Package ‘visualFields’

June 20, 2018

Type Package

Title Statistical Methods for Visual Fields

Description A collection of tools for analyzing the field of vision. It provides a framework for development and use of innovative methods for visualization, statistical analysis, and clinical interpretation of visual-field loss and its change over time. It is intended to be a tool for collaborative research.

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visualFields-package  Statistical methods for visual fields

Description
This is a collection of tools for analyzing the field of vision. It provides a framework for the development and use of innovative methods for visualization, statistical analysis, and clinical interpretation of visual-field loss and its change over time. visualFields is intended to be a tool for collaborative research.

Author(s)
Ivan Marin-Franch

References
This work was supported by NIH grant number R01EY007716

See Also
OPI, the Open Perimetry Initiative http://people.eng.unimelb.edu.au/aturpin/opi/index.html

agecalc  Calculates age

Description
Tool to calculate ages from date of birth and date of test, etc

Usage
agecalc( from, to, daysyear = NULL )

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>from</td>
<td>date from</td>
</tr>
<tr>
<td>to</td>
<td>date to</td>
</tr>
<tr>
<td>daysyear</td>
<td>if NULL, calculates real age. If informed, then calculates year based on the number of days per year (e.g. 362.25)</td>
</tr>
</tbody>
</table>
ageLinearModel

Value
returns age in years

Author(s)
Ivan Marin-Franch

Examples
agecalc( "1977-01-31", "2014-01-30" )

Description
calculates the linear model to account for mean age effect on visual sensitivity at each location from a sample of controls subjects

Usage
ageLinearModel( vf, smooth = TRUE, smoothFunction = quad2Dfit )

Arguments
vf a vf object. It needs to be in a specific format
smooth whether to use a function to smooth the results or not. Default is TRUE
smoothFunction If smooth is TRUE, the function to use for smoothing. Default is quad2Dfit, a 2D quadratic fit to resulting data. This function is not really a smoothing procedure, but a parametric fit

Details
The function obtains for each location a regression line of sensitivity threshold on age. The vf object may contain data for many visits of many subjects. The number of visits per subject can be variable and hence, to account for that, weighted least-squares linear regression is performed in which the weights for is the inverse of the number of visits for the subject. By default, the slopes and intercepts are "smoothed" by fitting a 2-dimensional quadratic fit, as in [1]. Other smoothFunctions can be defined instead using other type of parametric or non-parametric fits. The 2-dimensional quadratic fit has been found to be inappropriate for the stimulus used in frequency-doubling perimetry (FDP) [2].
All the data passed to the function must belong to the same perimeter, the same pattern of locations, the same presentation algorithm.

Value
returns a table with intercepts and slopes modelling age-related mean sensitivity change.
bebie

Author(s)

Ivan Marin-Franch

References


See Also

sdnv, locperc, quad2Dfit

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<td><em>Bebie curve</em></td>
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</table>

Description

Plots Bebie rank TD curve

Usage

```r
bebie( tdr, type = "conventional", diff = TRUE, percentiles = TRUE, correction = TRUE, txtfont = "serif", pointsize = 12, cex = 1 )
```

Arguments

- **tdr**: a `vf` object with the rank TD curve
- **type**: whether to use a conventional way to plot the rank TD curve or `ghrank` type where the `vf` object passed is the reconstructed within-normal TD rank curve. Default is conventional
- **diff**: add absolute td values or differences from mean normal. Default is TRUE
- **percentiles**: add percentile lines. Default is TRUE
- **correction**: add ranked TD line after correcting for general height difference. Default is TRUE
- **txtfont**: font of the text with visual-sensitivity values. Default is serif
- **pointsize**: size of the text with visual-sensitivity values. Default is 12
- **cex**: a numerical value giving the amount by which plotting text and symbols should be magnified relative to the default, which is 1
Value

returns a graph with the Bebie rank TD curve (also known as the cumulative defect curve [1]) if the option diff is set to FALSE. If the option diff is set to true, then it returns the difference between the subject’s rank curve and the mean normal curve. To use this option (and the options with percentile = TRUE), the tables nvtdrank, perctdrank, and perctdrankadj must exist in the nv-object, for the perimeter tperimetry, the pattern of locations talgorithm, and the presentation algorithm tpattern. See nvsapdefault to see the structure the tables must have.

Author(s)

Ivan Marin-Franch

References


Examples

# conventional "Bebie" rank TD curve
td <- tdval( vf9101right[15,] )
tdr <- tdrank( td )
bebie( tdr )

# "ghrank" type of "Bebie" rank TD curve
td <- tdval( vf9101right[15,] )
tdr <- tdrank( td )
ghr <- ghranktd( td )
bebie( ghr, type = "ghrank" )

cart2jpolar

**Description**

converts from (x, y) in degrees to polar coordinates. This is a necessary step to compute average fiber paths as a function of their angle of incidence in the optic nerve head with the Jansonius map.

**Usage**

cart2jpolar( xy )

**Arguments**

| xy          | Visual field location in Cartesian coordinates |
Details
Input xy needs to be a data frame. It returns a data frame with the radial and angular coordinates

Value
Data frame with the radial and angular coordinates

Author(s)
Ivan Marin-Franch

See Also
jpolar2cart

Examples

cart2jpolar( data.frame( x = c( 0, 10 ), y = c( 0, 10 ) ) )

colormapgraph

color legend for p-values in td and pd probability plots

Description
It generates color legend for p-values in td and pd probability plots

Usage
colormapgraph( ncol = 3, mapval = NULL, notSeenAsBlack = TRUE, txtfont = "sans", pointsize = 10, outerSymbol = "circle", outerSize = 1, outerInch = 0.18 )

Arguments

ncol number of columns in where to show the color symbols. Default is 3
notSeenAsBlack Add a black color-code representing non-seen to the color scheme of the probability maps for td and pd
mapval map and cutoff values to be used for the generation of the color map. If NULL, then go to current nv$mapsettings. Default is NULL
txtfont font of the text with visual-sensitivity values. Default is sans
pointsize size of the text with visual-sensitivity values. Default is 10
outerSymbol The outer symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
outerSize Size of the outer symbol. Default is 1
outerInch Maximum size of the outer symbol in inches. Default is 0.35
Details
it generates a graph with the color legend for p-values in td and pd probability plots given the actual
normative values version set for visualFields

Author(s)
Ivan Marin-Franch

See Also
vfcolormap

Examples

colormapgraph()

colormapgraph2  color legend for p-values in td and pd probability plots

Description
It genesartes color legend for p-values in td and pd probability plots

Usage

colormapgraph2( ncol = 3,
    mapval = NULL,
    notSeenAsBlack = TRUE,
    txtfont = "serif", pointsize = 8,
    outerSymbol = "square", innerSymbol = "circles",
    outerSize = 1, innerSize = 1,
    outerInCh = 0.35, innerInCh = 0.11 )

Arguments
ncol  number of columns in where to show the color symbols. Default is 3
notSeenAsBlack  Add a black color-code representing non-seen to the color scheme of the proba-
    bility maps for td and pd
mapval  map and cutoff values to be used for the generation of the color map. If NULL, 
    then go to current nv$mapsettings. Default is NULL
txtfont  font of the text with visual-sensitivity values. Default is serif
pointsize  size of the text with visual-sensitivity values. Default is 9
outerSymbol  The outer symbol at all locations. Can be any of circles, squares, rectangles, 
    stars. Default is square
innerSymbol  The inner symbol at all locations. Can be any of circles, squares, rectangles, 
    stars. Default is circle
createviewport

outerSize Size of the outer symbol. Default is 1
innerSize Size of the inner symbol. Default is 1
outerInch Maximum size of the outer symbol in inches. Default is 0.35
innerInch Maximum size of the inner symbol in inches. Default is 0.11

Details

it generates a graph with the color legend for p-values in td and pd probability plots given the actual normative values version set for visualFields

Author(s)

Ivan Marin-Franch

See Also

vfcolormap

Examples

colormapgraph2()

createviewport Wrapup for createviewport in package grid

Description

create regions in where to print graphs. Used for the generation of printouts

Usage

createviewport( name, left, top, width, height, pwidth = 8.27,
                pheight = 11.69 )

Arguments

name name of the viewport
left a numeric vector or unit object specifying left location (in inches)
top a numeric vector or unit object specifying top location (in inches)
width a numeric vector or unit object specifying width (in inches)
height a numeric vector or unit object specifying height (in inches)
pwidth width of the page (in inches). Default is 8.27
pheight height of the page (in inches). Default is 11.69
Details
create regions in where to print graphs. Used for the generation of printouts

Value
returns a viewport object

Author(s)
Ivan Marin-Franch

See Also
vflayout

---

Description
A table with relevant information about test location data for each pattern of locations.

