

Package ‘neurobase’

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Type Package

Title 'Neuroconductor' Base Package with Helper Functions for 'nifti' Objects

Version 1.32.1

Maintainer John Muschelli <muschelli.j2@gmail.com>

Description Base package for 'Neuroconductor', which includes many helper functions that interact with objects of class 'nifti', implemented by package 'oro.nifti', for reading/writing and also other manipulation functions.

Imports methods, abind, matrixStats, R.utils, graphics, grDevices, stats, RNifti

Depends oro.nifti (>= 0.11.0), R (>= 3.2.0)

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Suggests testthat, ggplot2, knitr, rmarkdown, dplyr, reshape2, httr, covr, brainR

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BugReports <https://github.com/muschelli.j2/neurobase/issues>

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Author John Muschelli [aut, cre]

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applyEmptyImageDimensions-methods
Apply Subsetting from Empty Image Dimensions

Description

Simple wrapper for subsetting an image with indices, dropping empty dimensions.

Usage

```

applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'nifti'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'character'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'factor'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'list'

```

```

applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'array'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'anlz'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

## S4 method for signature 'ANY'
applyEmptyImageDimensions(img, inds, reorient = FALSE, ...)

apply_empty_dim(img, ...)

```

Arguments

img	image, nifti object, or array
inds	indices of subset from getEmptyImageDimensions or dropEmptyImageDimensions .
reorient	Should image be reoriented if a filename?
...	not used

Value

Object of class nifti or array if nifti is not supplied

Note

apply_empty_dim is a shorthand for applyEmptyImageDimensions with all the same arguments.

See Also

[getEmptyImageDimensions](#), [dropEmptyImageDimensions](#)

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, ,10] = 0
nim = oro.nifti::nifti(arr)
inds = getEmptyImageDimensions(nim)
inds_arr = getEmptyImageDimensions(arr)
testthat::expect_equal(inds, inds_arr)

out = applyEmptyImageDimensions(nim, inds = inds)
out_arr = applyEmptyImageDimensions(arr, inds = inds)
testthat::expect_equal(out_arr, array(out, dim = dim(out)))
out = apply_empty_dim(nim, inds = inds)

set.seed(5)
dims = rep(10, 3)

```

```

arr = array(rnorm(prod(dims)), dim = dims)
arr[, , 10] = 0
nim = oro.nifti::nifti(arr)
inds = getEmptyImageDimensions(nim)
rnifti = RNifti::asNifti(nim)
ting = tempimg(nim)
limg = list(factor(timg), factor(timg))
apply_empty_dim(nim, inds = inds)
func = function(...) applyEmptyImageDimensions(..., inds = inds)
func(arr)
func(nim)
func(rnifti)
func(timg)
func(limg)

```

boxplot.nifti

Boxplot of Values in an Image

Description

Computes the boxplot of values of an image with the option for a mask.

Usage

```

## S3 method for class 'nifti'
boxplot(x, ..., mask)

## S3 method for class 'anlz'
boxplot(x, ..., mask)

```

Arguments

x	Object of class <code>nifti</code>
...	Arguments passed to boxplot.default
mask	object to subset the image. If missing, then all values of the image are plotted.

Value

Output of [boxplot](#)

Examples

```

img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
mask = img > 0
boxplot(img)
boxplot(img, mask = mask)
boxplot(as.anlz(img))

```

breaker	<i>Find Breaks for nifti Image Plotting</i>
---------	---

Description

Helper function for plotting - returns breaks for `image` plot function for object of class `nifti`

Usage

```
breaker(x, zlim, col, breaks = NULL)
```

Arguments

<code>x</code>	Object of class <code>nifti</code>
<code>zlim</code>	A user-specified <code>zlim</code> . If <code>NULL</code> , will calculate how <code>ortho2</code> would calculate <code>zlim</code>
<code>col</code>	colors to be plotted. Only used for <code>length(col)</code> , so can be a vector of length cols to be plotted
<code>breaks</code>	if <code>!is.null(breaks)</code> , then will calculate breaks. Otherwise will return this breaks vector

Value

Vector of length 2

If `breaks = NULL`, then vector of `length(col) + 1`, otherwise returns breaks

checking-methods	<i>Force object to filename</i>
------------------	---------------------------------

Description

Ensures the output to be a character filename (or vector) from an input image or `nifti`.

Usage

```
checking(file, allow_array = FALSE, ...)

## S4 method for signature 'nifti'
checking(file, allow_array = FALSE, ...)

## S4 method for signature 'ANY'
checking(file, allow_array = FALSE, ...)

## S4 method for signature 'character'
checking(file, allow_array = FALSE, ...)

## S4 method for signature 'list'
checking(file, allow_array = FALSE, ...)
```

Arguments

file character or nifti object
allow_array allow arrays to be passed in
... options passed to [temping](#)

Value

character filename of image or temporary nii, with .nii extension

Author(s)

John Muschelli <muschellij2@gmail.com>

checknii-methods *Force object to filename with .nii extension*

Description

Ensures the output to be a character filename (or vector) from an input image or nifti, but not gzipped and has .nii extension

Usage

```
checknii(file, ...)

## S4 method for signature 'nifti'
checknii(file, ...)

## S4 method for signature 'factor'
checknii(file, ...)

## S4 method for signature 'character'
checknii(file, ...)

## S4 method for signature 'list'
checknii(file, ...)

## S4 method for signature 'ANY'
checknii(file, ...)

ensure_nii(file, ...)
```

Arguments

file character or nifti object
... options passed to [checking](#)

Value

character filename of image or temporary nii, with .nii extension

Author(s)

John Muschelli <muschellij2@gmail.com>

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,10] = 0
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
limg = list(factor(timg), factor(timg))
func = checknii
func(nim)
func(rnifti)
func(timg)
func(limg)
```

checkniigz-methods *Force object to filename with .nii.gz extension*

Description

Ensures the output to be a character filename (or vector) from an input image or nifti, to be gzipped and has .nii.gz extension

Usage

```
checkniigz(file, ...)

## S4 method for signature 'nifti'
checkniigz(file, ...)

## S4 method for signature 'ANY'
checkniigz(file, ...)

## S4 method for signature 'factor'
checkniigz(file, ...)

## S4 method for signature 'character'
checkniigz(file, ...)

## S4 method for signature 'list'
```



```
checkniigz(file, ...)
```

```
ensure_nii_gz(file, ...)
```

Arguments

file	character or nifti object
...	options passed to checking

Value

Character filename of image or temporary nii, with .nii.gz extension

Author(s)

John Muschelli <muschellij2@gmail.com>

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,10] = 0
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
limg = list(factor(timg), factor(timg))
func = checkniigz
func(nim)
func(rnifti)
func(timg)
func(limg)
```

check_mask

Check Mask is Binary

Description

Determine if only values in a mask are 0/1

Usage

```
check_mask(mask, allow.NA = FALSE, allow.array = TRUE)
```

Arguments

mask	Object of class nifti
allow.NA	allow NAs in the mask
allow.array	if class(mask) is "array", is this OK?

Value

Logical indicating if object is binary mask with only 0, 1, and NA if applicable

Examples

```
arr = array(rbinom(1000, size = 1, prob = 0.2), dim = c(10,10,10))
nim = oro.nifti::nifti(arr)
check_mask(nim)
```

check_mask_fail	<i>Check Mask is Binary, Fail otherwise</i>
-----------------	---

Description

Determine if only values in a mask are 0/1. Will error otherwise.

Usage

```
check_mask_fail(...)
```

Arguments

... arguments to pass to [check_mask](#)

Value

Either will error if conditions not met or an invisible NULL

Examples

```
arr = array(rbinom(1000, size = 1, prob = 0.2), dim = c(10,10,10))
nim = oro.nifti::nifti(arr)
check_mask_fail(nim)
```

check_nifti-methods	<i>Check if nifti image or read in a nifti image</i>
---------------------	--

Description

Simple check to see if input is character or of class nifti

Usage

```
check_nifti(  
  x,  
  reorient = FALSE,  
  allow.array = FALSE,  
  fast = FALSE,  
  need_header = TRUE,  
  ...  
)  
  
## S4 method for signature 'nifti'  
check_nifti(  
  x,  
  reorient = FALSE,  
  allow.array = FALSE,  
  fast = FALSE,  
  need_header = TRUE,  
  ...  
)  
  
## S4 method for signature 'character'  
check_nifti(  
  x,  
  reorient = FALSE,  
  allow.array = FALSE,  
  fast = FALSE,  
  need_header = TRUE,  
  ...  
)  
  
## S4 method for signature 'factor'  
check_nifti(  
  x,  
  reorient = FALSE,  
  allow.array = FALSE,  
  fast = FALSE,  
  need_header = TRUE,  
  ...  
)  
  
## S4 method for signature 'list'  
check_nifti(  
  x,  
  reorient = FALSE,  
  allow.array = FALSE,  
  fast = FALSE,  
  need_header = TRUE,  
  ...  
)
```

```

)

## S4 method for signature 'array'
check_nifti(
  x,
  reorient = FALSE,
  allow.array = FALSE,
  fast = FALSE,
  need_header = FALSE,
  ...
)

## S4 method for signature 'anlz'
check_nifti(
  x,
  reorient = FALSE,
  allow.array = FALSE,
  fast = FALSE,
  need_header = TRUE,
  ...
)

## S4 method for signature 'ANY'
check_nifti(
  x,
  reorient = FALSE,
  allow.array = FALSE,
  fast = FALSE,
  need_header = TRUE,
  ...
)

```

Arguments

x	character path of image or an object of class nifti, or array
reorient	(logical) passed to readnii if the image is to be re-oriented
allow.array	(logical) Are array types allowed (TRUE) or should there be an error if the object is not character or class nifti.
fast	if TRUE, then fast_readnii will be used versus readnii if the files need to be read in.
need_header	if TRUE, then an image type with header information will be returned. If not, then an array is fine. Used really only in conjunction with <code>allow.array</code>
...	additional arguments to pass to readnii if relevant

Value

nifti object or array if `allow.array=TRUE` and `x` is an array

Author(s)

John Muschelli <muschellij2@gmail.com>

See Also

[readnii](#)

Examples

