Package 'afnireg'

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Type Package

Title AFNI Integration for fMRI Analysis in R

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Description Provides an R interface to AFNI's 3dDeconvolve program for fMRI analysis. Allows users to specify complex experimental designs and HRF models in R using the fmridesign framework and execute them using AFNI's optimized estimation routines. Supports multiple HRF basis functions, censoring, nuisance regression, multi-run designs, and contrast testing.

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Encoding UTF-8

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Depends R (>= 4.0.0)

Imports fmrireg (>= 0.1.0), fmridesign (>= 0.1.0), fmrihrf (>= 0.1.0), fmridataset (>= 0.1.0), assertthat, rlang, purrr, progress, utils, stats, methods

Suggests testthat (>= 3.0.0), knitr, rmarkdown

Remotes bbuchsbaum/fmrireg, bbuchsbaum/fmridesign, bbuchsbaum/fmrihrf, bbuchsbaum/fmridataset

VignetteBuilder knitr

Config/testthat/edition 3

URL https://github.com/bbuchsbaum/afnireg

BugReports https://github.com/bbuchsbaum/afnireg/issues

NeedsCompilation no

R topics documented:

`afni-package` *AFNI Integration for fMRI Analysis*

Description

This file serves as the main entry point for AFNI integration functionality. The implementation has been modularized into the following files:

Files

- `afni_hrf_specs.R` - HRF specifications and constructors
- `afni_stim_files.R` - Stimulus file creation and management
- `afni_build_stims.R` - Building AFNI stimulus objects
- `afni_command_generation.R` - 3dDeconvolve command generation
- `afni_contrasts.R` - Contrast and GLT handling
- `afni_construct.R` - Construct methods for AFNI terms
- `afni_s3_methods.R` - S3 methods for AFNI term classes
- `afni_lm.R` - Linear model interface functions

`.onLoad` *Package Loading Hook*

Description

Register AFNI HRF specifications with fmridesign when the package is loaded.

Usage

```
.onLoad(libname, pkgname)
```

`afnireg` *afnireg: AFNI Integration for fMRI Analysis in R*

Description

The afnireg package provides an R interface to AFNI's 3dDeconvolve program for fMRI analysis.

Author(s)

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See Also

Useful links:

- https://github.com/bbuchsbaum/afnireg
- Report bugs at https://github.com/bbuchsbaum/afnireg/issues

`AFNI_HRF` *AFNI HRF Specifications*

Description

The 'AFNI_HRF' function creates an object representing an AFNI-specific hemodynamic response function (HRF). It is a class constructor for AFNI HRFs.

Usage

```
AFNI_HRF(name, nbasis, params, span = 24)
```

Arguments

`name`	A string specifying the name of the AFNI HRF.
`nbasis`	An integer representing the number of basis functions for the AFNI HRF.
`params`	A list containing the parameter values for the AFNI HRF.
`span`	A numeric value representing the span in seconds of the HRF. Default is 24.

Details

This file contains all AFNI HRF (Hemodynamic Response Function) specifications, constructors, and related functions for creating AFNI-compatible HRF models.

AFNI HRF Constructor Function

Value

An AFNI_HRF object with the specified properties.

See Also

HRF

`afni_hrf` *construct an native AFNI hrf specification for '3dDeconvolve' with the 'stim_times' argument.*

Description

construct an native AFNI hrf specification for '3dDeconvolve' with the 'stim_times' argument.

Usage

```
afni_hrf(
  ...,
 basis = c("spmg1", "block", "dmblock", "tent", "csplin", "poly", "sin", "sine", "gam",
    "gamma", "spmg2", "spmg3", "wav"),
  onsets = NULL,
  durations = NULL,
  prefix = NULL,
  subset = NULL,
  nbasis = 1,
  contrasts = NULL,
  id = NULL,
  lag = 0,
  precision = 0.3,
  summate = TRUE,
  start = NULL,
  stop = NULL
)
```

Arguments

`...`	Variables to include in the HRF specification
`basis`	Character string specifying the basis function type
`onsets`	Numeric vector of event onset times
`durations`	Numeric vector of event durations
`prefix`	Character string prefix for the term
`subset`	Expression for subsetting events

nbasis	Number of basis functions
contrasts	Contrast specifications
id	Character string identifier for the term
lag	Numeric lag in seconds
precision	Numeric precision for convolution
summate	Logical whether to summate overlapping responses
start	the start of the window for sin/poly/csplin models
stop	the stop time for sin/poly/csplin models

Value

an afni_hrfspec instance with class "afni_hrfspec"