Usage
data( csplocmap )

Format
The structure saplocmap has 1 table for the test pattern sgrnfl. The table has six columns:
xod  stimulus x position
yod  stimulus y position
loc  sequential location number in the original device
size  size of the stimulus presentation
jangle  angle of incidence in blind spot from Jansonious map
jmslope  orientation of an average bundle at that position of the visual field as calculated from the Jansonious map
region  region of the visual fields in comparison with ONH sector.

Author(s)
Ivan Marin-Franch
References


See Also

saplocmap, fdplocmap

Description

A table with relevant information about test location data for the pattern of locations 24-2. The convention for visualFields is to use always a right-eye format. That is, a left eye would be "flipped" left-right and location number are counted row-wise from top-left to bottom-right. Information about the size of the stimulus and the corresponding angle of incidence and slope with Jansonious map [1] are included.

Usage

data( fdplocmap )

Format

The structure fdplocmap has 3 tables, one for each test pattern: p24d2, p10d2, p30d2. Each table has six columns:

- xod  stimulus x position
- yod  stimulus y position
- loc  sequential location number in the original device
- size  size of the stimulus presentation
- jmangle  angle of incidence in blind spot from Jansonious map
- jmslope  orientation of an average bundle at that position of the visual field as calculated from the Jansonious map
- region  region of the visual fields in comparison with ONH sector. Garway-Heath map

Author(s)

Ivan Marin-Franch
References


See Also

saplocmap

fiberpathpsi

Average path of a nerve fiber bundle function generator

Description

Generates a function that renders the average path of a nerve fiber bundle that exits through the optic nerve head with a particular angle

Usage

fiberpathpsi( psi0, r0 = 4 )

Arguments

<table>
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<tr>
<th>psi0</th>
<th>Angle of incidence of the average bundle path on the optic nerve head</th>
</tr>
</thead>
<tbody>
<tr>
<td>r0</td>
<td>Radius of the optic head nerve. It is a necessity of the model and changing it, changes the calculated average bundle paths. Default value is 4</td>
</tr>
</tbody>
</table>

Details

The function generated works in polar coordinates. The input is the radial coordinate r and output is the angular coordinate. The path in the cartesian (x, y) space is easily obtained with the function jpolartocart

Value

A function that returns angular coordinates for each radial coordinate.

Author(s)

Ivan Marin-Franch
References


See Also

gloc2psi

Examples

fiberpathpsi( 90 + 45 )

filterReliability

identify visual fields that did not pass filter for reliability

Description

identify visual fields that did not pass filter for reliability

Usage

filterReliability( vf, relCriteria = c( 0.2, 0.2, 0.2 ) )

Arguments

vf visual field, should have columns perc of false positives, false negatives, and fixation losses

relCriteria reliability limits for false positives, false negatives, and fixation losses

Value

returns a list of visual fields that did not pass the reliability criteria

Author(s)

Ivan Marin-Franch
**See Also**

*lidLensArtifact*

---

**gcdisp**

*average GC displacement from [1]*

---

**Description**

average GC displacement from [1] in degrees of visual angle (0.3 mm per degree of visual angle [2])

**Usage**

data( gcdisp )

**Format**

Displacement is a function of eccentricity of the GC soma position.

ecc  eccentricity of the GC soma position
displ  displacement

**Author(s)**

Ivan Marin-Franch

**References**


---

**gcloc2psi**

*Angle of incidence in the optic nerve head for vf locations*

---

**Description**

This is the inverse of the model: it obtains the angle of incidence psi of the average path that passes through position \((x,y)\)

**Usage**

gcloc2psi( xy, r0 = 4 )
Arguments

xy  Visual field location in Cartesian coordinates

r0  Radius of the optic head nerve. It is a necessity of the model and changing it, changes the calculated average bundle paths. Default value is 4

Value

The angle of incidence psi of the average path that passes through position (x, y)

Author(s)

Ivan Marin-Franch

References


See Also

fiberpathpsi

Examples

gcllocZpsi( data.frame( x = c( 0, 10 ), y = c( 0, 10 ) ) )
**ghpostd**

Details

gets normative values and stimuli location map to be used with visualFields

Value

returns the names of the variables containing the normative values and the stimuli location map

Author(s)

Ivan Marin-Franch

See Also

`setnv`

Examples

`getnv()`

---

**ghpostd**

*general height estimated as the rankRef-th ranked TD location*

Description

gets the general height estimated as the rankRef-th ranked TD location

Usage

`ghpostd( td, correction = FALSE, rankRef = c( "default" ) )`

Arguments

td vf-object with total-deviation values

correction obtain general height as difference from mean normal "85th" percentile TD value? Default is FALSE

rankRef the rank position to take as reference for general height. Default is "default". For "default" it looks at the type of visual field, p24d2 or p30d2, fullt or sitas, to get which is the position that corresponds, roughly with the 85th percentile

Details

calculates the general height estimated as the pos-th ranked TD location

Value

returns the subject’s estimated general height
Author(s)

Ivan Marin-Franch

See Also

pdval

Examples

```r
td <- tdval( vf91016right[15,] )
ghseventh <- gphostd( td )
```

### ghranktd

*general height estimated from rank TD curve*

#### Description

estimates the general height by comparison of the rank TD curve of the subject compared with mean normal rank TD curve

#### Usage

```
ghranktd( td, minPts = 2, strategy = "isospaced", withinNormal = 95, pCentral = 1, link = make.link( "logit" ), scaleFactor = 52.4 )
```

#### Arguments

- `td`: total-deviation values
- `minPts`: minimum number of TD values within normal limits necessary to estimate the general height. Default is 2. If there are less than 2 TD values within normal limits, then NA is returned
- `strategy`: strategy for the comparison of the reconstructed within normal part of the rank TD curve with the mean normal rank TD curve. There are two possibilities at the moment isospaced and parallel. In the option isospaced, the TD values identified as within-normal limits are equally spaced and compared with the corresponding rank location of the mean normal TD curve. In the slightly more computationally complicated option parallel, the rank positions are obtained so that the all differences between subject’s TD values and mean normal TD values in the corresponding rank position are equal. In both strategies, the mean rank position of the reconstructed rank TD curve corresponds with the mean rank position of the mean normal TD rank curve (for the pattern of locations 24-2 that is location 26.5 ). This way uniqueness is ensured on both strategies. Default is parallel. For more details see [1]
- `withinNormal`: value or label used to identify the locations that are within normal limits. Default is 95
gloperc

pCentral proportion of the TD rank curve to be used for the estimation of the general height. Default is 1
link link function to use with glm fit. See family. Default is logit
scaleFactor scale to use for ranks to make them be between 0 and 1. Default is 52.4

Value
returns the estimated general height for the test, or NA if the number of TD values within normal limits was less than numPts

Author(s)
Ivan Marin-Franch

References

See Also
pdval, ghpostd

gloperc percentiles for global indices

Description
gets the percentiles for global indices

Usage
gloperc( vals, percentiles = c( 0.5, 1, 2, 5, 95 ),
        type = c( "quantile", "(i-1)/(n-1)", "i/(n+1)", "i/n" ) )

Arguments
vals table with global indices for control subjects
percentiles percentiles at which to calculate cutoff values
type see wtd.quantile for a list of different options

Details
gets the percentiles for global indices. This function works in conjunction with vfstats. In vfstats all global indices refering to mean must start with m and all refereeing to standard deviation must start with s, otherwise gloperc won't calculate the cutoff values correctly
Value

percentiles for global indices

Author(s)

Ivan Marin-Franch

See Also

vfindex, vfstats, vfiperc, locperc

---

hist_poplr  

**histogram for PoPLR analysis**

---

Description

plots an histogram of Fisher S statistic combining all location p-values

Usage

```r
hist_poplr( scomb_obs, pcomb_obs, scomb, nLoc = 52, txtfont = "sans", pointsize = 10 )
```

Arguments

- `scomb_obs`: observed S-statistic for the observed visual fields
- `pcomb_obs`: p-value associated with the observed S-statistic for the observed visual fields
- `scomb`: S-statistics calculated for the permutation of visual fields
- `nLoc`: number of locations in the visual field to be analyzed. For 24-2, it is 52 (54 minus the locations in the blind spot). Default is 52.
- `txtfont`: font of the text with visual-sensitivity values. Default is sans
- `pointsize`: size of the text with visual-sensitivity values. Default is 10

Author(s)

Ivan Marin-Franch

References


See Also

poplr, poplr_cstat, poplr_pstat, vflayout2_poplr, vfplot2_poplr
### `jpolar2cart`

Converts to \((x, y)\) in degrees from polar coordinates. It is the inverse of \(\text{cart2jpolar}\).

#### Description

Converts to \((x, y)\) in degrees from polar coordinates. It is the inverse of \(\text{cart2jpolar}\).