```
x = nifti()
check_nifti(x)
set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
check_nifti(nim)
check_nifti(as.anlz(nim))
testthat::expect_error(check_nifti(arr, allow.array = FALSE))
tfile = tempimg(nim)
check_nifti(c(tfile, tfile))
check_nifti(list(tfile, tfile))
check_nifti(factor(c(tfile, tfile)))
check_nifti(RNifti::readNifti(tfile))
```

check_nifti_header-methods

Check if nifti image or read in a nifti header

Description

Simple check to see if input is character or of class nifti and read in the header

Usage

```
check_nifti_header(x)

## S4 method for signature 'nifti'
check_nifti_header(x)

## S4 method for signature 'character'
check_nifti_header(x)

## S4 method for signature 'factor'
check_nifti_header(x)

## S4 method for signature 'list'
check_nifti_header(x)
```

```
## S4 method for signature 'array'
check_nifti_header(x)

## S4 method for signature 'anzl'
check_nifti_header(x)

## S4 method for signature 'ANY'
check_nifti_header(x)
```

Arguments

x character path of image or an object of class nifti, or array

Value

nifti object or character

Author(s)

John Muschelli <muschellij2@gmail.com>

Examples

```
set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
check_nifti_header(nim)
check_nifti_header(as.anlz(nim))
testthat::expect_error(check_nifti_header(arr))
tfile = tempimg(nim)
check_nifti_header(tfile)
check_nifti_header(RNifti::readNifti(tfile))
check_nifti_header(c(tfile, tfile))
check_nifti_header(list(tfile, tfile))
check_nifti_header(factor(tfile))
```

check_outfile

Check output filename

Description

This function checks if an output filename is not NULL in conjunction whether the user would like to return an image

Usage

```
check_outfile(outfile, retimg, fileext = ".nii.gz")
```

Arguments

outfile	output filename or NULL
retimg	Should an image be returned
fileext	a non-empty character vector giving the file extension

Value

Filename of output file or a temporary filename

cog	<i>Image Center of Gravity</i>
-----	--------------------------------

Description

Find Center of Gravity of Image, after thresholding

Usage

```
cog(img, thresh = 0, ceil = FALSE, warn = TRUE)
```

Arguments

img	Object of class nifti
thresh	threshold for image, will find $\text{img} > 0$
ceil	Run ceiling to force integers (usu for plotting)
warn	Produce a warning if the image is empty after thresholding

Value

Vector of length 3

Examples

```
dims = rep(20, 3)
x = array(rnorm(prod(dims)), dim = dims)
img = nifti(x, dim= dims,
datatype = convert.datatype()$FLOAT32, cal.min = min(x),
cal.max = max(x), pixdim = rep(1, 4))
cog(img)
```

colorbar *Add a colorbar to an ortho2 object*

Description

Adds a series of colors mapped to a value

Usage

```
colorbar(breaks, col, text.col = "white", labels = TRUE, maxleft = 0.95)
```

Arguments

breaks	a set of finite numeric breakpoints for the colours (see image)
col	a list of colors (see image)
text.col	axis and text label color
labels	labels for tick marks - see axis
maxleft	Extent the left hand for colorbar

Value

A plot

Note

Much of this was taken from `vertical.image.legend` from the `aqfig` package

copyNIFTIHeader *Copy NIFTI Header to an array*

Description

Copies slots of a `nifti` object to an array. This is useful if you're subsetting 4D data and getting an array out

Usage

```
copyNIFTIHeader(
  img,
  arr,
  drop_slots = c(".Data", "dim_"),
  drop = TRUE,
  onlylast = TRUE,
  warn = TRUE,
  ...
)
```


Arguments

img	object of class nifti to copy header
arr	array to copy header information
drop_slots	Slots not to copy over from header
drop	Should <code>dropImageDimension</code> be called before returning?
onlylast	if drop = TRUE, passed to <code>dropImageDimension</code> , if only the last dimensions should be dropped
warn	if drop = TRUE, passed to <code>dropImageDimension</code> , for warning print out
...	arguments to pass to <code>nifti</code>

Value

Object of class nifti the size of arr

Examples

```
img = nifti(img = array(rnorm(10^4), dim=rep(10, 4)), dim=rep(10, 4), datatype = 16)
sub = img[,,1:3]
copyNIFTIHeader(img, sub)
sub = img[,,1, drop=FALSE]
copyNIFTIHeader(img, sub)
copyNIFTIHeader(img, sub, drop = FALSE)
```

cut.nifti

Perform Cut on an image

Description

Cuts a numeric image into an integer factor, with the option of a mask.

Usage

```
## S3 method for class 'nifti'
cut(x, breaks, ..., mask)

## S3 method for class 'anlz'
cut(x, ..., mask)
```

Arguments

x	Object of class nifti
breaks	either a numeric vector of two or more unique cut points or a single number (greater than or equal to 2) giving the number of intervals into which x is to be cut. Passed to <code>cut</code>
...	Arguments passed to <code>cut</code>
mask	object to subset the image. If missing, then all values of the image are used

Value

Object of class `nifti` with an attribute of levels

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
mask = img > 0
cut(img, mask = mask, breaks = 4)
```

datatype

Change Data type for img

Description

Tries to figure out the correct datatype for image. Useful for image masks - makes them binary if

Usage

```
datatypeper(
  img,
  type_string = NULL,
  datatype = NULL,
  bitpix = NULL,
  trybyte = TRUE,
  warn = TRUE
)
```

Arguments

<code>img</code>	nifti object (or character of filename)
<code>type_string</code>	(NULL) character of datatype and bitpix. Supercedes both datatype and bitpix. If specified <code>convert.datatype[[type_string]]</code> and <code>convert.bitpix[[type_string]]</code> will be used.
<code>datatype</code>	(NULL) character of datatype see convert.datatype
<code>bitpix</code>	(NULL) character of bitpix see convert.bitpix
<code>trybyte</code>	(logical) Should you try to make a byte (UINT8) if image in <code>c(0, 1)</code> ?
<code>warn</code>	Should a warning be issued if defaulting to FLOAT32?

Value

object of type `nifti`

Examples

```
img = nifti(array(rnorm(10^3, sd = 1000), dim = rep(10, 3)))
ring = round(img)
newnii(datatypeper(ring))
ring = datatypeper(ring, type_string= "FLOAT32")
```

density.nifti	<i>Density of Values in an Image</i>
---------------	--------------------------------------

Description

Computes the density of values of an image with the option for a mask.

Usage

```
## S3 method for class 'nifti'  
density(x, ..., mask)  
  
## S3 method for class 'anlz'  
density(x, ..., mask)
```

Arguments

x	Object of class nifti
...	Arguments passed to density.default
mask	object to subset the image. If missing, then all values of the image are plotted.

Value

Output of [density](#)

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))  
mask = img > 0  
density(img, mask = mask)  
density(img)  
  
density(as.anlz(img), mask = mask)  
density(as.anlz(img))
```

dicer	<i>Calculate Dice from a Table</i>
-------	------------------------------------

Description

Simple wrapper to calculate the Dice Coefficient/Similarity Index from a table

Usage

```
dicer(tab, verbose = TRUE)
```

Arguments

tab	table or matrix that is 2 by 2
verbose	should the Dice be printed before returned?

Value

Numeric scalar (one number)

Examples

```
tab = matrix(c(1000, 20, 20, 400), ncol = 2)
dicer(tab)
```

double_ortho	<i>Double Orthographic Display</i>
--------------	------------------------------------

Description

Copy of oro.nifti's [orthographic](#) function with some tweaks such as adding L/R designations for left and right

Usage

```
double_ortho(
  x,
  y = NULL,
  col.y = gray(0:64/64),
  NA.x = TRUE,
  mfrow = c(2, 4),
  add = FALSE,
  ...
)
```

Arguments

x	is an object of class nifti or similar.
y	is an object of class nifti or similar to be set aside x.
col.y	is grayscale (by default).
NA.x	Set any values of 0 in x to NA
mfrow	(numeric) layout of the 3 slices
add	Should the y-plot be added or its own plot? Used in double_ortho
...	other arguments to ortho2

See Also

[orthographic](#)

`dropEmptyImageDimensions`*Drop Empty Image Dimensions*

Description

Drops dimensions of an image that has all irrelevant values

Usage

```
dropEmptyImageDimensions(  
  img,  
  value = 0,  
  threshold = 0,  
  other.imgs = NULL,  
  keep_ind = FALSE,  
  reorient = FALSE  
)
```

```
drop_empty_dim(  
  img,  
  value = 0,  
  threshold = 0,  
  other.imgs = NULL,  
  keep_ind = FALSE,  
  reorient = FALSE  
)
```

Arguments

<code>img</code>	nifti object
<code>value</code>	Value to check against. If zero, then <code>dropEmptyImageDimensions</code> will drop any dimension that has fewer than <code>threshold</code> zeroes. May be a vector of values, matched with match
<code>threshold</code>	Drop dimension if fewer than <code>threshold</code> voxels are in the slice
<code>other.imgs</code>	List of other nifti objects or filenames to apply the same dropping as <code>img</code> .
<code>keep_ind</code>	keep indices in output. Will return list, even if <code>other.imgs</code> not specified
<code>reorient</code>	Should image be reoriented if a filename?

Value

List of output image indices, and other images if `other.imgs` not specified or `keep_ind = TRUE`. Otherwise object of class `nifti`

Note

drop_empty_dim is a shorthand for dropEmptyImageDimensions with all the same arguments. Also, NA are set to zero.

See Also

[getEmptyImageDimensions](#)

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, ,10] = 0
nim = oro.nifti::nifti(arr)

dnim = dropEmptyImageDimensions(nim, keep_ind = TRUE)
new_nim = dnim$outimg
names(dnim)
dnim = dropEmptyImageDimensions(nim, keep_ind = TRUE, other.imgs = nim)
dims = rep(10, 4)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)

testthat::expect_error(
{dnim = dropEmptyImageDimensions(nim, keep_ind = TRUE)}
)
```

emptyImageDimensionsMask

Make Mask from Empty Image Dimensions

Description

Make a mask of an image that has all irrelevant values

Usage

```
emptyImageDimensionsMask(img, ..., reorient = FALSE)
```

```
empty_dim_mask(img, ..., reorient = FALSE)
```

Arguments

img	nifti object
...	Arguments to be passed to getEmptyImageDimensions .
reorient	Should image be reoriented if a filename?

