Package 'FBRbeta'

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Type Package

Title FBR method based on beta-series

Version 1.0.0

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Description The Finite BOLD Response (FBR) is a method to analyze fMRI
Data. This method convolves the HRF with a design matrix.
This design matrix includes several boxcars with a particular length. The
FBR is a superior method for fast event-related designs and in models with lag
between HRF onset and stimulus onset. The advantange of the FBR is that it
is a flexible method, and it can estimate the BOLD. This current
implication of the FBR is based on beta-series. Each BOLD will get several
beta-values, depending on the amount and the length of the boxcars.
The \{}code{\{}link{fbrbetafunc}} is the general functions for the FBR.
This code consists of several other functions:
A function to shuffle the first timing, \{}code{\{}link{timingmatrix}}
A function to obtain the beta's from X and y, \{}code{\{}link{betafunc}},
A code to make boxcars of a particular timing \{}code{\{}link{boxcars}},
A code that combines \{}code{\{}link{timingmatrix}} and \{}code{\{}link{boxcars}}
in a function called \{}code{\{}link{designmatrix}}.
See the vignette for a nice example and explanation.

Depends R (>= 3.3.3),
arf3DS4,
MASS,
Matrix

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URL https://github.com/sremmers

License GPL-2

Encoding UTF-8

LazyData true

Imports

RoxygenNote 6.0.1

Suggests knitr,
rmarkdown,
testthat

VignetteBuilder knitr

R topics documented:

`betafunc` *Betafunction for X and y*

Description

Betafunction for X and y

Usage

```
betafunc(X, y)
```

Arguments

`X`	A matrix with nrow of m.
`y`	A vector with ncol of n.

Value

The beta's of `X` and `y`.

Examples

```
X = matrix(1:20, ncol = 4, nrow = 5)
y = matrix(c(3,6,4,9,10), ncol = 1)
betafunc(X, y)
```

`boxcars` *A function for to make a boxcar for one timing*

Description

A function for to make a boxcar for one timing

Usage

```
boxcars(leny, timings, nbox, lenbox, include.intercept = FALSE)
```

Arguments

leny	The length of y.
timings	The timing matrix, see timingmatrix.
nbox	The amount of boxcars in the design matrix.
lenbox	The length of each boxcar in the design matrix.
include.intercept	Include intercept, default = FALSE.

Value

The design matrix for one timing with the predefined amount and length of boxcars.

See Also

timingmatrix, for a timing matrix.

Examples

```
boxcars(100, c(10, 20, 40), nbox = 5, lenbox = 2)
```

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designmatrix *Create a boxcar for all timings*

Description

Create a boxcar for all timings

Usage

```
designmatrix(ROI, timings, nbox, lenbox, TR, include.intercept = FALSE)
```

Arguments

ROI	A vector of y.
timings	A string of timings.
nbox	Amount of boxcars in the design matrix.
lenbox	Amount of length of the boxcar in the design matrix.
TR	Sampling rate.
include.intercept	Include intercept, default is FALSE.

Value

A combination of timingmatrix and boxcars. This code gives a boxcar for each timing.

See Also

timingmatrix for a matrix of timings in which the first timing is shuffled, boxcars, the boxcar function.

Examples

```
ROI = c(9, -3, -7, -9, -7, -5, -9, 2,  7, 13, 20, 9, 4, 2, 7, 7, -2, -3, -5, 0)
timings = c(2, 6, 8, 10, 12, 14)
nbox = 3
lenbox = 2
TR = 1
designmatrix(ROI, timings, nbox, lenbox, TR)
```

FBRbeta *FBRbeta: A package for the FBR method based on beta series*

Description

The Finite BOLD Response (FBR) is a method to analyze fMRI data. This method convolves the HRF with a design matrix. This design matrix includes several boxcars with a particular length. The FBR is a superior method in event-related designs and in models with lag between HRF onset and stimulus onset. The advantange of the FBR is that it is a flexible method, and it can estimate the BOLD. This current implication of the FBR is based on beta-series. Each BOLD will get several beta-values, depending on the amount and the length of the boxcars. The `fbrbetafunc` is the general functions for the FBR. This code consists of several other functions:

FBRbeta functions

The `fbrbetafunc` is the general functions for the FBR. This code consists of several other functions: A function to shuffle the first timing, `timingmatrix` A function to obtain the beta's from X and y, `betafunc`, A code to make boxcars of a particular timing `boxcars`, A code that combines `timingmatrix` and `boxcars` in a function called `designmatrix`

Example

See the vignette for a nice example and step-by-step explanation.

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fbrbetafunc *Use the FBR method to find the beta-values*

Description

Use the FBR method to find the beta-values

Usage

```
fbrbetafunc(dat, boxtimings, ROI, timings, nbox, lenbox, TR, maximum = TRUE,
  summation = FALSE, all.beta = FALSE)
```

Arguments

dat	A nifti file. Can be obtained with readData("filtered_func_data.nii").
boxtimings	the designmatrix for each each timing, obtained with designmatrix.
ROI	The vector of interest *y*.
timings	A string of timings.
nbox	The amount of boxcars in the design matrix.
lenbox	The length of boxcars in the design matrix.
TR	Sampling rate.
maximum	Maximum is default, other option: summation, all.beta.
summation	The sum
all.beta	The full beta-matrix

Value

The beta-values.

See Also

designmatrix for the boxcar function for all timings/events., readData to read nifti files in R

Examples

```
ROI = c(9, -3, -7, -9, -7, -5, -9, 2,  7, 13, 20, 9, 4, 2, 7, 7, -2, -3, -5, 0)
timings = c(2, 6, 8, 10, 12, 14)
nbox = 3
lenbox = 2
TR = 1
boxtimings <- designmatrix(ROI, timings, nbox, lenbox, TR)
dat = 0 #not required in this example, but is readData("filtered_func_data.nii")

fbrbetafunc(dat, boxtimings, ROI, timings, nbox, lenbox, TR, maximum = TRUE )
t(fbrbetafunc(dat, boxtimings, ROI, timings, nbox, lenbox, TR, all.beta = TRUE ))
```

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main.interest *Obtain the beta's with a method of interest*

Description

Obtain the beta's with a method of interest

Usage

```
main.interest(boxtimings, ROI, maximum = FALSE, summation = FALSE,
  all.beta = FALSE, nbox)
```

Arguments

boxtimings	The design matrix for all timings designmatrix.
ROI	A vector of y.
maximum	Interest in the maximum of all values of beta for each trial.
summation	Interest in the summation of all values of beta for each trial.
all.beta	Interest in the full betas for each box. Note that the matrix needs to be transposed.
nbox	The amount of boxes

Value

The design matrix for all timings, in which the first timing is shuffled in space.

See Also

designmatrix, for a boxcar for a timing.

Examples

```
ROI = c(9, -3, -7, -9, -7, -5, -9, 2,  7, 13, 20, 9, 4, 2, 7, 7, -2, -3, -5, 0)
timings = c(2, 6, 8, 10, 12, 14)
nbox = 3
lenbox = 2
TR = 1
boxtimings <- designmatrix(ROI, timings, nbox, lenbox, TR)

main.interest(boxtimings, ROI, maximum = TRUE, nbox = nbox)
t(main.interest(boxtimings, ROI, all.beta = TRUE, nbox = nbox))
```

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timingmatrix *Shuffle the first timing in a matrix*

Description

Shuffle the first timing in a matrix

Usage

```
timingmatrix(timings)
```

Arguments

timings	A matrix of the stimulus presentations.

Value

The design matrix for all timings, in which the first timing is shuffled in space.

Examples

```
timings <- as.matrix(10, 20, 30, 40)
timingmatrix(timings)
```

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