#### Usage

```
jpolar2cart( rpsi )
```

#### Arguments

- **rpsi**: Visual field location in polar coordinates

#### Details

Input rpsi needs to be a data frame. It returns a data frame with the Cartesian coordinates.

#### Value

Data frame with the \((x, y)\) Cartesian coordinates

#### Author(s)

Ivan Marin-Franch

#### See Also

- \(\text{cart2jpolar}\)

#### Examples

```
jpolar2cart( cart2jpolar( data.frame( x = c( 0, 10 ), y = c( 0, 10 ) ) ) )
```

### `lidLensArtifact`

Identifies in a very coarse way visual fields that may have been affected by lid or lens artifacts. This function is to be used only with control data. It is probably better not to use it and look to the visual-fields printouts directly to identify those with lid and lens artifacts.

#### Description

Identifies in a very coarse way visual fields that may have been affected by lid or lens artifacts. This function is to be used only with control data. It is probably better not to use it and look to the visual-fields printouts directly to identify those with lid and lens artifacts.

#### Usage

```
lidLensArtifact( vf, min_dB = c( 12 ) )
```
loadvfcsv

Arguments

- **vf**: visual-field object
- **min_db**: lowest dB value considered normal

Value

it returns a list of indices of visual fields in vf that may have been affected by lid or lens artifact

Author(s)

Ivan Marin-Franch

See Also

filterReliability

loadvfcsv load visual fields from a CSV file

Description

loads visual fields from a CSV file

Usage

loadvfcsv( filename, patternMap )

Arguments

- **filename**: filename
- **patternMap**: pattern of stimulus locations

Details

The columns in the CSV file must follow the format of vf. Make sure that all dates have the format MM/DD/YYYY and all times have the format HH:MM:SS. Excel tends to change the format, and any edits in Excel that are safe may cause problems when loading the data as vf-object

Value

returns a vf-object with all the data in the CSV file filename

Author(s)

Ivan Marin-Franch

See Also

loadvxml, loadvxmlbatch
loadvfEyesuite  
Import visual field data from Haag-Streit Eyesuite

Description

loadvfEyesuite imports visual field data from the Eyesuite software by Haag-Streit. These data are converted into a vf object.

Usage

loadvfEyesuite(filename, date_format = "%d.%m.%Y")

Arguments

filename  the filename of the csv-file
date_format  the order of the dates used in the specific locale

Value

a vf object

loadvfxml  
loads visual fields from a XML file

Description

loads visual fields from a XML file

Usage

loadvfxml(filename, patternMap, typeData = "vf", typeSubject = "pwg", extractionType = c("average"), daysyear = NULL)

Arguments

filename  filename
patternMap  pattern of stimulus locations. Default is saplocmap$p24d2
typeData  Type of data to load; visual field (vf), total deviations (td), pattern deviations (pd), global indices (gi), visual-field index (vfi), total-deviation p-values (tdp), pattern-deviation p-values (pdp), global indices probability maps (gip), visual-field-index probability map (vfip). Default is vf
typeSubject  Type of subject, control (ctr) or patient (pwg). Default is (pwg)
extractionType  When typeData is (vf) what type of extraction we want: all re-tested sensitivities "all" or just the mean "average" over re-tested values? Default is "average"
daysyear  if NULL, calculates real age. If informed, then calculates year based on the number of days per year (e.g. 362.25)
loadvfxmlbatch

Details

The XML files format must be as from the extraction of the HFA device

Value

returns a \texttt{vf}-object with one row containing the information for the subject loaded in the XML

Author(s)

Ivan Marin-Franch

See Also

loadvfcsv, loadvfxmlbatch

loadvfxmlbatch \textit{loads visual fields from a set of XML files}

Description

loads visual fields from a set of XML files

Usage

loadvfxmlbatch( filename, patternMap, typeData = "vf" )

Arguments

filename \hspace{1cm} filename in CSV format with the list of XML files to upload and whether the subject whose data is in the XML file is a patient with glaucoma \texttt{pwg} or a control \texttt{ctr}

patternMap \hspace{1cm} pattern of stimulus locations. Default is \texttt{saplocmap$p24d2}

typeData \hspace{1cm} Type of data to load: visual field (vf), total deviations (td), pattern deviations (pd), global indices (gi), visual-field index (vfi), total-deviation p-values (tdp), pattern-deviation p-values (pdp), global indices probability maps (gip), visual-field-index probability map (vfip). Default is \texttt{vf}

Value

returns a \texttt{vf}-object with as many rows as XML files exists in \texttt{filename}

Author(s)

Ivan Marin-Franch

See Also

loadvfcsv, loadvfxml
locperc: percentiles for each location

Description

gets the percentiles for each location

Usage

locperc( vals, stds, percentiles = c( 0.5, 1, 2, 5, 95 ),
type = c( "quantile", "(i-1)/(n-1)" , "i/(n+1)" , "i/n" ),
poolLocations = FALSE )

Arguments

vals: table with sensitivity values, total-deviation values, or pattern-deviation values

stds: standard deviations per location for sensitivity values, total-deviation values, or pattern-deviation values

percentiles: percentiles at which to calculate cutoff values

type: see wtd.quantile for a list of different options

poolLocations: assume that the shape of the empirical distributions at each location is the same and pool sensitivity, TD, or PD values per location. This is useful when the number of controls available is small. Sample size is increased at the expense of possible bias due to the fact that empirical distributions are not necessarily the same in each location

Details

gets the percentiles at each location. Since the number of visits per subject can be variable. To account for that, weighted quantile is used in which the weights for is the inverse of the number of visits for the subject

All the data passed to the function must belong to the same perimeter tperimetry, the same pattern of locations talgorithm, and the same presentation algorithm tpattern.

Value

percentiles for each location

Author(s)

Ivan Marin-Franch
References


See Also

gloperc

data(nvcspsgalpha)

Description

Normative reference values or (normative values or nv for short) for Contrast Sensitivity Perimetry (CSP) from IU (William H Swanson and Victor E Malinovsky) databases.

Usage

data(nvcspsgalpha)

Format

This normative-value object is defined by some tables, variables, and sub-structures, some of which are mandatory and some which are not. This nv-object has the following objects:

pmapsettings mandatory. Information about which percentiles are used for location-wise analysis in this nv and their corresponding color coding for display. This is a table with four columns. First column specifies the percentiles (in percent) for cutoff's and the other three columns are the corresponding RGB values (defined from 0 to 1) specifying the color code to use for values below that percentile.

globalco mandatory. Percentiles to be used for the analysis of global indices such as mean deviation (MD), pattern standard deviation (PSD) or visual-field index (VFI).

gnrf1_zest mandatory. The actual normative values for the presentation algorithm ZEST at the array of test locations SGRNFL.

nvname mandatory. Name assigned to this normative-value object.

Author(s)

Ivan Marin-Franch, William H Swanson

See Also

nvspdefault
Description

Normative reference values or (normative values or nv for short) for static automated perimetry (SAP) obtained from a combination of control subjects from SUNY and IU databases.

Usage

data(nvsapdefault)

Format

This normative-value object is defined by some tables, variables, and sub-structures, some of which are mandatory and some which are not. Importantly an age linear model must be included for test pattern (24-2) and presentation algorithm (e.g. SITA standard). Also important are the tables specifying the settings. Think of the normative-value object as a structure with several levels. The first level has three main substructures with settings:

- **pmapsettings mandatory.** Information about which percentiles are used for location-wise analysis in this nv and their corresponding color coding for display. This is a table with four columns. First column specifies the percentiles (in percent) for cutoffs and the other three columns are the corresponding RGB values (defined from 0 to 1) specifying the color code to use for values below that percentile.

- **globalco mandatory.** Percentiles to be used for the analysis of global indices such as mean deviation (MD), pattern standard deviation (PSD) or visual-field index (VFI).

- **nvname mandatory.** Name assigned to this normative-value object. From here age linear models, percentile values, etc are defined for combination of test patterns and presentation algorithms. It is important that the construction of the name for each of the normative-value for the particular test and presentation is in agreement with the values of tperimetry and talgorithm in vf. This is very important because it is the way **visualfields** can identify automatically which normative values are to be used with data for a particular visual field. For instance, for the test pattern 24-2 (p24d2) and the stimulus-presentation algorithm SITA standard (sitas), the substructure in the normative-values object must be called p24d2_sitas. This substructure itself is composed of other substructures and tables. These are

- **demographics optional.** It has stats about the controls subjects used for the calculation of the normative values.

- **agem mandatory.** A table with two columns, intercept and slope, specifying a linear model modeling the (linear) decrease at each location of the sensitivities in decibels (dB) per year. These were calculated with the **ageLinearModel.** See locations 26 and 35 have NAs. That is because these are the locations that correspond anatomically with the blind spot (see **vfsettings**) and are hence excluded from any analysis.