Examples

```
# Create SPM canonical HRF specification
hrf1 <- afni_hrf(onsets = c(10, 30, 50), basis = "spmg1")

# Create block HRF with duration
hrf2 <- afni_hrf(onsets = c(10, 30, 50), durations = 5, basis = "block")

# Create tent basis HRF
hrf3 <- afni_hrf(onsets = c(10, 30, 50), basis = "tent",
                 start = 0, stop = 20, nbasis = 10)
```

---

afni_lm *create an afni_lm spec*

Description

create an afni_lm spec

Usage

```
afni_lm(
  fmri_mod,
  dataset,
  working_dir = ".",
  polort = -1,
  jobs = 1,
  censor = NULL,
  iresp = FALSE,
  nodata = NULL,
  TR_times = fmri_mod$sampling_frame$TR,
  x1D_stop = FALSE,
  nofullf_atall = TRUE,
  options = NULL,
  ...
)
```

Arguments

fmri_mod	the fmri_model
dataset	the dataset
working_dir	the working directory
polort	polynomial detrending order
jobs	number of parallel jobs
censor	censoring vector
iresp	whether to output IRFs
nodata	nodata option for testing
TR_times	TR in seconds
x1D_stop	whether to stop after creating design matrix
nofullf_atall	skip full F-test
options	optional list of additional options that override defaults
...	additional 3dDeconvolve options

---

afni_lm_spec *afni_lm_spec constructor*

Description

afni_lm_spec constructor

Usage

```
afni_lm_spec(model, dataset, working_dir, options, cmd)
```

---

afni_trialwise *construct a native AFNI hrf specification for '3dDeconvolve' and individually modulated events using the 'stim_times_IM' argument.*

Description

construct a native AFNI hrf specification for '3dDeconvolve' and individually modulated events using the 'stim_times_IM' argument.

Usage

```
afni_trialwise(
  label,
  basis = c("spmg1", "block", "dmblock", "gamma", "wav"),
  onsets = NULL,
  durations = 0,
  subset = NULL,
  id = NULL,
  start = 0,
  stop = 22,
  precision = 0.3,
  summate = TRUE
)
```

Arguments

label	name of regressor
basis	Character string specifying the basis function type
onsets	Numeric vector of event onset times
durations	Numeric vector of event durations (default 0)
subset	Expression for subsetting events
id	Character string identifier for the term
start	start of hrf (for multiple basis hrfs)
stop	end of hrf (for multiple basis hrfs)
precision	Numeric precision for convolution (default 0.3)
summate	Logical whether to summate overlapping responses (default TRUE)

Value

an afni_trialwise_hrfspec instance

Examples

```
tw <- afni_trialwise("trialwise", basis="gamma", onsets=seq(1,100,by=5))
```

---

build_afni_stims *Build AFNI Stimulus Files*

Description

Generic function to build AFNI stimulus files

Usage

```
build_afni_stims(x, ...)
```

Arguments

x	The input object
...	Additional arguments

`cells.afni_hrf_convolved_term` *Get cells for afni_hrf_convolved_term*

Description

Get cells for afni_hrf_convolved_term

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
cells(x, ...)
```

Arguments

`x`	An afni_hrf_convolved_term object
`...`	Additional arguments

`conditions.afni_hrf_convolved_term` *Extract Conditions from AFNI Convolved Terms*

Description

Extract Conditions from AFNI Convolved Terms

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
conditions(x, ...)
```

Arguments

`x`	An AFNI convolved term object
`...`	Additional arguments

Value

Character vector of condition names

`construct.afni_hrfspec` *Construct Methods for AFNI HRF Specifications*

Description

This file contains the construct methods that build AFNI convolved terms from HRF specifications and model data.

Usage

```
## S3 method for class 'afni_hrfspec'
construct(x, model_spec, ...)
```

Arguments

`x`	An afni_hrfspec object
`model_spec`	Model specification containing data and sampling frame
`...`	Additional arguments

`construct.afni_trialwise_hrfspec` *Construct an afni_trialwise_convolved_term from an afni_trialwise_hrfspec*

Description

Construct an afni_trialwise_convolved_term from an afni_trialwise_hrfspec

Usage

```
## S3 method for class 'afni_trialwise_hrfspec'
construct(x, model_spec, ...)
```

Arguments

`x`	An afni_trialwise_hrfspec object
`model_spec`	Model specification containing data and sampling frame
`...`	Additional arguments

`contrasts.afni_hrf_convolved_term` *Extract contrasts from an afni_hrf_convolved_term*

Description

Extract contrasts from an afni_hrf_convolved_term

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
contrasts(x, ...)
```

`contrast_weights.afni_hrf_convolved_term` *Extract contrast weights for an afni_hrf_convolved_term*

Description

Extract contrast weights for an afni_hrf_convolved_term

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
contrast_weights(x, ...)
```

`design_matrix.afni_hrf_convolved_term` *Extract Design Matrix from AFNI Convolved Terms*

Description

AFNI convolved terms don't produce R design matrices as they are processed externally by 3dDeconvolve.