Value

Object of class `nifti`, with binary values

Note

`empty_dim_mask` is a shorthand for `emptyImageDimensionsMask` with all the same arguments.

See Also

[getEmptyImageDimensions](#)

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,10] = 0
nim = oro.nifti::nifti(arr)
out = emptyImageDimensionsMask(nim)
out_arr = emptyImageDimensionsMask(arr)
testthat::expect_equal(out_arr, array(out, dim = dim(out)))
out_arr = empty_dim_mask(arr)
```

ensure_array

Ensure an array output

Description

Forces an array output for manipulation and overall conversion

Usage

```
ensure_array(img)
```

Arguments

`img` Image object ([nifti](#) or `niftiImage`)

Value

Array of same dimensions as image object

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,10] = 0
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
ling = list(factor(timg), factor(timg))
func = ensure_array
func(arr)
func(nim)
func(rnifti)
func(timg)
func(limg[[1]])

```

fast_dice_tab

Fast Dice Tabulation

Description

Fast Dice Tabulation

Usage

```
fast_dice_tab(x, y)
```

```
fast_dice(x, y, verbose = FALSE)
```

Arguments

x	A nifti image, filename, or niftiImage
y	A nifti image, filename, or niftiImage
verbose	A logical indicating output

Value

A table object

Examples

```

library(oro.nifti)
set.seed(20161007)
dims = rep(10, 3)
arr = array(rnorm(10*10*10), dim = dims)
nim = oro.nifti::nifti(arr) > -1
fast_dice_tab(nim, nim)
fast_dice(nim, nim) == 1

```

fast_readnii	<i>Reading NIfTI images through RNifti</i>
--------------	--

Description

This function calls the `readNifti` function from the `RNifti` package, and then converts the image to a `nifti` object

Usage

```
fast_readnii(fname, dtype = TRUE, drop_dim = TRUE)
```

Arguments

<code>fname</code>	file name of the NIfTI file.
<code>dtype</code>	Should <code>datatyper</code> be run after reading?
<code>drop_dim</code>	Should <code>drop_img_dim</code> be run after reading?

Value

A `nifti` object

Examples

```
set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
tfile = tempfile(fileext = ".nii.gz")
write_nifti(nim, tfile)
ring = fast_readnii(tfile)
```

file_imgext	<i>Get Image file extension</i>
-------------	---------------------------------

Description

Get the image file extension, either `.nii`, `.hdr`, `.nii.gz`, or `.hdr.gz`

Usage

```
file_imgext(file, withdot = TRUE)
```

Arguments

<code>file</code>	Vector of character filenames
<code>withdot</code>	Should the extension begin with <code>."</code> ?

Value

Vector of extensions. If withdot = FALSE, then will return nii instead of .nii

finite_img-methods *Finite Image*

Description

Simple wrapper for setting non-finite values to zero

Usage

```
finite_img(img, replace = 0)

## S4 method for signature 'nifti'
finite_img(img, replace = 0)

## S4 method for signature 'array'
finite_img(img, replace = 0)

## S4 method for signature 'ANY'
finite_img(img, replace = 0)

## S4 method for signature 'character'
finite_img(img, replace = 0)

## S4 method for signature 'list'
finite_img(img, replace = 0)
```

Arguments

img	character path of image or an object of class nifti, or list of images
replace	Value to replace non-finite values to

Value

nifti object

Author(s)

John Muschelli <muschellij2@gmail.com>

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
arr[c(5, 6, 7, 8)] = c(NA, NaN, Inf, -Inf)
nim = nifti(arr)
finite_img(nim)
finite_img(arr)
tfile = tempimg(nim)
checking(c(tfile, tfile))
checking(list(tfile, tfile))
finite_img(list(tfile, tfile))
finite_img(c(tfile, tfile))
img = RNifti::readNifti(tfile)
checking(img)
img[c(5, 6, 7, 8)] = c(NA, NaN, Inf, -Inf)
stopifnot(!any(c(is.na(c(finite_img(img))))))

```

flip_img

Flip Nifti Image

Description

This image will flip x, y, or z direction

Usage

```
flip_img(img, x = FALSE, y = FALSE, z = FALSE, ...)
```

Arguments

img	nifti object or character filename
x	(logical) Flip x direction
y	(logical) Flip y direction
z	(logical) Flip z direction
...	Arguments passed to check_nifti

Value

Object of class nifti

Examples

```

img = random_nifti(rep(15, 3))
flipped = flip_img(img, x = TRUE, y = TRUE, z = TRUE)
img = random_nifti(rep(15, 2))
flipped = flip_img(img, x = TRUE)
testthat::expect_error(flip_img(img, z= TRUE))

```

```
getEmptyImageDimensions
```

Get Empty Image Dimensions

Description

Creates a list of indices of an image that has all irrelevant values

Usage

```
getEmptyImageDimensions(img, value = 0, threshold = 0, reorient = FALSE, ...)
```

```
get_empty_dim(img, value = 0, threshold = 0, reorient = FALSE, ...)
```

Arguments

img	nifti object or array
value	Value to check against. If zero, then <code>getEmptyImageDimensions</code> will include any dimension that has fewer than threshold zeroes. May be a vector of values, matched with <code>match</code>
threshold	Include dimension if fewer than threshold voxels are in the slice
reorient	Should image be reoriented if a filename?
...	additional arguments to pass to <code>check_nifti</code>

Value

List of length 3 of indices.

Note

`get_empty_dim` is a shorthand for `getEmptyImageDimensions` with all the same arguments. Also, NA are set to zero.

```
hist.nifti
```

Histogram of Values in an Image

Description

Computes and displays a histogram of the values of an image with the option for a mask.

Usage

```
## S3 method for class 'nifti'
hist(x, ..., mask)
```

```
## S3 method for class 'anlz'
hist(x, ..., mask)
```

Arguments

x	Object of class <code>nifti</code>
...	Arguments passed to <code>hist.default</code>
mask	object to subset the image. If missing, then all values of the image are plotted.

Value

Output of `hist`

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
mask = img > 0
hist(img, mask = mask)
```

images2matrix	<i>Transform set of images to matrix</i>
---------------	--

Description

Creates a matrix, where the voxels are on the rows and images are on the columns

Usage

```
images2matrix(imgs, mask = NULL)
```

Arguments

imgs	Vector of files or list of images (<code>niftiImage</code> , <code>array</code> , or <code>nifti</code>)
mask	Binary image to subset the voxels

Value

Matrix of V by p , where V is the product of the dimensions of one image or the number of voxels in the mask, and p is the number of images

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
imgs = list(nim, arr)
mask = nim > 2
mat1 = images2matrix(imgs)
mat2 = images2matrix(list(nim, nim))
if (packageVersion("oro.nifti") >= package_version("0.10.2")) {
  testthat::expect_equal(mat1, mat2)
}
```

```

} else {
  testthat::expect_error(testthat::expect_equal(mat1, mat2))
}
mat1 = images2matrix(imgs, mask = mask)
mat2 = images2matrix(list(nim, nim), mask)

```

img_colour_df

Convert Image to Data.frame with Colors

Description

Takes in an image and a color scheme, converts that image into a data.frame with the data and a color mapping.

Usage

```

img_colour_df(img, zlim = NULL, breaks = NULL, col = gray(0:64/64))

img_color_df(...)

```

Arguments

img	an object to be coerced to nifti using check_nifti
zlim	Limits for the domain of the intensities
breaks	Breaks for the intensities to map to colors
col	Colors to map intensities
...	not used

Value

A data.frame with the first columns being the x,y,z (maybe t) coordinates (named dim and the dimension number), a value column that contains the intensity information, and a colour column representing the color that voxel maps to

Note

img_color_df is a duplicate of img_colour_df

Examples

```

img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
df = img_colour_df(img)
df = img_color_df(img)

```

img_indices	<i>Retrieve Image Indices</i>
-------------	-------------------------------

Description

Extract image xyz indices (in voxels or millimeters), with the option to append the values

Usage

```
img_indices(img, mask = NULL, add_values = FALSE, units = c("index", "mm"))
```

Arguments

img	Object of class <code>nifti</code>
mask	Mask to be applied for indices the index
add_values	Should the value be column-bound to the matrix
units	Should the indices be in xyz-coordinates or millimeters.

Value

Matrix of 3 columns if `add_values = FALSE` or 4 columns, otherwise.

Examples

```
set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
ind = img_indices(nim)
ind2 = img_indices(nim, mask = nim > 2)
# 3d example
set.seed(5)
dims = rep(10, 3)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
ind = img_indices(nim)
ind2 = img_indices(nim, mask = nim > 2)
testthat::expect_equal(colnames(ind2), c("x", "y", "z"))
ind2 = img_indices(nim, mask = nim > 2, add_values = TRUE)
testthat::expect_equal(colnames(ind2), c("x", "y", "z", "value"))
```

img_list_to_ts	<i>Image List to Time Series</i>
----------------	----------------------------------

Description

Turns a a list of 3D images into a 4D time series image

Usage