- **sds mandatory.** A table with three columns with the standard deviations for threshold sensitivities, total-deviation values (TD), and pattern-deviation values (PD).
**TDpercloc** mandatory. A table with as many columns as cutoff percentiles (rows) were defined in `pmapsettings`. Each column is the TD cutoff value for each percentile. It is used to get the probability map.

**P2percloc** mandatory. A table with as many columns as cutoff percentiles (rows) were defined in `pmapsettings`. Each column is the PD cutoff value for each percentile. It is used to get the probability map.

**percglo** mandatory. A table with as many columns as cutoff percentiles (rows) were defined in `globalco` for global indices. Each row has a different statistical index. Most of them are not really used by convention. The statistical indices considered are mean and standard deviation of the threshold sensitivities \((\text{msens} \text{ and } \text{ssens})\), mean and standard deviation of the TD values \((\text{mtdev} \text{ and } \text{stdev})\), and mean and standard deviation of the PD values \((\text{mpdev} \text{ and } \text{spdev})\). The two indices that are used by convention are \(\text{mtdev} \text{ and } \text{spdev}\), that is mean deviation (MD) and pattern standard deviation (PSD).

**percvfi** mandatory. A table with as many columns as cutoff percentiles (rows) were defined in `globalco` for global indices. This table has data only for the VFI \((\text{mvfi})\) and the standard deviation of the VFI at each location \((\text{svfi})\).

**nvtdrank** optional, but necessary to run `bebie` with the option `diff = TRUE`. A table with two columns, mean normal Bebie TD rank curve and the standard deviation at each ranked location.

**perctdrank** optional, but necessary to run `bebie` with the option `percentiles = TRUE`. A table with as many columns as cutoff percentiles (rows) were defined in `pmapsettings`. Each column is the TD cutoff value for each percentile.

**perctdrankadj** optional, but necessary to run `bebie` with the option `diff = TRUE` and `percentiles = TRUE`. Same as `perctdrank` but the difference from mean normal Bebie TD rank curve analysis.

**Author(s)**

Ivan Marin-Franch, William H Swanson

**References**

[1] ADD REFERENCE FOR 24-2


---

**pdpmap**

*probability map for pattern deviation*

**Description**

gets probability map for pattern-deviation values
pdpmapghr

Usage

pdpmap(p)

Arguments

p

pattern-deviation values in dBs

Details

calculates the probability maps for pattern-deviation values

Value

returns the subject's pattern-deviation probability map from the age-matched normative reference.

Author(s)

Ivan Marin-Franch

See Also

pdval, tdval, tdpmap

Examples

```
# Assuming the variable names and functions are properly defined

# Example variables

td <- tdval(vf91016right)
pd <- pdval(td)
pdp <- pdmap(pd)
```

pdpmapghr

probability map for pattern deviation from global sensitivity estimate

Description

gets probability map for pattern-deviation values obtained from estimates of general height rank

Usage

pdpmapghr(p)

Arguments

p

pattern-deviation values in dBs

Details

calculates the probability maps for pattern-deviation values obtained from estimates from general height rank
Value
returns the subject's pattern-deviation probability map from the age-matched normative reference.

Author(s)
Ivan Marin-Franch

See Also
pdval, tdval, tdpmmap

Examples
td <- tdval( vf91016right )
pd <- pdvalghr( td )
pdp <- pdpmmapghr( pd )

Description
gets pattern-deviation values

Usage
pdval( td )

Arguments
td total-deviation values

Details
calculates pattern-deviation values using the (around) 85-th percentile. All in dBs.

Author(s)
Ivan Marin-Franch

See Also
pdpmmap, tdval, tdpmmap

Examples
td <- tdval( vf91016right )
pd <- pdval( td )
pdvalghr

(pattern deviation from general height rank (GHR))

Description

gets the pattern-deviation from the estimator of general height rank (GHR)

Usage

pdvalghr( td )

Arguments

  td  total-deviation values

Details

calculates pattern-deviation from the estimator of general height rank (GHR). All in dBS.

Author(s)

Ivan Marin-Franch

See Also

pdval, pdpmap, pdpmapghr, tdval, tdpmap

Examples

  td <- tdval( vf91016right )
  pd <- pdvalghr( td )

poplr

(permutation of Pointwise Linear Regression (PoPLR))

Description

performs the PoPLR analysis from a series of visual-field threshold sensitivities, or TD or PD values over time

Usage

poplr( vf, nperm = 5000, type = "slr", truncVal = 1,
       sl_test = NULL, typecomb = "fisher", details = FALSE )
Arguments

vf
object with threshold sensitivities, td, or pd values

nperm
number of permutations. Default is 5000

type
Type of regression statistic: slr for simple linear regression and rank for Spearman correlation coefficient. Default is slr

truncVal
p-value cut-off for truncation. Default is 1

sl_test
values for the 1-tailed hypothesis test for all locations. The reference value is not restricted, but it should be either zero (was there any progression?) or negative (was the progression greater than test value?). Default is 0

typecomb
Combination type for p-values. Default is fisher

details
Whether to return all details of the permuation analysis or just final results. Default is FALSE

Author(s)

Ivan Marin-Franch

References


See Also

hist_poplr, poplr_cstat, poplr_pstat, vflayout2_poplr, vfplot2_poplr

Examples

res <- poplr( vf91016right )

Description

For details see [1]

Usage

poplr_cstat( pval, typecomb = "fisher", truncVal = 1, minmax = TRUE, spatialwtd = NULL, distance = NULL, eccwtd = NULL )
Arguments

- **pval**: p-values. Typically the ones obtained from `poplr_pstat`
- **typecomb**: Combination type for p-values. Default is `fisher`, by now the only one implemented
- **truncVal**: p-value cut-off for truncation. Default is 1
- **minmax**: whether to use minimum p-value if empty combination statistic after truncation. Default is `TRUE`
- **spatialwtd**: Weights for spatial autocorrelation. Typically the p-values, the slope, or the Spearman rank correlation obtained with `poplr_pstat`. If `null`, then the weights are all 1
- **distance**: Pairwise distances between locations. Default is `NULL`
- **eccwtd**: Eccentricity-related weights. Ask Neil. Default is `NULL`

Author(s)

Ivan Marin-Franch

References


See Also

`poplr`, `hist_poplr`, `poplr_pstat`, `vflayout2_poplr`, `vfplot2_poplr`

Examples

```r
res <- poplr( vf91016right )
```

Description

For details see [1]

Usage

```r
poplr_pstat( vf, porder, type = "slr", sl_test = NULL )
```
Arguments

- **vf**: visual-field data. It can be td or pd as well.
- **porder**: order of permutations of visual-fields sensitivities. Each row contains a permutation of tests from vf.
- **type**: Type of regression statistic: slr for simple linear regression and rank for Spearman correlation coefficient. Default is slr.
- **sl_test**: values for the 1-tailed hypothesis test for each location. The reference values are not restricted, but they should be either zero (was there any progression?) or negative (was the progression greater than test value?). Default is NULL.

Value

the function returns two different structures depending on whether the analysis is linear regression (type = "slr") or Spearman rank correlation type = "rank"). For slr analysis, the structure consists of four matrices with data: pval (p-value at each permutation and location of the significance of the 1-tailed hypothesis test specified by sl_test for each location), se (standard error), sl (slope), and int (intercept). For rank analysis, the structure consists of two matrices: pval (p-value at each permutation and location of the significance of the 1-tailed hypothesis test specified by sl_test for each location) and rho (the Spearman rank correlation).

Author(s)

Ivan Marin-Franch

References


See Also

poplr, hist_poplr, poplr_cstat, vflayout2_poplr, vplot2_poplr

Examples

```r
res <- poplr( vf91016right )
```

Description

makes a linear regression with projection in the future by projyears years.
Usage

\[
\text{progols( } \text{tdate, index, projyears = 5,} \\
\text{ xlab = "years from first visit", ylab = "md",} \\
\text{ txtfont = "sans", pointsize = 10, cex = 1 )}
\]

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tdate</td>
<td>visit date</td>
</tr>
<tr>
<td>index</td>
<td>index measured at the corresponding age</td>
</tr>
<tr>
<td>xlab</td>
<td>label for x-axis. Default is age</td>
</tr>
<tr>
<td>ylab</td>
<td>label for y-axis. Default is md</td>
</tr>
<tr>
<td>projyears</td>
<td>Years for projection. Default is 5</td>
</tr>
<tr>
<td>txtfont</td>
<td>font of the text with visual-sensitivity values. Default is sans</td>
</tr>
<tr>
<td>pointsize</td>
<td>size of the text with visual-sensitivity values. Default is 10</td>
</tr>
<tr>
<td>cex</td>
<td>a numerical value giving the amount by which plotting text and symbols should be magnified relative to the default. Default is 1</td>
</tr>
</tbody>
</table>

Author(s)

Ivan Marin-Franch

Examples

\[
\text{vfi <- vfinx( vf91016right )} \\
\text{progols( vfi$tdate, vfi$mvfi, ylab = "vfi" )}
\]

---

\[
\text{psi2oct \hspace{1cm} Angle of incidence in the OCT scan corresponding to angle of incidence in optic nerve head}
\]

Description

Obtains the angle of incidence in the circular oct scan from the average path that starts at an angle psi from the optic nerve head.

