Package: Epoch (via r-universe)

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Title IEEG (Intracranial Electroencephalography) Epoch Data Tools

Version 1.0.7

Description Provides tools for working with iEEG matrix data, including downloading curated iEEG data from OSF (The Open Science Framework <https://osf.io/>) (EpochDownloader()), making new objects (Epoch()), processing (crop() and resample()), and visualizing the data (plot()).

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Contents

`.checkIndex` *Check and keep valid index only*

Description

Check and keep valid index only

Usage

```
.checkIndex(indices, names)
```

Arguments

`indices`	Numeric or character index to check
`names`	Character. All names corresponding to the indices

`.standardizeIEEG` *Standardize iEEG row data for plotting*

Description

Standardize iEEG row data for plotting

Usage

```
.standardizeIEEG(data, standardize = TRUE, gap = 2)
```

Arguments

data	Matrix or data frame of iEEG data
standardize	Logical or numeric vector. If logical, indicates whether to standardize each row. If numeric, indicates the scaling factor for each row.
gap	Numeric. The gap to separate different electrodes in the plot.

Value

Standardized data matrix

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coltimes *Obtain the time points for the Epoch matrix*

Description

Obtain the time points for the Epoch matrix

Usage

```
coltimes(x)

## S4 method for signature 'Epoch'
coltimes(x)
```

Arguments

x	An Epoch object

Value

A numeric vector of time points, or column indices if time points are not defined

See Also

Other Epoch methods: `crop()`, `plot,Epoch,missing-method`, `resample()`, `show,Epoch-method`

Examples

```
# Create an Epoch object
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)

# get the time points of an Epoch object
coltimes(epoch)
```

crop *Methods for Epoch class*

Description

Truncating iEEG data to a specific time range.

Usage

```
crop(x, start, end, ...)

## S4 method for signature 'Epoch'
crop(x, start, end, checkTimeRange = TRUE)
```

Arguments

x	An Epoch object
start	Numeric value specifying start of new time range
end	Numeric value specifying end of new time range
...	Not used
checkTimeRange	Logical, whether to check the validity of the time range. This includes checking if the time range is empty, if start is greater than end, and if start or end are out of bounds. Default is TRUE.

Value

clip the time range of the Epoch object

See Also

Other Epoch methods: coltimes(), plot,Epoch,missing-method, resample(), show,Epoch-method

Examples

```
# Create an Epoch object
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)

# crop the epoch
crop(epoch, start = 0.5, end = 1.5)
```

dim,Epoch-method *Wrapper functions for calling TableContainer methods*

Description

Wrapper functions for calling TableContainer methods

Usage

```
## S4 method for signature 'Epoch'
dim(x)

## S4 method for signature 'Epoch'
dimnames(x)

## S4 method for signature 'Epoch'
x[i, j, ..., drop = TRUE]
```

Arguments

x	An Epoch object
i	Row indices for subsetting. If only i is provided, it will return the entire row(s).
j	Column indices for subsetting.
...	Additional arguments.
drop	Not used.

Value

[: A new Epoch object with the selected data.

Examples

```
# Create an Epoch object
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)

# wrappers
dim(epoch)
dimnames(epoch)
epoch[1]
```

Epoch *Constructor for Epoch class*

Description

Constructor for Epoch class

Usage

```
Epoch(
  table,
  electrodes = NULL,
  times = NULL,
  startTime = NULL,
  samplingRate = NULL,
  rowData = NULL,
  colData = NULL,
  metaData = NULL
)
```

Arguments

table	Matrix containing epoch data (rows=electrodes, columns=time points)
electrodes	Optional character vector for electrode names, if not provided, row names of data are used. If row names are also not available, there will be no electrode names.
times	Optional numeric vector of time points.
startTime	Optional numeric value for start time, if provided, times will be calculated based on this and samplingRate.
samplingRate	Optional numeric value for sampling rate, if provided, times will be calculated based on this and startTime.
rowData	Optional data frame containing metadata for rows (electrodes).
colData	Optional data frame containing metadata for columns (time points).
metaData	Optional list containing metadata for the Epoch object. Element name "SamplingRate" is reserved by the Epoch class.

Value

An Epoch object

Examples

```
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)
```

Epoch-class *Epoch Class*

Description

S4 class to handle epoch data with electrodes and time points

Slots

`table` a matrix containing iEEG data (columns=time points, rows=electrodes)

`colData` a data frame containing metadata for columns (time points)

`rowData` a data frame containing metadata for rows (electrodes)

`metaData` a list containing metadata for the Epoch object

EpochDownloader *EpochDownloader constructor*

Description

Manually update the project list from the remote repository. This function will attempt to download the latest configuration from the GitHub repository. If it fails, the current configuration will remain unchanged.

This function returns the list of available projects. If the configuration has not been fetched yet, it will automatically update the project list from the remote repository.