```
img_list_to_ts(imgs, copy_nifti = TRUE, warn = TRUE)
```

Arguments

imgs	object of class <code>list</code> , each with 3 dimensions,
copy_nifti	Should a nifti object be returned (TRUE) or a simply array (FALSE). Should only be used for slight speed up when array is adequate
warn	Should a warning be printed if object is not class <code>nifti</code>

Value

Object of class `nifti`

Note

If the object is not of class `list`, then the object is returned

img_ts_to_df	<i>Image Time Series to Data.frame</i>
--------------	--

Description

Turns a 4D time series image to a Data.frame

Usage

```
img_ts_to_df(imgs, warn = FALSE)
```

Arguments

imgs	object of class <code>nifti</code> with 4 dimensions, aka a 4D time series
warn	Should a warning be printed if object is not class <code>nifti</code> (e.g. a list instead)

Value

Matrix of values

img_ts_to_list	<i>Image Time Series to list</i>
----------------	----------------------------------

Description

Turns a 4D time series image to a list of 3D images

Usage

```
img_ts_to_list(imgs, copy_nifti = TRUE, warn = TRUE)
```

Arguments

imgs	object of class <code>nifti</code> with 4 dimensions, aka a 4D time series
copy_nifti	Should <code>nifti</code> objects be returned (TRUE) or simply arrays (FALSE). Should only be used for slight speed up when array is adequate
warn	Should a warning be printed if object is not class <code>nifti</code>

Value

List of images

Note

If the object is not of class `nifti` or have 4 dimensions, then the object is returned

Examples

```
set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
simg = img_ts_to_list(nim)
simg_arr = img_ts_to_list(arr)
back = img_list_to_ts(simg_arr)
slist = lapply(simg, function(x) array(x, dim(x)))
testthat::expect_equal(slist, simg_arr)
simg_arr = img_ts_to_matrix(arr)
simg_arr = img_ts_to_df(arr)
```

img_ts_to_matrix *Image Time Series to Matrix*

Description

Turns a 4D time series image to a Matrix

Usage

```
img_ts_to_matrix(imgs, warn = FALSE)
```

Arguments

imgs object of class `nifti` with 4 dimensions, aka a 4D time series
warn Should a warning be printed if object is not class `nifti` (e.g. a list instead)

Value

Matrix of values

maskEmptyImageDimensions-methods
Apply Masking from Empty Image Dimensions

Description

Simple wrapper for replacing indices with a value

Usage

```
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)
```

```
## S4 method for signature 'nifti'
```

```
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)
```

```
## S4 method for signature 'character'
```

```
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)
```

```
## S4 method for signature 'factor'
```

```
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)
```

```
## S4 method for signature 'list'
```

```
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)
```

```
## S4 method for signature 'array'
```

```

maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)

## S4 method for signature 'anlz'
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)

## S4 method for signature 'ANY'
maskEmptyImageDimensions(img, inds, reorient = FALSE, mask.value = 0, ...)

mask_empty_dim(img, ...)

```

Arguments

img	image, nifti object, or array
inds	indices of subset from getEmptyImageDimensions or dropEmptyImageDimensions .
reorient	Should image be reoriented if a filename?
mask.value	Value to replace voxels outside the mask.
...	not used

Value

Object of class nifti or array if nifti is not supplied

Note

mask_empty_dim is a shorthand for maskEmptyImageDimensions with all the same arguments.

See Also

[getEmptyImageDimensions](#), [dropEmptyImageDimensions](#)

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, ,10] = 0
nim = oro.nifti::nifti(arr)
inds = getEmptyImageDimensions(nim)
inds_arr = getEmptyImageDimensions(arr)
res = maskEmptyImageDimensions(nim, inds = inds, mask.value = NA)
res2 = maskEmptyImageDimensions(arr, inds = inds_arr, mask.value = NA)
testthat::expect_equal(array(res, dim = dim(res)),
array(res2, dim = dim(res2)))

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, ,10] = 0
nim = oro.nifti::nifti(arr)
inds = getEmptyImageDimensions(nim)

```

```

rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
limg = list(factor(timg), factor(timg))
mask_empty_dim(nim, inds = inds)
func = function(...) maskEmptyImageDimensions(..., inds = inds)
func(arr)
func(nim)
func(rnifti)
func(timg)
func(limg)

```

mask_img

Mask Image

Description

Takes an image, masks it by mask, and returns an object of class `nifti`

Usage

```
mask_img(img, mask, allow.NA = TRUE)
```

Arguments

<code>img</code>	object of class <code>nifti</code>
<code>mask</code>	array or object of class <code>nifti</code> , same dimensions as <code>img</code>
<code>allow.NA</code>	allow NAs in the mask

Value

Object of class `nifti` with values outside mask set to 0 if mask is 0 and NA if mask is NA and `img` if `mask == 1`

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
mask = abs(nim) > 1
masked = mask_img(nim, mask)
mask[mask == 0] = NA
na_masked = mask_img(nim, mask, allow.NA = TRUE)

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, , 10] = 0

```

```

nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
mask = nim > 0
ting = tempimg(nim)
limg = list(factor(ting), factor(ting))
func = function(...) mask_img(..., mask = mask)
func(arr)
func(nim)
func(rnifti)
func(ting)
lapply(limg, func)

```

mask_vals

Extract or Replace Values Inside a Mask

Description

Methods that act on the `.Data` field in a NIFTI/ANALYZE image but only on values inside a mask.

Usage

```

mask_vals(object, mask)

mask_vals(object, mask) <- value

## S4 replacement method for signature 'nifti'
mask_vals(object, mask) <- value

## S4 replacement method for signature 'anlz'
mask_vals(object, mask) <- value

## S4 replacement method for signature 'array'
mask_vals(object, mask) <- value

```

Arguments

<code>object</code>	is an object of class <code>nifti</code> or <code>anlz</code> .
<code>mask</code>	is an object of class <code>nifti</code> or <code>anlz</code> .
<code>value</code>	is the value to assign to the <code>.Data</code> field.

Examples

```

img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
mask = img > 1.5
mask_vals(img, mask)
mask_vals(img, mask) = rep(4, sum(mask))
mask_vals(img, as(mask, "array")) = rep(4, sum(mask))
mask_vals(as(img, "array"),
          as(mask, "array")) = rep(4, sum(mask))

```

mean.nifti	<i>Mean of Values in an Image</i>
------------	-----------------------------------

Description

Computes the mean of values of an image with the option for a mask.

Usage

```
## S3 method for class 'nifti'  
mean(x, ..., mask)
```

```
## S3 method for class 'anlz'  
mean(x, ..., mask)
```

Arguments

x	Object of class nifti
...	Arguments passed to mean.default
mask	object to subset the image. If missing, then all values of the image are plotted.

Value

Output of [mean](#)

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))  
mask = img > 0  
mean(img, mask = mask)
```

minmax_img-methods	<i>Normalize Image using Range</i>
--------------------	------------------------------------

Description

Calculates the range of values in an image, then scales the image minimum to 0 and maximum to 1

Usage

```

minmax_img(img)

## S4 method for signature 'nifti'
minmax_img(img)

## S4 method for signature 'array'
minmax_img(img)

## S4 method for signature 'ANY'
minmax_img(img)

## S4 method for signature 'character'
minmax_img(img)

## S4 method for signature 'factor'
minmax_img(img)

## S4 method for signature 'list'
minmax_img(img)

```

Arguments

`img` character path of image or an object of class `nifti`, or list of images

Value

A `nifti` object (or list of them) or class of object passed in if not specified

Examples

```

set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
mimg = minmax_img(nim)
marr = minmax_img(arr)
testthat::expect_equal(array(mimg, dim = dim(mimg)), marr)

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,10] = 0
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
limg = list(factor(timg), factor(timg))
func = minmax_img
func(arr)
func(nim)

```

```
func(rnifti)
func(timg)
func(limg)
```

multi_overlay

Create Multi-Image Plot with Overlays

Description

Creates a multi-row or multi-column plot with image slices and the potential for overlays as well.

Usage

```
multi_overlay(
  x,
  y = NULL,
  z = NULL,
  w = 1,
  mask = NULL,
  col.x = gray(0:64/64),
  col.y = hotmetal(),
  zlim.x = NULL,
  zlim.y = NULL,
  ybreaks = NULL,
  plane = c("axial", "coronal", "sagittal"),
  xlab = "",
  ylab = "",
  axes = FALSE,
  direction = c("horizontal", "vertical"),
  par.opts = list(oma = c(0, 0, 0, 0), mar = rep(0, 4), bg = "black"),
  text = NULL,
  text.x = 0.5,
  text.y = 1.4,
  text.cex = 2.5,
  text.col = "white",
  main = NULL,
  main.col = text.col,
  main.cex = text.cex,
  NA.x = TRUE,
  NA.y = TRUE,
  pdim = NULL,
  useRaster = TRUE,
  ...
)

multi_overlay_center(x, y = NULL, ...)
```