Usage

\[
\text{psi2oct( psi, diam = 12 )}
\]

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>psi</td>
<td>Angle of incidence of the average bundle path on the optic nerve head</td>
</tr>
<tr>
<td>diam</td>
<td>Diameter of the scan. Default value is 12 in visual angle, which is the common diameter used in this types of OCT scans</td>
</tr>
</tbody>
</table>
Details

The operation psi2oct( gloc2psi ) maps vf locations with RNFL angles so that the thickness that corresponds to each vf location can be estimated. This can be used in conjunction with vf2gcloc to correct for ganglion cell body displacement from vf location.

Value

The angle of incidence in the circular oct scan.

Author(s)

Ivan Marin-Franch.

Examples

psi2oct( 90 + 45 )

quad2Dfit  

\textit{two-dimensional quadratic fitting for visual-field results}

Description

fits a 2D quadratic function using values in val as "observations" for the x and y coordinates in patternMap.

Usage

quad2Dfit( val, patternMap, bspos )

Arguments

\begin{itemize}
\item \textbf{val} \hspace{1cm} values at each location
\item \textbf{patternMap} \hspace{1cm} pattern of stimulus locations. It uses the x and y coordinates in conjunction with val to get the fitted values with the 2D model
\item \textbf{bspos} \hspace{1cm} position of the blind spot
\end{itemize}

Value

fitted values by a 2D quadratic function.

Author(s)

Ivan Marin-Franch.

See Also

\texttt{ageLinearModel}
**Conditional retest distribution**

**Description**
Computes the conditional retest distribution and the \((1 - \alpha / 2)\) conditional retest intervals.

**Usage**
```r
retestconddist( vf, nbase = 1, nfollow = 1, alpha = 0.1, typequantile = 7 )
```

**Arguments**
- `vf`: Visual field data. It has to have as many visual fields as `nbase + nfollow`.
- `nbase`: Number of visual fields to be used as baseline.
- `nfollow`: Number of visual fields to be used as follow up.
- `alpha`: Significance to derive the \((1 - \alpha / 2)\) conditional retest intervals. Default value is 0.1.
- `typequantile`: An integer between 1 and 9 selecting one of the nine quantile algorithms detailed below to be used. Default value is 7.

**Value**
conditional retest distribution and the \((1 - \alpha / 2)\) conditional retest intervals

**Author(s)**
Ivan Marin-Franch

**References**

**Examples**
```r
vfcondretest <- retestconddist( vf91016left[c(1:4),], nbase = 2, nfollow = 2 )
```
ringmapgraph  

**ring legend for p-values**

**Description**

It generates ring legend for p-values

**Usage**

```r
ringmapgraph( ncol = 3, mapval = NULL, txtfont = "mono", pointsize = 7,
outerSymbol = "circles", innerSymbol = "circles",
outerSize = 1, innerSize = 1,
outerInch = 0.2, innerInch = 0.1,
outerBorderThickness = 2, innerBorderThickness = 2 )
```

**Arguments**

- `ncol`: number of columns in where to show the color symbols. Default is 3
- `mapval`: map and cutoff values to be used for the generation of the color map. Default is NULL
- `txtfont`: font of the text with visual-sensitivity values. Default is mono
- `pointsize`: size of the text with visual-sensitivity values. Default is 7
- `outerSymbol`: The outer symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
- `innerSymbol`: The inner symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
- `outerSize`: Size of the outer symbol. Default is 1
- `innerSize`: Size of the inner symbol. Default is 1
- `outerInch`: Maximum size of the outer symbol in inches. Default is 0.2
- `innerInch`: Maximum size of the inner symbol in inches. Default is 0.1
- `outerBorderThickness`: Thickness of outer border for outer symbol denoting statistical significance. Default is 2
- `innerBorderThickness`: Thickness of the inner border that represents statistical significance. Default is 2

**Author(s)**

Ivan Marin-Franch

**See Also**

vfcolormap
Description

A table with relevant information about test location data for each pattern of locations, 24-2, 10-2, and 30-2, and the conventional Goldman size III stimulus. The G1 pattern is also included for the Goldman size III, size V and size VI stimuli. The convention for visualFields is to use always a right-eye format. That is, a left eye would be “flipped” left-right and location number are counted row-wise from top-left to bottom-right. Information about the size of the stimulus and the corresponding angle of incidence and slope with Jansonious map [1] are included.

Usage

data( saplocmap )

Format

The structure saplocmap has 1 table for the test pattern p24d2. The table has six columns:

- xod: stimulus x position
- yod: stimulus y position
- loc: sequential location number in the original device
- size: size of the stimulus presentation
- jmangle: angle of incidence in blind spot from Jansonious map
- jmslope: orientation of an average bundle at that position of the visual field as calculated from the Jansonious map
- region: region of the visual fields in comparison with ONH sector. Garway-Heath map

Author(s)

Ivan Marin-Franch

References


See Also

fdplocmap
Description

get the standard deviations at each location for normative values: sensitivities, total-deviation, and pattern-deviation values

Usage

sdnv( vf, smooth = TRUE, smoothFunction = quad2Dfit )

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vf</td>
<td>vf-object with sensitivity thresholds</td>
</tr>
<tr>
<td>smooth</td>
<td>whether to use a function to smooth the results or not. Default is TRUE</td>
</tr>
<tr>
<td>smoothFunction</td>
<td>If smooth is true, the function to use for smoothing. Default is quad2Dfit, a 2D quadratic fit to resulting data. This function is not really a smoothing procedure, but a parametric fit</td>
</tr>
</tbody>
</table>

Details

calculates total-deviation and pattern-deviation values and, from them, their standard deviation at each location

Value

returns a 3-column data frame with SDs per location. Each row is a location. Column 1 is for sensitivities, column 2 for total deviation, and column 3 for pattern deviation.

Author(s)

Ivan Marin-Franch

See Also

ageLinearModel, locperc, quad2Dfit
The function `sdnvghr` computes the standard deviations of normative values of PD from general-height-rank estimates at each location.

**Description**

get the standard deviations of PD values from general-height-rank estimates at each location for normative values.

**Usage**

```r
sdnvghr( vf, smooth = TRUE, smoothFunction = quad2Dfit )
```

**Arguments**

- **vf** - object with sensitivity thresholds
- **smooth** - whether to use a function to smooth the results or not. Default is `TRUE`
- **smoothFunction** - If `smooth` is true, the function to use for smoothing. Default is `quad2Dfit`, a 2D quadratic fit to resulting data. This function is not really a smoothing procedure, but a parametric fit.

**Details**

calculates total-deviation and pattern-deviation values and, from them, their standard deviation at each location.

**Value**

returns a 3-column data frame with SDs per location. Each row is a location. Column 1 is for sensitivities, column 2 for total deviation, and column 3 for pattern deviation.

**Author(s)**

Ivan Marin-Franch

**See Also**

`ageLinearModel`, `locperc`, `quad2Dfit`
setnv

set normative values and location map

description
set normative values and stimuli location map to be used with visualFields

Usage

set_nv( ntxt = "nvsapdefault" )

Arguments

ntxt char. Name of the normative reference values to be used. It must be an existing structure

details
sets normative values and stimuli location map to be used with visualFields

Author(s)

Ivan Marin-Franch

See Also

gtnv

Examples

setnv()

stimLoc

stimulus location and size

description
plots the stimulus location and size

Usage

stimLoc( perimetry, pattern, eye, txtfont = "mono", pointsize = 7, xminmax = 29, yminmax = 29 )
Arguments

perimetry type of perimetry
pattern pattern used in the perimetry
eye eye being tested
txtfont font of the text with visual-sensitivity values. Default is mono
pointsize size of the text with visual-sensitivity values. Default is 7
xminmax minimum and maximum limits on the x axis. Default is 29
yminmax minimum and maximum limits on the y axis. Default is 29

Author(s)
Ivan Marin-Franch

See Also

saplocmap

Examples

stimLoc( "sap", "p24d2", "0D" )

| tdpmap probability map for total deviation |

Description

gets probability map for total-deviation values

Usage

tdpmap( td )

Arguments

td total-deviation values in dBs

Details

calculates the probability maps for total-deviation values

Author(s)
Ivan Marin-Franch

See Also

tdval, pdval, pdpmap
Examples

\[
\begin{align*}
\text{td} & \leftarrow \text{tdval( vf91016right )} \\
\text{tdp} & \leftarrow \text{tdpmap( td )}
\end{align*}
\]

---

tdrank \hspace{1cm} total-deviation rank curve

Description

get total-deviation rank curve

Usage

\[
tdrank( \text{td} )
\]

Arguments

\[
\text{td} \quad \text{total deviation values}
\]

Details

calculates total-deviation rank curve.