Usage

```
EpochDownloader(id = NULL, progress = TRUE, verbose = FALSE, path = NULL)

## S4 method for signature 'EpochDownloader'
names(x)

## S4 method for signature 'EpochDownloader'
x[i]

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

## S4 method for signature 'EpochDownloader'
x[[i]]

## S4 method for signature 'EpochDownloader'
show(object)
```

```
## S4 method for signature 'EpochDownloader'
length(x)

wiki(x, ...)

## S4 method for signature 'EpochDownloader'
wiki(x)

updateRepos(verbose = FALSE)

EpochRepos(verbose = TRUE)
```

Arguments

id	Either the ID of an OSF project or the name of an iEEG projects (case insensitive). Check the available projects using `EpochRepos()`. The default points to the fragility data from the Fragility multi-center retrospective study.
progress	Logical indicating whether to show progress during download.
verbose	Logical indicating whether to show messages
path	The path to the temporary folder where the files will be downloaded.
x	An `EpochDownloader` object.
i	Index or name of the files to be accessed.
name	The name of the file to be accessed.
object	An `EpochDownloader` object.
...	Not used, for future extensibility

Value

`EpochDownloader`: An `EpochDownloader` object.

`names`: A character vector of file names.

`[`: A named list of `Epoch` objects. The names are the dataset names.

`$`: A single `Epoch` object.

`[[`: A single `Epoch` object.

`show`: Prints a summary of the `EpochDownloader` object.

`length`: Returns the number of files in the `EpochDownloader` object.

`wiki`: Opens the wiki page in the default browser

`updateRepos`: No return value, called for side effects.

`EpochRepos`: A list of project names and their corresponding OSF project IDs.

Examples

```
# list all available projects
EpochRepos()

# downloader for the fragility data
dl <- EpochDownloader(id = "fragility")

# list all Epoch objects in the downloader
names(dl)

# download the first Epoch object
dl[1]
# equivalent to (index by name)
dl[names(dl)[1]]

# download the multiple Epoch objects

dl[c(1, 2)]
# equivalent to (index by name)
dl[names(dl)[c(1, 2)]]


EpochRepos()
```

`EpochDownloader-class` *EpochDownloader*

Description

`EpochDownloader` is a class that allows downloading and accessing files from a OSF project.

Slots

`id` The ID of the OSF project.

`files` The files in the OSF project.

`dataNames` The names of the files in the OSF project.

`tmp_folder` The temporary folder where the files are downloaded.

`progress` Logical indicating whether to show progress during download.

get_config_data *Get configuration data from remote URL*

Description

Get configuration data from remote URL

Usage

```
get_config_data()
```

Value

A list of project configurations

plot,Epoch,missing-method *Plot method for Epoch objects*

Description

Plot method for Epoch objects

Usage

```
## S4 method for signature 'Epoch,missing'
plot(
  x,
  y,
  gap = 2,
  groupIndex = NULL,
  timeResolution = 2048,
  maxLabels = 50,
  linewidth = 0.2,
  x.lab.size = 10,
  y.lab.size = 10,
  standardize = TRUE,
  ...
)
```

Arguments

x	An Epoch object
y	Not used (for S4 method compatibility)
gap	Numeric value specifying the gap between electrode traces (default: 2)
groupIndex	Integer or string. A group of electrodes to show together in a different color. If NULL(default), all electrodes are shown in the same color.
timeResolution	Maximum number of time points to keep for each electrode (default: 2048)
maxLabels	Maximum number of electrode labels to display on the y-axis (default: 50)
linewidth	Line width for the electrode traces (default: 0.2)
x.lab.size	Size of the x-axis label text (default: 10)
y.lab.size	Size of the y-axis label text (default: 10)
standardize	If the parameter is a logical value, it indicates whether to standardize the iEEG data across time for each electrode. If it is a logical vector with length equal to the number of electrodes, it indicates whether to standardize each electrode individually. If it is a numeric vector with length equal to the number of electrodes, it indicates the standard deviation to use for standardization for each electrode. (default: TRUE).
...	Additional arguments (not currently used)

Value

plot: A ggplot object showing iEEG electrode traces

See Also

Other Epoch methods: coltimes(), crop(), resample(), show,Epoch-method

Examples

```
# Create an Epoch object
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)

# Plot the epoch
plot(epoch)
```

resample *Generic function for resampling objects*

Description

This function allows you to resample an object to a different sampling frequency.

This function allows you to resample an Epoch object to a different sampling frequency.

Usage

```
resample(x, ...)

## S4 method for signature 'Epoch'
resample(x, samplingRate, ...)
```

Arguments

x	An Epoch object to be resampled.
...	Additional arguments passed to gsignal::resample
samplingRate	The new sampling frequency (unit: Hertz).

Value

An Epoch object with the resampled data.

See Also

Other Epoch methods: coltimes(), crop(), plot,Epoch,missing-method, show,Epoch-method

Examples

```
# Create an Epoch object
epoch_data <- matrix(rnorm(1000), nrow = 10)
rownames(epoch_data) <- paste0("Electrode_", 1:10)
epoch <- Epoch(epoch_data, startTime = 0, samplingRate = 100)

# downsample the epoch to 50 Hz
resample(epoch, samplingRate = 50)

# upsample the epoch to 200 Hz
resample(epoch, samplingRate = 200)
```

show,Epoch-method *Print the Epoch Object*

Description

Print the Epoch Object

Usage

```
## S4 method for signature 'Epoch'
show(object)
```

Arguments

object	Epoch object

Value

returns an invisible NULL

See Also

Other Epoch methods: coltimes(), crop(), plot,Epoch,missing-method, resample()

Index