Arguments

x	List of images of class <code>nifti</code> or character vector of filenames
y	List of images of class <code>nifti</code> or character vector of filenames. Same length as x.
z	Slice to display.
w	3D volume to display if x has 4-D elements
mask	<code>nifti</code> image to drop empty image dimensions if wanted. Passed to dropEmptyImageDimensions
col.x	Color to display x images
col.y	Color to display y images
zlim.x	Limits for x to plot
zlim.y	Limits for y to plot
ybreaks	(numeric) breaks for y to passed to image
plane	the plane of acquisition to be displayed
xlab	Label for x-axis
ylab	Label for y-axis
axes	Should axes be displayed
direction	Should images be a row or column? Ignored if <code>mfrow</code> is in <code>par.opts</code>
par.opts	Options to pass to par
text	Text to be displayed
text.x	Location of text in x-domain
text.y	Location of text in y-domain
text.cex	Multiplier for text font
text.col	Color for text and main.
main	Title for each plot
main.col	Color for main. Will default to <code>text.col</code>
main.cex	Multiplier for text font. Will default to <code>text.cex</code>
NA.x	Should \emptyset 's in x be set to NA?
NA.y	Should \emptyset 's in y be set to NA?
pdim	Pixel dimensions if passing in arrays. Will be overridden if x is a <code>nifti</code> object
useRaster	if TRUE, a bitmap raster is used to plot the image instead of polygons. Passed to image
...	Additional arguments to pass to image

Examples

```

set.seed(5)
dims = rep(10, 4)
arr = array(rnorm(prod(dims)), dim = dims)
arr[,,c(3, 5)] = rpois(1000*2, lambda = 2)
nim = oro.nifti::nifti(arr)
mask = nim > 2
add_mask = nim[,,1] > 0
imgs = img_ts_to_list(nim)
masks = img_ts_to_list(mask)
multi_overlay(imgs, masks)
multi_overlay(imgs, masks,
main = "hey", direction = "vertical", plane = "coronal")
multi_overlay(imgs, masks, mask = add_mask,
main = "hey")

```

```
## Not run:
```

```

if (requireNamespace("brainR", quietly = TRUE)) {
  visits = 1:3
  y = paste0("Visit_", visits, ".nii.gz")
  y = system.file(y, package = "brainR")
  y = lapply(y, readnii)

  y = lapply(y, function(r){
    pixdim(r) = c(0, rep(1, 3), rep(0, 4))
    dropImageDimension(r)
  })

  x = system.file("MNI152_T1_1mm_brain.nii.gz",
    package = "brainR")
  x = readnii(x)
  mask = x > 0
  x = lapply(visits, function(tmp){
    x
  })
  alpha = function(col, alpha = 1) {
    cols = t(col2rgb(col, alpha = FALSE)/255)
    rgb(cols, alpha = alpha)
  }
  multi_overlay(x, y,
    col.y = alpha(hotmetal(), 0.5),
    mask = mask,
    main = paste0("\n", "Visit ", visits),
    text = LETTERS[visits],
    text.x = 0.9,
    text.y = 0.1,
    text.cex = 3)
}

```

```
## End(Not run)
```

newnii	<i>Resets image parameters for a copied nifti object</i>
--------	--

Description

Resets the slots of a nifti object, usually because an image was loaded, then copied and filled in with new data instead of making a nifti object from scratch. Just a wrapper for smaller functions

Usage

```
newnii(img, ...)
```

Arguments

img	nifti object (or character of filename)
...	arguments to be passed to datatype

Value

object of type nifti

niftiarr	<i>Make new nifti from array</i>
----------	----------------------------------

Description

Make new nifti object by passing in old nifti and array

Usage

```
niftiarr(img, arr)
```

Arguments

img	object of class nifti
arr	array to be passed in to .Data slot

Value

object of class nifti

nii.stub	<i>Grab nii file stubname</i>
----------	-------------------------------

Description

Quick helper function to strip off .nii or .nii.gz from filename

Usage

```
nii.stub(x, bn = FALSE)
```

Arguments

x	character vector of filenames ending in .nii or .nii.gz
bn	Take basename of file?

Value

A character vector with the same length as x

orient_rpi	<i>Reorient an Image to RPI orientation</i>
------------	---

Description

Reorient an Image to RPI orientation

Usage

```
orient_rpi(file, verbose = TRUE)
orient_rpi_file(file, verbose = TRUE)
is_rpi_oriented(file, verbose = FALSE)
```

Arguments

file	Object of class <code>nifti</code> or character path
verbose	print diagnostic messages

Value

List of 3 elements

- `img`: Reoriented image of class `nifti`
- `convention`: Convention (Neurological/Radiological) of original image
- `orientation`: Original image orientations

Note

'orient_rpi' and 'orient_rpi_file' uses 'RNifti' to ensure the reading orientation

Examples

```
lr_fname = system.file( "nifti", "mniLR.nii.gz", package = "oro.nifti")
img = readnii(lr_fname)

rl_fname = system.file( "nifti", "mniRL.nii.gz", package = "oro.nifti")
rl_img = readnii(rl_fname)
stopifnot(all(rl_img[nrow(rl_img):1,] == img))

reor = orient_rpi(rl_fname)
stopifnot(all(img == reor$img))

rev = reverse_orient_rpi(reor$img, convention = reor$convention,
orientation = reor$orientation)
stopifnot(all(rev == rl_img))
```

ortho2

Orthographic Display, added options

Description

Copy of oro.nifti's [orthographic](#) function with some tweaks such as adding L/R designations for left and right

Usage

```
ortho2(
  x,
  y = NULL,
  xyz = NULL,
  w = 1,
  col = gray(0:64/64),
  col.y = oro.nifti::hotmetal(),
  zlim = NULL,
  zlim.y = NULL,
  NA.x = FALSE,
  NA.y = TRUE,
  crosshairs = TRUE,
  col.crosshairs = "red",
  xlab = "",
  ylab = "",
  axes = FALSE,
  oma = c(0, 0, 0, ifelse(ycolorbar, 5, 0)),
  mar = rep(0, 4),
  bg = "black",
```

```

text = NULL,
text.color = "white",
text.cex = 2,
text.x = 32,
text.y = 32,
add.orient = FALSE,
mfrow = c(2, 2),
ybreaks = NULL,
breaks = NULL,
addlegend = FALSE,
leg.x = 32,
leg.y = 32,
legend,
leg.col,
leg.title = NULL,
leg.cex,
window = NULL,
ycolorbar = FALSE,
clabels = TRUE,
add = TRUE,
pdim = NULL,
useRaster = is.null(y),
mask = NULL,
...
)

```

Arguments

<code>x</code>	is an object of class <code>nifti</code> or similar.
<code>y</code>	is an object of class <code>nifti</code> or similar for the overlay.
<code>xyz</code>	is the coordinate for the center of the crosshairs.
<code>w</code>	is the time point to be displayed (4D arrays only).
<code>col</code>	is grayscale (by default).
<code>col.y</code>	is hotmetal (by default).
<code>zlim</code>	is the minimum and maximum 'z' values passed into image.
<code>zlim.y</code>	is the minimum and maximum 'z' values passed into image for the overlay.
<code>NA.x</code>	Set any values of 0 in x to NA
<code>NA.y</code>	Set any values of 0 in y to NA
<code>crosshairs</code>	is a logical value for the presence of crosshairs in all three orthogonal planes (default = TRUE).
<code>col.crosshairs</code>	is the color of the crosshairs (default = red).
<code>xlab</code>	is set to "" since all margins are set to zero.
<code>ylab</code>	is set to "" since all margins are set to zero.
<code>axes</code>	is set to FALSE since all margins are set to zero.

oma	is the size of the outer margins in the par function.
mar	is the number of lines of margin in the par function.
bg	is the background color in the par function.
text	allows the user to specify text to appear in the fourth (unused) pane.
text.color	is the color of the user-specified text (default = "white").
text.cex	is the size of the user-specified text (default = 2).
text.x	x coordinate for text
text.y	y coordinate for text
add.orient	(logical) Add left/right, A/P, etc. orientation
mfrow	(numeric) layout of the 3 slices
ybreaks	(numeric) breaks for y to passed to image
breaks	(numeric) breaks for x to passed to image
addlegend	(logical) add legend?
leg.x	(numeric) x coordinate for legend
leg.y	(numeric) y coordinate for legend
legend	(character) legend text
leg.col	(character) Colors for legend
leg.title	(character) title for legend
leg.cex	(numeric) cex for legend
window	(vector) Length-2 vector to limit image to certain range
ycolorbar	(logical) Should a colorbar for y be plotted
clabels	Label for colorbar (see colorbar)
add	Should the y-plot be added or its own plot? Used in <code>double_ortho</code>
pdim	Pixel dimensions if passing in arrays. Will be overridden if x is a <code>nifti</code> object
useRaster	logical; if TRUE a bitmap raster is used to plot the image instead of polygons. Passed to image .
mask	If a mask is passed, <code>drop_empty_dim</code> is applied to both x and y
...	other arguments to the image function may be provided here.

See Also

[orthographic](#)

Examples

```
set.seed(10)
x = oro.nifti::nifti(array(rnorm(1000), dim = rep(10, 3)))
ortho2(x)
y = x > 2
mask = x > 2.5
ortho2(x, y)
```

```

ortho2(x, y, mask = mask, add.orient = TRUE)
ortho2(x, y, mask = mask, add.orient = TRUE, add = FALSE)
nim = RNifti::asNifti(x, internal = FALSE)
ortho2(nim, y, mask = mask)
neurobase::ortho2(nim, x, mask = mask,
ybreaks = seq(min(x), max(x), length.out = 65), ycolorbar = TRUE)

ortho2(nim, y, mask = mask, add = FALSE)
arr_x = as.array(x)
arr_y = as.array(y)
ortho2(arr_x)
ortho2(arr_x, arr_y, useRaster = FALSE)

set.seed(10)
x = oro.nifti::nifti(array(rnorm(10000), dim = rep(10, 4)))
y = x > 2
mask = x > 2.5
ortho2(x, y)

set.seed(10)
x = oro.nifti::nifti(array(rnorm(100), dim = rep(10, 2)))
y = x > 2
mask = x > 2.5
ortho2(x, y)

```

ortho_diff

Plot differences for Prediction and Gold Standard

Description

Uses `ortho2` to plot differences between a predicted binary image and the assumed ground truth (roi).