Author(s)

Ivan Marin-Franch

See Also

tdrankperc

Examples

\[
\begin{align*}
\text{td} & \leftarrow \text{tdval( vf91016right )} \\
\text{tdr} & \leftarrow \text{tdrank( td )}
\end{align*}
\]
Description

gets percentiles for adjusted TD rank curve

Usage

tdrankadjperc( td, percentiles = c( 0.5, 1, 2, 5, 95 ), type = "conventional",
typequantiles = c( "quantile", "(i-1)/(n-1)" , "i/(n+1)" , "i/n" ),
smooth = TRUE, smoothFunction = tdrankglm )

Arguments

td \( \text{vf-object with total-deviation values} \)
type \( \text{whether to use a conventional way to plot the rank TD curve or } \text{ghrank type} \)
where the \( \text{vf object passed is the reconstructed within-normal TD rank curve.} \)
Default is \text{conventional}
percentiles \( \text{percentiles at which to calculate cutoff values} \)
typequantiles \( \text{see } \text{wtd.quantile for a list of different options} \)
smooth \( \text{whether to use a function to smooth the results or not. Default is } \text{TRUE} \)
smoothFunction \( \text{if } \text{smooth is } \text{TRUE is true, the function to use for smoothing. Default is } \text{tdrankglm,} \)
a GLM fit which was proven to do a good fit for average over subject of TD rank
curves. This function is not really a smoothing procedure, but a parametric fit

Value

percentiles for adjusted TD rank curves

Author(s)

Ivan Marin-Franch

See Also

tdrank, tdrankperc

Examples

tdrankadjperc( td )
**tdrankglm**  

*GLM fit for TD rank curve*

**Description**

gets a generalized linear model fit for TD rank curve

**Usage**

```r
tdrankglm( tdr, familytxt = c( "gaussian" ), link = make.link( "logit" ),  
    rankCentral = NULL, scaleFactor = 52.4 )
```

**Arguments**

- `tdr`: table with TD rank curve
- `familytxt`: family of distributions to use with `glm` fit. See `family`. Default is `gaussian`
- `link`: link function to use with `glm` fit. See `family`. Default is `logit`
- `rankCentral`: central ranked positions to use in the fit. By default it is `NULL`, so that all rank locations are used for the fit
- `scaleFactor`: scale to use for ranks to make them be between 0 and 1. Default is 52.4

**Details**

- `details`

**Value**

fitted values of the generalized linear model fit for TD rank curve

**Author(s)**

Ivan Marin-Franch

**See Also**

tdrank, tdrankperc
Description

gets percentiles for TD rank curve

Usage

tdranknv( td, smooth = TRUE, smoothFunction = tdrankglm )

Arguments

td table with total-deviation values
smooth whether to use a function to smooth the results or not. Default is TRUE
smoothFunction if smooth is TRUE, the function to use for smoothing. Default is tdrankglm, a GLM fit which was proven to do a good fit for average over subject of TD rank curves. This function is not really a smoothing procedure, but a parametric fit

Details
details

Value

percentiles for TD rank curves

Author(s)

Ivan Marin-Franch

See Also

tdrank, tdrankglm
tdrankperc

percentiles for TD rank curve

Description

gets percentiles for TD rank curve

Usage

```
tdrankperc( td, percentiles = c( 0.5, 1, 2, 5, 95 ),
             type = c( "quantile", "(i-1)/(n-1)", "i/(n+1)", "i/n" ),
             smooth = TRUE, smoothFunction = tdrankglm )
```

Arguments

td table with total-deviation values
percentiles percentiles at which to calculate cutoff values
type see wtd.quantile for a list of different options
smooth whether to use a function to smooth the results or not. Default is TRUE
smoothFunction if smooth is TRUE is true, the function to use for smoothing. Default is tdrankglm, a GLM fit which was proven to do a good fit for average over subject of TD rank curves. This function is not really a smoothing procedure, but a parametric fit

Details

details

Value

percentiles for TD rank curves

Author(s)

Ivan Marin-Franch

See Also

tdrank, tdrankglm
### tdval

**total deviation**

**Description**

gets total-deviation values

**Usage**

```
 tdval( vf )
```

**Arguments**

- `vf`: stimulus sensitivities in dBs

**Details**

calculates the normative reference sensitivities for healthy subjects of the same age as the subject and obtains differences between the visual field sensitivities and mean normal sensitivities. All in dBs.

**Author(s)**

Ivan Marin-Franch

**See Also**

tdmap, pdval, pdpmap

**Examples**

```
 td <- tdval( vf91016right )
```

---

### vf2gcloc

**Calculates the location of the GC soma corresponding to vf locations**

**Description**

Calculates the corresponding location of the GC soma for a list of vf locations. See [1,2]

**Usage**

```
 vf2gcloc( xy )
```

**Arguments**

- `xy`: data frame with the xy VF locations in degrees of visual angle
Value

returns GC soma position in degrees of visual angle

Author(s)

Ivan Marin-Franch

References


Examples

vfRgclocH dataNframeH x I 1L y I 1 I

vf9I016csp1vf

a vf-object with CSP sample data with

Description

a vf-object with sample data for the examples in visualFields's help. This is real data for the right eye, but the ages have been changed to protect anonymity of the subject

Usage

data( vf9I016csp1vf )

Format

the format is as in vf but for CSP format (see csplocmap)

Author(s)

Ivan Marin-Franch, William H Swanson, Victor E Malinovsky

See Also

vf
vf91016left

vf91016left

Description
a *vf*-object with sample data for the examples in visualfields's help. This is real data for the right eye, but the ages have been changed to protect anonymity of the subject

Usage
data( vf91016left )

Format
the format is as explained in *vf* with columns L1..L54 containing sensitivity thresholds

Author(s)
Ivan Marin-Franch, William H Swanson, Victor E Malinovsky

See Also
vf

vf91016right

Description
a *vf*-object with sample data for the examples in visualfields's help. This is real data for the right eye, but the ages have been changed to protect anonymity of the subject

Usage
data( vf91016right )

Format
the format is as explained in *vf* with columns L1..L54 containing sensitivity thresholds

Author(s)
Ivan Marin-Franch, William H Swanson, Victor E Malinovsky

See Also
vf
vfArtes2014  
Short-term retest static automated perimetry data

Description
Thirty patients recruited from the glaucoma clinics at the Queen Elizabeth Health Sciences Centre in Halifax, Nova Scotia. Each patient underwent 12 visual fields in 12 consecutive weekly sessions.

Usage
data( vfArtes2014 )

Format
It is a vf-object

Author(s)
Paul H Artes, David P Crabb

References

vfaverage  
average of vf-objects

Description
computes the location averages of vf-object

Usage
vfaverage( vf )

Arguments
vf  
a vf-object with more than 1 entry

Value
returns the location average of vf.
vfcolormap

Author(s)
Ivan Marin-Franch

Examples
vfaverage( vf91016left )

vfcolormap
Color code for TD or PD probability maps

Description
returns the RGB values specifying the color code for the TD or PD probability maps

Usage
vfcolormap( map, mapval = NULL )

Arguments
map array with the percentile for TD or PD probability map
mapval map and cutoff values to be used for the generation of the color map. If NULL, then go to current nv$pmapsettings. Default is NULL

Author(s)
Chaitanya Khadilkar, Ivan Marin-Franch

See Also
vfplot, vfgrayscale

vfdemographics
demographics and statistics of sample in visual-fields object vf
description
gets demographics and weighted statistics of sample in visual-fields object vf

Usage
vfdemographics( vf )
Arguments

vf A *vf*-object with sensitivity thresholds, total-deviation or pattern-deviation values

Value

returns a table with demographics and weighted statistics

Author(s)

Ivan Marin-Franch

Examples

```r
vfdemog <- vfdemographics( vf91016right )
```

---

vfenv  
*environment with the current normative values used visualFields*

Description

environment containing the current version of normative values to be used with visualFields. The default used is *nvsapdefault*

Usage

data(vfenv)

Format

It has as many element as the version of normative values used plus one with the name of the version used. To set a structure as the new dataset use *setnv*. The structure has to be similar to *nvsapdefault*.

