------------------------

Value

Character string

convert_intent	<i>Convert Intent</i>
----------------	-----------------------

Description

Converts the intent field from a GIFTI image to a more standard naming

Usage

```
convert_intent(intent)
```

Arguments

intent	(character) string of intent type
--------	-----------------------------------

Value

A character string

`create_data_matrix` *Create Data Matrix with ordering respected*

Description

Create Data Matrix with ordering respected

Usage

```
create_data_matrix(
  data,
  dims,
  ordering = c("RowMajorOrder", "ColumnMajorOrder")
)
```

Arguments

<code>data</code>	Data output from data_decoder
<code>dims</code>	Dimensions of output
<code>ordering</code>	Ordering of the data

Value

Matrix of Values

`data_array_attributes` *Data Array Attributes*

Description

Parses a list of XML data to get the attributes

Usage

```
data_array_attributes(darray)
```

Arguments

<code>darray</code>	List of <code>xml_nodes</code> from GIFTI data array
---------------------	--

Value

`data.frame` of attributes

data_decoder	<i>Array Data Decoder</i>
--------------	---------------------------

Description

Decodes values from a GIFTI image

Usage

```
data_decoder(
  values,
  encoding = c("ASCII", "Base64Binary", "GZipBase64Binary", "ExternalFileBinary"),
  datatype = NULL,
  endian = c("little", "big", "LittleEndian", "BigEndian"),
  ext_filename = NULL,
  n = NULL
)
```

Arguments

values	text from XML of GIFTI image
encoding	encoding of GIFTI values
datatype	Passed to convert_binary_datatype
endian	Endian to pass in readBin
ext_filename	if encoding = "ExternalFileBinary", then this is the external filename
n	number of values to read. Relevant if encoding = "ExternalFileBinary"

Value

Vector of values

Examples

```
if (have_gifti_test_data(outdir = NULL)) {
  gii_files = download_gifti_data(outdir = NULL)
  L = gifti_list(gii_files[1])
  orig = L$DataArray$Data[[1]]
  encoding = attributes(L$DataArray)$Encoding
  datatype = attributes(L$DataArray)$DataType
  endian = attributes(L$DataArray)$Endian
  vals = data_decoder(orig, encoding = encoding,
    datatype = datatype, endian = endian)
  enc = data_encoder(vals, encoding = encoding,
    datatype = datatype, endian = endian)
  enc == orig
}
```

 data_encoder

Array Data Encoder

Description

Encodes values for a GIFTI image

Usage

```
data_encoder(
  values,
  encoding = c("ASCII", "Base64Binary", "GZipBase64Binary"),
  datatype = NULL,
  endian = c("little", "big", "LittleEndian", "BigEndian")
)
```

Arguments

values	values to be encoded
encoding	encoding of GIFTI values
datatype	Passed to convert_binary_datatype
endian	Endian to pass in readBin

Value

Single character vector

Examples

```
if (have_gifti_test_data(outdir = NULL)) {
  gii_files = download_gifti_data(outdir = NULL)
  L = gifti_list(gii_files[1])
  orig = L$DataArray$Data[[1]]
  encoding = attributes(L$DataArray)$Encoding
  datatype = attributes(L$DataArray)$DataType
  endian = attributes(L$DataArray)$Endian
  vals = data_decoder(orig, encoding = encoding,
    datatype = datatype, endian = endian)
  enc = data_encoder(vals, encoding = encoding,
    datatype = datatype, endian = endian)
  enc == orig
}
```

decompress_gii	<i>Decompress Gzipped GIFTI (with extension .gz)</i>
----------------	--

Description

If a GIFTI file is compressed, as in .gii.gz, this will decompress the file. This has nothing to do with the encoding WITHIN the file

Usage

```
decompress_gii(file)
```

Arguments

file	file name of GIFTI file
------	-------------------------

Value

Filename of decompressed GIFTI

Examples

```
if (have_gifti_test_data(outdir = NULL)) {  
  gii_files = download_gifti_data(outdir = NULL)  
  outfile = decompress_gii(gii_files[1])  
  print(outfile)  
}
```

download_gifti_data	<i>Download GIFTI Test Data</i>
---------------------	---------------------------------

Description

Downloads GIFTI test data from https://www.nitrc.org/frs/download.php/411/BV_GIFTI_1.3.tar.gz

Usage

```
download_gifti_data(  
  outdir = system.file(package = "gifti"),  
  overwrite = FALSE,  
  ...  
)
```

Arguments

outdir	Output directory for test file directory
overwrite	Should files be overwritten if already exist?
...	additional arguments to download.file