Usage

```

ortho_diff(
  img,
  pred,
  roi,
  xyz = NULL,
  cols = c("#56B4E9", "#D55E00", "#009E73"),
  levels = c("False Negative", "False Positive", "True Positive"),
  addlegend = TRUE,
  center = TRUE,
  leg.cex = 1.5,
  ...
)

multi_overlay_diff(

```



```

    x,
    pred,
    roi,
    z = NULL,
    cols = c("#56B4E9", "#D55E00", "#009E73"),
    ...
)

```

Arguments

img	image to be underlaid
pred	binary segmentation (prediction)
roi	binary manual segmentation (ground truth)
xyz	coordinate for the center of the crosshairs.
cols	colors for false negatives/positives
levels	labels for false negatives/positives
addlegend	add legend, passed to ortho2
center	run xyz on roi . Disregarded if xyz is not NULL
leg.cex	multiplier for legend size
...	arguments to be passed to ortho2 or multi_overlay
x	List of images of class <code>nifti</code> or character vector of filenames
z	slice to display

See Also

[ortho2](#)

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
roi = nim > 2
pred = nim > 1.5
ortho_diff(nim, pred, roi)
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
mask = nim > 2
pred = nim > 1.5
multi_overlay_diff(nim, roi = mask, pred = pred)

```

```

if (requireNamespace("brainR", quietly = TRUE)) {
  visits = 1:3
  y = paste0("Visit_", visits, ".nii.gz")
  y = system.file(y, package = "brainR")
  y = lapply(y, readnii)

  y = lapply(y, function(r){
    pixdim(r) = c(0, rep(1, 3), rep(0, 4))
    dropImageDimension(r)
  })

  x = system.file("MNI152_T1_1mm_brain.nii.gz",
                 package = "brainR")
  x = readnii(x)
  mask = x > 0
  alpha = function(col, alpha = 1) {
    cols = t(col2rgb(col, alpha = FALSE)/255)
    rgb(cols, alpha = alpha)
  }
  roi = y[[2]]
  pred = y
  multi_overlay_diff(x, roi = roi, pred = pred)
  multi_overlay_diff(x, roi = roi, pred = pred,
                    mask = mask,
                    main = paste0("\n", "Visit ", visits),
                    text = LETTERS[visits],
                    text.x = 0.9,
                    text.y = 0.1,
                    text.cex = 3)
}

```

parse_img_ext

Parse Image Extensions

Description

Get image extensions from a filename

Usage

```
parse_img_ext(file)
```

Arguments

file Character filename to parse

Value

Extension of file

Examples

```
parse_img_ext("blah.nii.gz")
parse_img_ext("blah.mnc")
parse_img_ext("blah.nii")
parse_img_ext("blah")
parse_img_ext("blah.img")
parse_img_ext("blah.hdr")
parse_img_ext("blah.hdr.gz")
```

quantile.nifti

Sample Quantiles

Description

Computes sample quantiles for an image, with the option of a mask.

Usage

```
## S3 method for class 'nifti'
quantile(x, ..., mask)

## S3 method for class 'anlz'
quantile(x, ..., mask)
```

Arguments

x	Object of class <code>nifti</code>
...	Arguments passed to <code>quantile</code>
mask	object to subset the image. If missing, then all values of the image are used

Value

Output of `quantile`

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
mask = img > 0
quantile(img, mask = mask)
```

quantile_img *Create Quantile Image*

Description

Creates output image of the quantiles that each voxel is in, after applying the mask

Usage

```
quantile_img(img, mask = NULL, ...)
```

Arguments

img	Character vector, or object of class <code>nifti</code>
mask	Mask to determine cumulative distribution function (cdf) from
...	Additional arguments to pass to ecdf

Value

Object of class `nifti`

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
qimg = quantile_img(nim)
qarr = quantile_img(arr)
testthat::expect_equal(qarr, array(qimg, dim = dim(qarr)))
qimg = quantile_img(nim, mask = nim > 0)
```

randomize_mask *Randomize Image based on Mask*

Description

Randomize the values within a mask

Usage

```
randomize_mask(img, mask)
```

Arguments

`img` Object of class `nifti` with values to be randomized
`mask` Binary mask indicating which values should be randomized.

Value

Object of class `nifti`

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
mask = abs(nim) > 1
randomize_mask(nim, mask)
```

`random_nifti` *Create Random 'nifti' object*

Description

Create Random 'nifti' object

Usage

```
random_nifti(dim, ...)
```

Arguments

`dim` dimensions for the 'nifti' object
`...` arguments to send to `nifti`

Value

A 'nifti' object

Examples

```
random_nifti(c(10, 10, 2))
random_nifti(c(10, 10))
```

readNIFTI2	<i>readNIFTI with default non-reorientation</i>
------------	---

Description

This function calls the [readNIFTI](#) function from the `oro.nifti` package, but sets the reorientation to FALSE by default

Usage

```
readNIFTI2(..., reorient = FALSE)

readnii(
  ...,
  reorient = FALSE,
  dtype = TRUE,
  drop_dim = TRUE,
  reset_slope = FALSE,
  warn = FALSE,
  rm_extensions = TRUE
)
```

Arguments

<code>...</code>	Arguments to pass to readNIFTI
<code>reorient</code>	Reorientation argument to pass to readNIFTI
<code>dtype</code>	Should datatyper be run after reading?
<code>drop_dim</code>	Should drop_img_dim be run after reading?
<code>reset_slope</code>	Reset slope/intercept of image
<code>warn</code>	Should warnings from readNIFTI be printed? If not, suppressWarnings is called. Also passed to datatyper
<code>rm_extensions</code>	should <code>niftiExtensions</code> be converted to simple nifti objects?

Value

nifti object

read_rpi	<i>Read NIfTI file reoriented to RPI</i>
----------	--

Description

This function calls the [readnii](#) function after calling [orient_rpi_file](#) to force RPI orientation.

Usage

```
read_rpi(file, ..., verbose = TRUE)
```

Arguments

file	file name of the NIfTI file.
...	Arguments to pass to readnii
verbose	print diagnostics, passed to orient_rpi_file

Note

'read_rpi' uses 'RNifti' to ensure the reading orientation

remake_img	<i>Remake Image from Vector</i>
------------	---------------------------------

Description

Wrapper function to take a vector of values and result in a [nifti](#) object

Usage

```
remake_img(vec, img, mask = NULL, warn = FALSE, ...)
```

Arguments

vec	vector of values to be in resulting image
img	object of class nifti to put vector into
mask	binary array/ nifti object to denote where vector values are to be.
warn	Should a warning be issued if defaulting to FLOAT32?
...	additional arguments passed to datatyper

Value

Object of class [nifti](#)

See Also[niftiarr](#)**Examples**

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, , 10] = 0
nim = oro.nifti::nifti(arr)
remake_img(c(nim), nim)
mask = nim > 5
vals = nim[mask]
vals = sqrt(vals)
remake_img(vals, nim, mask = mask)

```

remap_filename	<i>Build Filename (usually for images)</i>
----------------	--

Description

This is a simple function that helps with the case where you want to construct a filename (usually for an image) with the same base of the filename, the same directory (default), but things added to the front or end of that base filename, with the same extension.

Usage

```
remap_filename(x, sub_dir = NULL, prefix = "", suffix = "")
```

Arguments

x	input filename/character vector
sub_dir	sub-directory for the new filename. If NULL, then the directory is the the same directory as x
prefix	string to put in front of base of filename
suffix	string to put at the end of base of filename

Value

Character vector

Examples

```

fname = file.path("/path/to/file", "original.nii.gz")
remap_filename(fname, prefix = "preproc_", "_with_gz")
fname = "original.nii"
remap_filename(fname, prefix = "note_", "_has_directory")
remap_filename(c(fname, "other.nii.gz"), prefix = "note_", "_has_directory")

```

`replaceEmptyImageDimensions-methods`*Replace Subsetting from Empty Image Dimensions*

Description

Simple wrapper for subsetting an image with indices, dropping empty dimensions.

Usage

```
replaceEmptyImageDimensions(  
  img,  
  inds,  
  target_dim,  
  value = 0,  
  reorient = FALSE,  
  ...  
)  
  
## S4 method for signature 'nifti'  
replaceEmptyImageDimensions(  
  img,  
  inds,  
  target_dim,  
  value = 0,  
  reorient = FALSE,  
  ...  
)  
  
## S4 method for signature 'character'  
replaceEmptyImageDimensions(  
  img,  
  inds,  
  target_dim,  
  value = 0,  
  reorient = FALSE,  
  ...  
)  
  
## S4 method for signature 'factor'  
replaceEmptyImageDimensions(  
  img,  
  inds,  
  target_dim,  
  value = 0,  
  reorient = FALSE,  
  ...  
)
```

```
)

## S4 method for signature 'list'
replaceEmptyImageDimensions(
  img,
  inds,
  target_dim,
  value = 0,
  reorient = FALSE,
  ...
)

## S4 method for signature 'array'
replaceEmptyImageDimensions(
  img,
  inds,
  target_dim,
  value = 0,
  reorient = FALSE,
  ...
)

## S4 method for signature 'anlz'
replaceEmptyImageDimensions(
  img,
  inds,
  target_dim,
  value = 0,
  reorient = FALSE,
  ...
)

## S4 method for signature 'ANY'
replaceEmptyImageDimensions(
  img,
  inds,
  target_dim,
  value = 0,
  reorient = FALSE,
  ...
)

replace_empty_dim(img, ...)
```

Arguments

`img` image, nifti object, or array
`inds` indices of subset from [getEmptyImageDimensions](#) or [dropEmptyImageDimensions](#).

target_dim	Original dimension from which the data was subset, the final dimension of the output
value	value to replace in the image where outside the indices
reorient	Should image be reoriented if a filename?
...	not used

Value

Object of class `nifti` or array if `nifti` is not supplied

Note

`replace_empty_dim` is a shorthand for `replaceEmptyImageDimensions` with all the same arguments.

See Also

[getEmptyImageDimensions](#), [dropEmptyImageDimensions](#)

Examples