... same variables as in the corresponding normative values version used. See default value of *nv$nvname*

*nv$nvname* char. Name of the variable with the normative values to use. Default is "nvsapdefault"

Author(s)

Ivan Marin-Franch

See Also

gtnv, setnv
vfgrayscale

vfgrayscale  gray scales for sensitivities

Description
maps sensitivity values to grayscales

Usage
vfgrayscale( sens, age, pattern, algorithm )

Arguments
sens  an array with sensitivity values
age  age of the subject
algorithm  algorithm used in the visual test
pattern  pattern used in the visual test

Details
This function maps sensitivity values to grayscales. The grayscale depends on age of the person, test pattern and algorithm

Value
returns the RGB values for the gray scale

Author(s)
Ivan Marin-Franch

See Also
vfcolormap
vfidefault  

Settings of visual field index

Description

Specifies the weighting to be applied at each location for averaging.

Usage

data(vfidefault)

Format

vfisets contains structures for different patterns of location testing. For instance, p24d2 or p30d2. Each structure contains 2 items:

regweights the actual weights to be applied to each region
locregions mapping between locations in the visual-field testing pattern and regions with the same weight

Author(s)

Ivan Marin-Franch

References


vfindex  

visual field index

Description

calculates the visual field index. It can be parametrized by re-defining which locations go to which weighting regions and the actual weights per region.

Usage

vfindex(vf, td2pdctutoff = -20, perc = 5, vfiset = visualFields::vfidefault)
vfindexpmap

Arguments

- **vf**: stimulus sensitivities in dBs
- **td2pd_cutoff**: cutoff value for mean deviation. See `perc` below for an explanation of how both criteria work in conjunction. Default is -20
- **perc**: percentile at which to check whether the 85th TD percentile is within normal limits or not. If it is not and mean deviation is lower than `td2pd_cutoff`, then TD probability maps are to be used instead of PD probability maps. Default is 5th percentile
- **vfiset**: settings to be applied for the calculation of VFI

Details

calculates the visual field index. It can be parametrized by re-defining which locations go to which weighting regions and the actual weights per region.

Author(s)

Ivan Marin-Franch

References


See Also

`vfstats`, `vfstatspmap`, `vfindexpmap`

Examples

```r
vfi <- vfindex( vf91016right )
```

---

**vfindexpmap**

*probability values for visual field index*

Description

calculates the probability values for visual field index

Usage

```r
vfindexpmap( vfi )
```

Arguments

- **vfi**: visual fields index
vfiperc

Details
calculates the probability values for visual field index (see \texttt{vfindex})

Author(s)
Ivan Marin-Franch

References

See Also
\texttt{vfstats, vfstatspmap, vfindex}

Examples

```r
vfi <- vfindex( vf91016right )
vfip <- vfindexpmap( vfi )
```

\texttt{vfiperc} \hspace{1cm} \textit{percentiles for visual field index}

Description
gets the percentiles for visual field index

Usage

\texttt{vfiperc( vals, percentiles = c( 0.5, 1, 2, 5, 95 ), type = c( "quantile", "(i-1)/(n-1)" , "i/(n+1)" , "i/n" ) )}

Arguments

\begin{itemize}
\item \texttt{vals} \hspace{1cm} \texttt{vf}-object with vfi values
\item \texttt{percentiles} \hspace{1cm} percentiles at which to calculate cutoff values
\item \texttt{type} \hspace{1cm} see \texttt{wtd.quantile} for a list of different options
\end{itemize}

Value

percentiles for visual field index

Author(s)
Ivan Marin-Franch
vflayout

References


See Also

vfindex, vfstats, gloperc, locperc

---

vflayout

printout with results for the visual field

Description

creates a printout with results for the visual field. This includes sensitivity threshold values with a gray scale plot, and TD and PD values with color coding for the probability map

Usage

vflayout( vf, pwidth = 8.27, pheight = 11.69, margin = 0.25, filename = NULL )

Arguments

vf vf-object with sensitivity thresholds
pwidth width of the page (in inches). Default is 8.27
pheight height of the page (in inches). Default is 11.69
margin margins of the page (in inches). Default is 0.25
filename file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.

Author(s)

Ivan Marin-Franch

See Also

vflayoutghr, vfplot, vfplotloc

Examples

vflayout( vf91016right[,15,] )
vflayout2

printout with results for the visual field

Description
creates a printout with results for the visual field. This includes sensitivity threshold values with a gray scale plot, and TD and PD values with color coding for the probability map.

Usage
vflayout2( vf, pwidth = 8.27,
pheight = 11.69, margin = 0.25,
filename = NULL,
ffamily = "serif", sizetxt = 12,
sizetxtSmall = 8, ffamilyvf = "serif",
pointsize = 5,
outerSymbol = "circle", outerInch = 0.13,
innerSymbol = "circle", innerInch = outerInch / 1.9,
lengthLines = 0, thicknessLines = 0 )

Arguments
vf vf-object with sensitivity thresholds
pwidth width of the page (in inches). Default is 8.27
pheight height of the page (in inches). Default is 11.69
margin margins of the page (in inches). Default is 0.25
filename file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.
ffamily Family font for the text in the from. Default is "Helvetica"
sizetxt Text size for main text in the form. Default is 12
sizetxtSmall Text size for details in the form. Default is 8
ffamilyvf Family font for the number in the vfpots (TD, PD, etc). Default is "Times"
pointsize Point size for numbers in the vfpots (TD, PD, etc). Default is 5
outerSymbol Type of outer symbol. Default is "circle"
outerInch Inches of outer symbol. Default is 0.13
innerSymbol Type of inner symbol. Default is "circle"
innerInch Inches of inner symbol. Default is outerInch / 1.9
lengthLines Length of lines. Default is 0
thicknessLines Line thickness. Default is 0

Author(s)
Ivan Marin-Franch
See Also

vflayout2ghr, vfplot2, vfplotloc2

Examples

vflayout2ghr( vf91016right[15,] )

vflayout2ghr

printout with results for the visual field

Description

creates a printout with results for the visual field. This includes sensitivity threshold values with a
gray scale plot, and TD and PD values (from general-height-rank estimates) with color coding for
the probability map

Usage

vflayout2ghr( vf, pwidth = 8.27, pheight = 11.69, margin = 0.25,
filename = NULL )

Arguments

vf

vf-object with sensitivity thresholds

pwidth

width of the page (in inches). Default is 8.27

pheight

height of the page (in inches). Default is 11.69

margin

margins of the page (in inches). Default is 0.25

filename

file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed
in the screen. Default is NULL.

Author(s)

Ivan Marin-Franch

See Also

vflayout2, vfplot2, vfplotloc2

Examples

vflayout2ghr( vf91016right[15,] )
vflayout2_legoplot  

legoplot visualization for change in sensitivities over time of visual fields

Description

displays a legoplot visualization for change in sensitivities over time of visual fields

Usage

vflayout2_legoplot( vf, grp = 3, pwidth = 8.27, pheight = 11.69,  
margin = 0.25, filename = NULL,  
ffamily = "serif", szetxt = 12,  
szetxtSmall = 8,  
szettxyf = "serif", pointsize = 6,  
txtcolorlego = "red", pointsizelego = 16,  
outsymbol = "circle", outersInch = 0.12,  
innersymbol = "circle", innerInch = outersInch / 1.9,  
inches2axisunits = 12.528,  
lengthlines = 0, thicknesslines = 0,  
outsymbollego = "square", outersInchlego = 0.36,  
innersymbollego = "circle", innerInchlego = 0.16 )

Arguments

vf  vf-object with sensitivity thresholds  
grp  how many visual fields to group. Default is 3  
pwidth  width of the page (in inches). Default is 8.27  
pheight  height of the page (in inches). Default is 11.69  
margin  margins of the page (in inches). Default is 0.25  
filename  file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.  
ffamily  Family font for the text in the form. Default is "Helvetica"  
szetxt  Text size for main text in the form. Default is 12  
szetxtSmall  Text size for details in the form. Default is 8  
szettxyf  Font family for text in lego plots. Default is "Times"  
pointsize  Point size for text in lego plots. Default is 6  
txtcolorlego  Text color for lego plots. Default is "red"  
pointsizelego  Point size for text of lego plots. Default is 16  
outsymbol  Type of outer symbol. Default is "circle"  
outersInch  Inches of outer symbol. Default is 0.12  
innersymbol  Type of inner symbol. Default is "circle"
innerInch
       Inches of inner symbol. Default is outerInch / 1.9
inch2axisunits
       Conversion factor inches to axis units. Default is 12.528
lengthLines
       Length of lines. Default is 0
thicknessLines
       Line thickness. Default is 0
outersymbollego
       Type of outer lego symbol. Default is "square"
outerInchlego
       Inches of outer lego symbol. Default is 0.36
innersymbollego
       Type of inner lego symbol. Default is "circle"
innerInchlego
       Inches of inner lego symbol. Default is 0.16