Value

Vector of file names

gifti_list	<i>Convert GIFTI to List</i>
------------	------------------------------

Description

Reads in a GIFTI file and coerces it to a list

Usage

```
gifti_list(file)
```

Arguments

file	file name of GIFTI file
------	-------------------------

Value

List of elements

Examples

```
if (have_gifti_test_data(outdir = NULL)) {
  gii_files = download_gifti_data(outdir = NULL)
  L = gifti_list(gii_files[1])
  orig = L$DataArray$Data[[1]]
  encoding = attributes(L$DataArray)$Encoding
  datatype = attributes(L$DataArray)$DataType
  endian = attributes(L$DataArray)$Endian
  vals = data_decoder(orig, encoding = encoding,
    datatype = datatype, endian = endian)
  enc = data_encoder(vals, encoding = encoding,
    datatype = datatype, endian = endian)
  enc == orig
}
```

gifti_map_value	<i>Map Values to Triangles from GIFTI</i>
-----------------	---

Description

Takes values and maps them to the correct triangles in space.

Usage

```
gifti_map_value(
  pointset,
  triangle,
  values,
  indices = seq(nrow(pointset)),
  add_one = TRUE
)
```

Arguments

pointset	pointset from GIFTI
triangle	triangles from GIFTI
values	Values to map to the triangles. Same length as indices
indices	indices to place the values, must be in the range of 1 and the number of rows of pointset
add_one	Should 1 be added to the indices for the triangle?

Value

A list of coordinates (in triangles) and the corresponding value mapped to those triangles

have_gifti_test_data	<i>Check Presence of GIFTI Test Data</i>
----------------------	--

Description

Checks if GIFTI test data is downloaded

Usage

```
have_gifti_test_data(outdir = system.file(package = "gifti"))
```

Arguments

outdir	Output directory for test file directory
--------	--

Value

Logical indicator

Examples

```
have_gifti_test_data(outdir = NULL)
```

<code>is.gifti</code>	<i>Test if GIFTI</i>
-----------------------	----------------------

Description

Simple wrapper to determine if class is GIFTI

Usage

```
is.gifti(x)
```

```
is_gifti(x)
```

Arguments

`x` object to test

Value

Logical if `x` is GIFTI

<code>readgii</code>	<i>Read GIFTI File</i>
----------------------	------------------------

Description

Reads a GIFTI File and parses the output

Usage

```
readgii(file)
```

```
readGIFTI(file)
```

```
read_gifti(file)
```

Arguments

`file` Name of file to read

Value

List of values

Examples

```

if (have_gifti_test_data(outdir = NULL)) {
  gii_files = download_gifti_data(outdir = NULL)
  gii_list = lapply(gii_files, readgii)
  surf_files = grep("white[.]surf[.]gii", gii_files, value = TRUE)
  surfs = lapply(surf_files, surf_triangles)

  col_file = grep("white[.]shape[.]gii", gii_files, value = TRUE)
  cdata = readgii(col_file)
  cdata = cdata$data$shape
  mypal = grDevices::colorRampPalette(colors = c("blue", "black", "red"))
  n = 4
  breaks = quantile(cdata)
  ints = cut(cdata, include.lowest = TRUE, breaks = breaks)
  ints = as.integer(ints)
  stopifnot(!any(is.na(ints)))
  cols = mypal(n)[ints]
  cols = cols[surfs[[1]]$triangle]
}
## Not run:
if (have_gifti_test_data(outdir = NULL)) {

  if (requireNamespace("rgl", quietly = TRUE)) {
    rgl::rgl.open()
    rgl::rgl.triangles(surfs[[1]]$pointset, color = cols)
    rgl::play3d(rgl::spin3d(), duration = 5)
  }
}

## End(Not run)

```

surf_triangles

Make Triangles from Gifti Image

Description

Creates Triangles for plotting in RGL from a Gifti image

Usage

```
surf_triangles(file)
```

Arguments

file File name of Gifti image, usually surf.gii

Value

List of values corresponding to the data element from [readgii](#)

writegii	<i>Write .gii xml from "gifti" object</i>
----------	---

Description

Writes a "gifti" object to a GIFTI file (ends in *.gii).

Usage

```
writegii(gii, out_file, use_parsed_transformations = FALSE)
```

```
writeGIFTI(gii, out_file, use_parsed_transformations = FALSE)
```

```
write_gifti(gii, out_file, use_parsed_transformations = FALSE)
```

Arguments

gii The "gifti" object

out_file Where to write the new GIFTI file

use_parsed_transformations

Should the \$parsed_transformations be written instead of the transformations?
Use if the XML pointers in transformations might be invalid. Default: FALSE

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