```

dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
arr[, , 10] = 0
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
ting = tempimg(nim)
limg = list(factor(ting), ting)
inds = getEmptyImageDimensions(nim)
inds_arr = getEmptyImageDimensions(arr)
testthat::expect_equal(inds, inds_arr)

out = applyEmptyImageDimensions(nim, inds = inds)
result = replaceEmptyImageDimensions(out, inds = inds,
target_dim = dim(nim))
testthat::expect_equal(array(result, dim = dim(result)),
array(nim, dim = dim(nim)))
replace_empty_dim(out, inds = inds,
target_dim = dim(nim))

target_dim = dim(nim)

arr = array(out, dim = dim(out))
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
ting = tempimg(nim)
limg = list(factor(ting), factor(ting))
func = function(...) replaceEmptyImageDimensions(...,
target_dim = target_dim, inds = inds)
func(arr)
func(nim)

```

```
func(rnifti)
func(timg)
func(limg)
```

```
replace_dropped_dimensions
```

Remake Dropped Dimensions

Description

This function is the reverse of `dropEmptyImageDimensions`. If `dropEmptyImageDimensions` was run, and the output is a list, usually if `keep_ind = TRUE`, this function reverses that.

Usage

```
replace_dropped_dimensions(img, inds, orig.dim)
```

Arguments

<code>img</code>	Object of class <code>nifti</code> where image dimensions were dropped.
<code>inds</code>	List of length 3 of indices from <code>dropEmptyImageDimensions</code> or <code>getEmptyImageDimensions</code>
<code>orig.dim</code>	Original dimension of pre-dropped image. Output image will have dimensions same as this value

Value

Object of class `nifti`

Examples

```
## Not run:
# nim is an object of class nifti
dd = dropEmptyImageDimensions(nim, keep_ind = TRUE)
remake = replace_dropped_dimensions(img = dd$outimg,
inds = dd$inds,
orig.dim = dd$orig.dim)
all.equal(nim, remake)

## End(Not run)
```

 replace_outside_surface

Replace Values Outside Surface of image

Description

Determines values outside the surface of an image and gives a mask back with those values set to a replacement.

Usage

```
replace_outside_surface(
  img,
  value = 0,
  threshold = 0,
  replace_value = NA,
  reorient = FALSE
)
```

Arguments

img	nifti object or array
value	Value to check against. If zero, then <code>replace_outside_surface</code> will include any dimension that has fewer than <code>threshold</code> zeroes. May be a vector of values, matched with match
threshold	Include dimension if fewer than <code>threshold</code> voxels are in the slice
replace_value	Value to replace those outside the surface.
reorient	Should image be reoriented if a filename? Passed to check_nifti

Value

Creates an array of binary values. If `img` is a nifti object, then a nifti is returned

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(0, dim = dims)

arr[ 3:5, 4:6, c(2, 6:8, 5)] = 1
nim = oro.nifti::nifti(arr)
out = replace_outside_surface(nim, replace_value = 0)
out_arr = replace_outside_surface(arr, replace_value = 0)
testthat::expect_equal(out_arr, array(out, dim = dim(out)))
```

rescale_img

*Image Rescaler***Description**

Rescales an image to be in certain value range. This was created as sometimes DICOM scale and slope parameters may be inconsistent across sites and the data need to be value restricted

Usage

```
rescale_img(
  filename,
  pngname = NULL,
  write.nii = FALSE,
  outfile = NULL,
  min.val = -1024,
  max.val = 3071,
  ROIformat = FALSE,
  drop_dim = TRUE,
  writer = "dcm2nii",
  ...
)
```

Arguments

filename	filename of image to be read into R or nifti object
pngname	filename of png of histogram of values of image to be made. For no png - set to NULL (default)
write.nii	logical - should the image be written.
outfile	if write.nii = TRUE, filename of output file
min.val	minimum value of image (default -1024 (for CT)). If no thresholding set to -Inf
max.val	maximum value of image (default 3071 (for CT)). If no thresholding set to Inf
ROIformat	if TRUE, any values ≤ 0 will be set to 0
drop_dim	Should <code>drop_img_dim</code> be applied?
writer	character value to add to description slot of NIFTI header
...	extra methods to be passed to <code>writenii</code>

Value

Object of class nifti

Examples

```
img = nifti(array(rnorm(10^3, sd = 1000), dim = rep(10, 3)))
outfile = tempfile(fileext = ".nii.gz")
pngname = tempfile(fileext = ".png")
rescale_img(img, write.nii = TRUE, outfile = outfile,
pngname = pngname)
```

reverse_orient_rpi *Reverse Reorientation an Image to RPI orientation*

Description

Reverse Reorientation an Image to RPI orientation

Usage

```
reverse_orient_rpi(
  file,
  convention = c("NEUROLOGICAL", "RADIOLOGICAL"),
  orientation,
  verbose = TRUE
)

reverse_orient_rpi_file(
  file,
  convention = c("NEUROLOGICAL", "RADIOLOGICAL"),
  orientation,
  verbose = TRUE
)
```

Arguments

file	Object of class <code>nifti</code> or character path
convention	Convention of original image (usually from <code>orient_rpi</code>)
orientation	Vector of length 3 from original image (usually from <code>orient_rpi</code>)
verbose	print diagnostic messages

Value

Object of class `nifti`

Note

'reverse_orient_rpi' and 'reverse_orient_rpi_file' uses 'RNifti' to ensure the reading orientation

robust_window	<i>Window image based on quantiles of Image</i>
---------------	---

Description

Takes an image, finds the quantiles given by probs, then sets values outside these values to other values, as determined by replace argument passed to [window_img](#)

Usage

```
robust_window(img, non_zero = FALSE, probs = c(0, 0.999), ..., mask = NULL)
```

Arguments

img	object of class nifti
non_zero	Should zeroes be excluded from the calculation of quantiles?
probs	quantiles to constrain the image these define the window sent to window_img
...	additional arguments sent to window_img
mask	binary image to use to calculate quantiles

Value

Object of class nifti with values outside quantiles replaced by values depending on replace argument passed to [window_img](#)

same_dims	<i>Check if Objects have Same Dimensions</i>
-----------	--

Description

Wrapper to check if multiple objects all have the same dimensions

Usage

```
same_dims(...)
```

Arguments

...	Arguments (matrices or arrays) where the dimension will be checked against the first object's dimension
-----	---

Value

Logical indicating if all have the same dimensions or not

Examples

```
mat1 = matrix(1:9, ncol = 3)
mat2 = matrix(rnorm(9), ncol = 3)
mat3 = matrix(rnorm(16), ncol = 4)
mat4 = matrix(rnorm(9), ncol = 3)
same_dims(mat1, mat2)
same_dims(mat1, mat3)
same_dims(mat1, mat2, mat4)
```

separate_img-methods *Separate Labeled Image into Multiple Binary Images*

Description

Takes in an image, gets the unique values, then creates a list of binary images for each one of those values.

Usage

```
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'nifti'
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'array'
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'ANY'
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'factor'
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'character'
separate_img(img, levels = NULL, drop_zero = TRUE)

## S4 method for signature 'list'
separate_img(img, levels = NULL, drop_zero = TRUE)
```

Arguments

<code>img</code>	character path of image or an object of class <code>nifti</code> , or list of images
<code>levels</code>	if <code>levels</code> is given, then the separation is only done for those levels and not unique values of the image.
<code>drop_zero</code>	Should zeroes be dropped from the labels? Zero usually denotes background or non-interesting voxels

Value

A nifti object (or list of them) or class of object passed in if not specified

Note

Exact equalling is using ==

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
simg = separate_img(nim)
simg_arr = separate_img(arr)
slist = lapply(simg, function(x) array(x, dim(x)))
testthat::expect_equal(slist, simg_arr)

rnifti = RNifti::asNifti(nim)
timg = tempimg(nim)
limg = list(factor(timg), factor(timg))
func = separate_img
func(arr)
func(nim)
func(rnifti)
func(timg)
func(limg)
```

slice_colour_df

Slice a Image Color Data.frame

Description

Slices a image color data.frame along the 3 planes (axial, coronal, sagittal) and returns it in a ggplot-ready format for faceting.

Usage

```
slice_colour_df(img_df, xyz = NULL)
```

Arguments

img_df	an image data.frame, usually from <code>img_colour_df</code> . Must have the columns: dim1, dim2, dim3, colour, and value.
xyz	coordinates to slice the data.frame in x, y, and z - domains

Value

A data.frame with x and y coordinates, colour, and intensity values, along with the associated planes that were sliced.

Examples

```
img = nifti(array(rnorm(10^3), dim = rep(10, 3)))
df = img_colour_df(img)
sliced = slice_colour_df(df, c(5, 5, 4))
```

subset_dti-methods *Subset DTI data based on b-values #'*

Description

Subset DTI data based on b-values #'

Usage

```
subset_dti(
  img,
  bvals,
  bvecs,
  b_step = 1,
  maximum = Inf,
  shells = NULL,
  verbose = TRUE,
  ...
)

## S4 method for signature 'nifti'
subset_dti(
  img,
  bvals,
  bvecs,
  b_step = 1,
  maximum = Inf,
  shells = NULL,
  verbose = TRUE,
  ...
)

## S4 method for signature 'ANY'
subset_dti(
  img,
  bvals,
  bvecs,
```

```

    b_step = 1,
    maximum = Inf,
    shells = NULL,
    verbose = TRUE,
    ...
)