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
design_matrix(x, ...)
```

Arguments

`x`	An AFNI convolved term object
`...`	Additional arguments

Value

NULL or empty matrix

gen_afni_lm *Generate AFNI Linear Model*

Description

Generic function to generate AFNI linear model specifications

Usage

```
gen_afni_lm(x, ...)
```

Arguments

x	The input object
...	Additional arguments

is_afni_convolved_term *Check if an Object is an AFNI Convolved Term*

Description

Check if an Object is an AFNI Convolved Term

Usage

```
is_afni_convolved_term(x)
```

Arguments

x	An object to check

Value

Logical indicating if the object is an AFNI convolved term

is_continuous.afni_hrf_convolved_term *Check if AFNI Term is Continuous*

Description

Check if AFNI Term is Continuous

Check if afni_hrf_convolved_term is continuous

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
is_continuous(x, ...)

## S3 method for class 'afni_hrf_convolved_term'
is_continuous(x, ...)
```

Arguments

x	An afni_hrf_convolved_term object
...	Additional arguments

Value

Logical indicating if the term is continuous

longnames.afni_hrf_convolved_term *S3 Methods for AFNI Terms*

Description

This file contains S3 method implementations for AFNI-specific term classes, providing standard interfaces for longnames, shortnames, cells, and other operations.

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
longnames(x, ...)
```

nbasis.afni_hrf_convolved_term *Get Number of Basis Functions for AFNI Terms*

Description

Get Number of Basis Functions for AFNI Terms

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
nbasis(x)
```

Arguments

x	An AFNI convolved term object

Value

Number of basis functions

nbasis.event_term *Get Number of Basis Functions for Event Terms*

Description

Get Number of Basis Functions for Event Terms

Usage

```
## S3 method for class 'event_term'
nbasis(x)
```

Arguments

x	An event_term object

Value

Number of basis functions

print.afni_hrf_convolved_term *AFNI-specific Convolved Term Classes*

Description

This file contains the AFNI-specific convolved term classes that were previously defined in fmridesign. These classes represent terms that are processed by AFNI's 3dDeconvolve rather than R's convolution.

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
print(x, ...)

## S3 method for class 'afni_trialwise_convolved_term'
print(x, ...)
```

Arguments

x	An afni_trialwise_convolved_term object.
...	Additional arguments.

Details

Print method for afni_hrf_convolved_term objects.

print.afni_lm_spec *Print method for afni_lm_spec*

Description

Print method for afni_lm_spec

Usage

```
## S3 method for class 'afni_lm_spec'
print(x, ...)
```

Arguments

x	An afni_lm_spec object
...	Additional arguments

reexports *Objects exported from other packages*

Description

These objects are imported from other packages. Follow the links below to see their documentation.

fmridataset fmri_dataset

fmridesign baseline_model, blockids, construct, event_model, event_table, event_term, split_onsets

fmrihrf blocklens, sampling_frame

fmrireg fmri_model

requires_external_processing *Check if a Term Requires External Processing*

Description

Check if a Term Requires External Processing

Usage

```
requires_external_processing(x)
```

Arguments

x	An object to check

Value

Logical indicating if external processing is required

run.afni_lm_spec *Run AFNI Linear Model Specification*

Description

Execute an AFNI linear model specification using 3dDeconvolve.

Usage

```
run.afni_lm_spec(
  x,
  outdir,
  execute = TRUE,
  execfun = system,
  prepend = "",
  ...
)
```

Arguments

x	An afni_lm_spec object
outdir	Output directory
execute	Logical; execute the command
execfun	Function to execute the command (default: system)
prepend	String to prepend to command
...	Additional arguments

Value

Result of execution

---

shortnames.afni_hrf_convolved_term
Get Short Names for AFNI Terms

Description

Get Short Names for AFNI Terms

Get short names for afni_hrf_convolved_term

Usage

```
## S3 method for class 'afni_hrf_convolved_term'
shortnames(x, ...)

## S3 method for class 'afni_hrf_convolved_term'
shortnames(x, ...)
```

Arguments

x	An afni_hrf_convolved_term object
...	Additional arguments

Value

Character vector of short names

to_glt *Convert to AFNI GLT*

Description

Generic function to convert contrasts to AFNI GLT format

Usage

```
to_glt(x, ...)
```

Arguments

x	The input object
...	Additional arguments

to_glt.contrast *AFNI Contrast Functions*

Description

This file contains functions for handling contrasts in AFNI models, including conversion to GLT (General Linear Test) format.

Usage

```
## S3 method for class 'contrast'
to_glt(x, ...)
```