## S4 method for signature 'character'
subset_dti(
  img,
  bvals,
  bvecs,
  b_step = 1,
  maximum = Inf,
  shells = NULL,
  verbose = TRUE,
  ...
)

## S4 method for signature 'list'
subset_dti(
  img,
  bvals,
  bvecs,
  b_step = 1,
  maximum = Inf,
  shells = NULL,
  verbose = TRUE,
  ...
)

```

Arguments

<code>img</code>	character or nifti object
<code>bvals</code>	filename of b-values (assuming 1 row)
<code>bvecs</code>	filename of b-vectors (assuming 3 rows)
<code>b_step</code>	step of b-values to round to
<code>maximum</code>	maximum b-value threshold
<code>shells</code>	Shells to keep (after rounding)
<code>verbose</code>	print diagnostic messages
<code>...</code>	options passed to checking

Value

List of filenames of image, b-values, and b-vectors that were subsetted.

Author(s)

John Muschelli <muschellij2@gmail.com>

Examples

```
## Not run:
img = "~/Downloads/data.nii.gz"
bvals = "~/Downloads/bvals"
bvecs = "~/Downloads/bvals"
verbose = TRUE
b_step = 50
maximum = 1500
shells = NULL
sub = subset_dti(img = img, bvals = bvals, bvecs = bvecs,
maximum = 1500,
b_step = 50)

## End(Not run)
```

tempimg

Create temporary nii.gz file

Description

Takes in a object of class nifti, writes it to a temp file, appends .nii.gz as [writenii](#) adds it.

Usage

```
tempimg(
  nim,
  gzipped = TRUE,
  checknan = TRUE,
  check_type = FALSE,
  warn = FALSE,
  drop_dim = TRUE,
  dtype = TRUE,
  ...
)
```

Arguments

nim	object of class nifti
gzipped	Should file be gzipped? Passed to writenii
checknan	Check for NAs or NaNs
check_type	Check the datatype for an image. Will run datatyper .
warn	Should warnings be displayed if writenii has any? Passed to writenii .

drop_dim	Should drop_img_dim be applied?
dtype	Should datatyper be run before writing? Should override 'check_type'?
...	Passed to writenii .

Value

filename of output nii.gz

window_img	<i>nifti image windower</i>
------------	-----------------------------

Description

Windows an image to min and max values and also changes cal_max and cal_min parameters

Usage

```

window_img(
  x,
  window = c(0, 100),
  replace = c("window", "missing", "zero"),
  ...
)

```

Arguments

x	is either a character name for the image or an object of class nifti
window	numeric of length 2 that gives min and max for window
replace	either "window" if the any values outside of c(min, max) are set to the min or max or "missing" for these to be set to NA
...	not used

Value

Object of class nifti

See Also

[readnii](#)

Examples

```

set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
window_img(nim, window = c(1, 5))
window_img(nim, window = c(1, 5), replace = "missing")
tfile = tempimg(nim)
window_img(tfile)
window_img(as.factor(tfile))
arr = window_img(img_data(nim))
rnim = RNifti::readNifti(tfile)
window_img(rnim, window = c(1, 5))
range(window_img(rnim, window = c(1, 5)))
window_img(rnim, window = c(1, 5), replace = "missing")
range(window_img(rnim, window = c(1, 5), replace = "missing"))

```

writeNIFTI2

writeNIFTI with default non-reorientation

Description

This function calls the [writeNIFTI](#) function from the `oro.nifti` package, but makes sure to remove `.nii` extension and warnings can be suppressed.

Usage

```
writeNIFTI2(nim, filename, dtype = FALSE, compression = 9, ...)
```

```

writenii(
  nim,
  filename,
  dtype = TRUE,
  drop_dim = TRUE,
  warn = FALSE,
  compression = 9,
  rm_extensions = TRUE,
  ...
)

```

Arguments

<code>nim</code>	object of class <code>nifti</code> , passed to writeNIFTI
<code>filename</code>	path to save the NIFTI file. Suffix will be removed
<code>dtype</code>	Should datatyper be run before writing?

compression	compression level for gzipped files.
...	Additional arguments passed to <code>writeNIFTI</code>
drop_dim	Should <code>drop_img_dim</code> be run before writing?
warn	Should warnings from <code>writeNIFTI</code> be printed? If not, <code>suppressWarnings</code> is called
rm_extensions	should <code>niftiExtensions</code> be converted to simple nifti objects before writing?

Value

Nothing

Note

While `writeNIFTI2` does not run `datatyper` as default, `writenii` does. Additional functionality will be added to `writenii` likely but will not to `writeNIFTI2`

Examples

```
set.seed(5)
dims = rep(10, 3)
arr = array(rnorm(prod(dims)), dim = dims)
nim = oro.nifti::nifti(arr)
rnifti = RNifti::asNifti(nim)
tfile = tempfile(fileext = ".nii.gz")
timg = writenii(nim, tfile, rm_extensions = TRUE, warn = TRUE)
timg = writeNIFTI2(nim, tfile, dtype = TRUE)
```

write_nifti *General NIFTI Writer*

Description

Writes out NIFTI files for multiple formats. Currently, for `nifti` objects and `niftiImage` objects from `RNifti`

Usage

```
write_nifti(nim, filename, ...)
```

Arguments

nim	Container for NIFTI Image
filename	Filename of image to be written out
...	additional arguments, to be passed to <code>writeNifti</code> or <code>writenii</code>

Value

Output from NIFTI writer

Examples

```

set.seed(5)
dims = rep(10, 4)
arr = array(rpois(prod(dims), lambda = 2), dim = dims)
nim = oro.nifti::nifti(arr)
tfile = tempfile(fileext = ".nii.gz")
write_nifti(nim, tfile)
ring = RNifti::readNifti(tfile)
write_nifti(ring, tfile)

```

xyz

Image Center of Gravity Wrapper

Description

Find Center of Gravity of Image, after thresholding and take ceiling (wrapper for [cog](#))

Usage

```
xyz(...)
```

Arguments

... Arguments passed to [cog](#)

Value

Vector of length 3

Note

Just a convenience wrapper for `cog(ceil=TRUE)`

zero_pad

Zero pads an image

Description

This function zero pads an image by a certain number of dimensions, usually for convolution

Usage

```
zero_pad(img, kdim, invert = FALSE, pad_value = 0L, ...)
```

Arguments

img	Array or class nifti
kdim	Dimensions of kernel
invert	(logical) If FALSE, does zero padding. If TRUE, reverses the process.
pad_value	Value to pad the image with. May use other values, such as -1024 for CT data
...	Options to copyNIFTIHeader

Value

Object of class nifti

Examples

```
kdim = c(3,3,5)
img = array(rnorm(30*30*36), dim = c(30, 30, 36))
pad = zero_pad(img, kdim)
back = zero_pad(pad, kdim, invert=TRUE)
all.equal(back, img)
```

zlimmer

Find Image z-limits

Description

Helper function for plotting - returns zlim for [image](#) plot function

Usage

```
zlimmer(x, zlim = NULL, computed_range = NULL)
```

Arguments

x	Object of class nifti
zlim	A user-specified zlim. If NULL, will calculate how ortho2 would calculate zlim
computed_range	If the range of the data was already computed, this can be passed in and will be used if relevant.

Value

If zlim = NULL, then vector of length 2, otherwise returns zlim

zscore_img

*Get Z-score over a margin of an img***Description**

Standardizes an image either by the axial, sagittal, or coronal slice or whole image

Usage

```
zscore_img(
  img,
  mask = NULL,
  margin = NULL,
  centrality = c("mean", "median", "trimmed_mean"),
  variability = c("sd", "iqrdiff", "mad", "maddiff", "iqr", "trimmed_sd"),
  trim = 0.2,
  remove.na = TRUE,
  remove.nan = TRUE,
  remove.inf = TRUE,
  remove.val = 0,
  remask = TRUE
)
```

Arguments

img	character path of image or an object of class nifti
mask	character path of mask or an object of class nifti
margin	Margin of image to z-score over (NULL - whole brain, 3-Axial, 2-Sagittal, 1-Coronal)
centrality	(character) Measure to center the data, either mean or median
variability	(character) Measure to scale the data
trim	if centrality is trimmed_mean or variability is trimmed_sd, then the amount of trimming
remove.na	(logical) change NAs to remove.val
remove.nan	(logical) change NaN to remove.val
remove.inf	(logical) change Inf to remove.val
remove.val	(logical) value to put the NA/NaN/Inf
remask	(logical) Should the image be remasked after normalizing?

Value

Array of object of class nifti

See Also[aperm](#)**Examples**

```
dim = c(100, 30, 5)
img = array(rnorm(prod(dim), mean=4, sd=4),
dim=dim)

truth2 = img
for (i in 1:dim(img)[2]) {
truth2[,i,] = (truth2[,i,] - mean(truth2[,i,]))/sd(truth2[,i,])
}

truth1 = img
for (i in 1:dim(img)[1]) {
truth1[i,,] = (truth1[i,,] - mean(truth1[i,,]))/sd(truth1[i,,])
}

truth3 = img
for (i in 1:dim(img)[3]) {
truth3[,,i] = (truth3[,,i] - mean(truth3[,,i]))/sd(truth3[,,i])
}
try3 = zscore_img(img, margin=3)
stopifnot(all.equal(try3, truth3))
try2 = zscore_img(img, margin=2)
stopifnot(all.equal(try2, truth2))
try1 = zscore_img(img, margin=1)
stopifnot(all.equal(try1, truth1))

z = zscore_img(img, margin=NULL)
ztrim = zscore_img(img, margin=NULL,
centrality = "trimmed_mean", variability = "trimmed_sd")

z = zscore_img(img, centrality = "median", variability = "iqr")
z = zscore_img(img, centrality = "median", variability = "iqrdiff")
z = zscore_img(img, centrality = "median", variability = "maddiff")
```

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