Author(s)

Ivan Marin-Franch

See Also

vflayout2, vflayout2_poplr

Examples

vflayout2_legoplot( vf91016right )

vflayout2_poplr

layout displaying the PoPLR analysis

Description

the function performs the PoPLR analysis (see poplr) with default values and presents the results in form of a A4 printout

Usage

vflayout2_poplr(vf, grp = 3, nperm = 5000,
plotType = "vf", truncVal = 1,
type = "slr", typecomb = "fisher",
pwidth = 8.27, pheight = 11.69,
margin = 0.25, filename = NULL,
colorMapType = "pval", colorScale = NULL,
ringMapType = NULL, ringScale = NULL,
imparedVision = 10, rangeNormal = NULL,
ffamily = "serif", sizetxt = 12,
sizetxtSmall = 8,
ffamilyvf = "serif", pointsize = 7,
Arguments

**vf**
- vf object with threshold sensitivities, td, or pd values

**grp**
- how many visual fields to group. Default is 3

**nperm**
- number of permutations. Default is 5000

**plotType**
- Type of plot to show. It can be visual sensitivities (vf), total-deviation values (td), or pattern-deviation values (pd)

**truncVal**
- p-value cut-off for truncation. Default is 1

**type**
- Type of regression statistic: slr for simple linear regression and rank for Spearman correlation coefficient. Default is slr

**typecomb**
- Combination type for p-values. Default is fisher

**pwidth**
- width of the page (in inches). Default is 8.27

**pheight**
- height of the page (in inches). Default is 11.69

**margin**
- margins of the page (in inches). Default is 0.25

**filename**
- file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.

**colorMapType**
- what does color map categorizes. It can be pvals, slopes, or years blind. Default is pvals

**colorScale**
- Color mapping to use. Default is NULL. A different default is given depending on colorMapType

**ringMapType**
- what concentric rings categorizes. It can be pvals or slopes, or years blind. Default is NULL, for which no rings are shown.

**ringScale**
- Ring mapping to use. Default is NULL. A different default is given depending on ringMapType

**rangeNormal**
- range to indicate which slopes are normal. All significance from data points within the range will be removed. Default is NULL.

**impairedVision**
- sensitivity below which it is considered impairment. Default is 10

**ffamily**
- Family font for the text in the from. Default is "Helvetica"

**sizetxt**
- Text size for main text in the form. Default is 12

**sizetxtSmall**
- Text size for details in the form. Default is 8

**ffamilyvf**
- Font family for text in lego plots. Default is "Times"

**pointsize**
- Point size for text in lego plots. Default is 7

**outersymbol**
- Type of outer symbol. Default is "circle"

**outerInch**
- Inches of outer symbol. Default is 0.12
innerSymbol Type of inner symbol. Default is "circle"
innerInch Inches of inner symbol. Default is outerInch / 1.9
inch2axisunits Conversion factor inches to axis units. Default is 12.528
lengthLines Line length. Default is 0
thicknessLines Line thickness. Default is 0
outerInchpoplr Size of outer symbols for PoPLR gragh. Default is 0.185
innerInchpoplr Size of inner symbols for PoPLR gragh. Default is outerInchpoplr / 1.9
lengthLinespoplr length of lines. Default is 0
borderThickness Border thickness. Default is 1.5

Author(s)
Ivan Marin-Franch, Chaitanya Khadilkar

References

See Also
vflayout2, vflayout2_legoplot, poplr, hist_poplr, poplr_cstat, poplr_pstat, vplot2_poplr

Examples

vflayout2_poplr( vf91016right )

vflayoutghr  printout with results for the visual field

Description
creates a printout with results for the visual field. This includes sensitivity threshold values with a gray scale plot, and TD and PD values (from general-height-rank estimates) with color coding for the probability map

Usage
vflayoutghr( vf, pwidth = 8.27, pheight = 11.69, margin = 0.25, filename = NULL )
Arguments

vf  vf-object with sensitivity thresholds
pwidth  width of the page (in inches). Default is 8.27
pheight  height of the page (in inches). Default is 11.69
margin  margins of the page (in inches). Default is 0.25
filename  file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.

Author(s)

Ivan Marin-Franch

See Also

vflayout, vfplot, vfplotloc

Examples

```r
vflayoutghr( vf91016right[, ] )
```

vflayout_poplr  layout displaying the PoPLR analysis

Description

the function performs the PoPLR analysis (see poplr) with default values and presents the results in form of a A4 printout

Usage

```r
vflayout_poplr( vf, grp = 3, nperm = 5000,
plotType = "vf", truncVal = 1,
type = "slr", typecomb = "fisher",
pwidth = 8.27, pheight = 11.69,
margin = 0.25, filename = NULL,
colormaptype = "pval", colorscale = NULL )
```

Arguments

vf  vf object with threshold sensitivities, td, or pd values
grp  how many visual fields to group. Default is 3
nperm  number of permutations. Default is 5000
plotType  Type of plot to show. It can be visual sensitivities (vf), total-deviation values (td), or pattern-deviation values (pd)
vflayout_progress

truncVal  p-value cut-off for truncation. Default is 1

type      Type of regression statistic: slr for simple linear regression and rank for Spear-
           man correlation coefficient. Default is slr

typecomb  Combination type for p-values. Default is fisher

pwidth    width of the page (in inches). Default is 8.27

pheight   height of the page (in inches). Default is 11.69

margin    margins of the page (in inches). Default is 0.25

filename  file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed
           in the screen. Default is NULL.

colormapType what does color map categorizes. It can be pvals, slopes, or years blind. Default is pvals

colorScale Color mapping to use. Default is NULL. A different default is given depending
           on colormapType

Author(s)

Ivan Marin-Franch, Chaitanya Khadilkar

References

the overall significance of deterioration with permutation analyses of pointwise linear regression

See Also

vflayout, poplr, hist_poplr, poplr_cstat, poplr_pstat, vfplot_poplr

Examples

vflayout_poplr( vf91016right )

Description

A layout showing graphs and stats for progression analysis.

Usage

vflayout_progress( vf, plotType, grp = 2, nperm = 5000,
                  colormapType = "pval", colorScale = NULL,
                  filename = NULL,
                  pwidth = 8.27, pheight = 11.69, margin = 0.25 )
Arguments

 vfvf object with threshold sensitivities, td, or pd values
 plotType Type of plot to show. It can be visual sensitivities (vf), total-deviation values (td), or pattern-deviation values (pd)
 grp how many visual fields to group. Default is 3
 nperm number of permutations. Default is 5000
 colormapType what does color map categorizes. It can be pvals, slopes, or years blind. Default is pvals
 colorScale Color mapping to use. Default is NULL. A different default is given depending on colormapType
 filename file name to save the printout as pdf. If it is saved to pdf, it won’t be displayed in the screen. Default is NULL.
 pwidth width of the page (in inches). Default is 8.27
 pheight height of the page (in inches). Default is 11.69
 margin margins of the page (in inches). Default is 0.25

Author(s)

Ivan Marin-Franch

See Also

vflayout, vflayout_poplr

Examples

vflayout_progress( vf91016left, plotType = “td”)

vfobject visualField objects

Description

This is the main object of the visualFields package. It is essentially a dataframe, but with a fixed number of columns (with pre-determined names) for information about the subject and test data and a variable number of columns for the perimetry results. These can be the sensitivities, or total-deviation values, or pattern-deviation values obtained from static automated perimetry (SAP), frequency-doubling perimetry (FDP), or any other perimetry device. (The number of columns for tested locations is variable as is different for different testing patterns, 24-2, 30-2, 10-2, etc.) Mean deviation, pattern standard deviation, vfi, etc are stored too in a visualField-type object

Details

The fixed columns of the visualField object with information about subject and test are:
**vfobject**

<table>
<thead>
<tr>
<th>id</th>
<th>subject identification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>tperimetry</td>
<td>test perimetry. The type of perimetry analysis performed. Possible values include &quot;sap&quot; and &quot;fdp&quot;. The value of this column, tperimetry, is used in conjunction with the value in talgorithm, and tpattern to find the corresponding normative values (see help on nv) to use for data analysis (e.g. calculation of total-deviation and pattern-deviation values and probability maps). At the moment, only normative values for SAP, 24-2, SITA standard, is distributed with visualFields. Nevertheless, visualFields contains a number of functions that can be used for the generation of normative values (see getnv, agelinearModel, sdnv, tdval, pdval, locperc, vfstats, vfindex, gloperc, vfi_perc, setnv).</td>
</tr>
<tr>
<td>talgorithm</td>
<td>test algorithm. The algorithm used for the perimetric test. Possible values are sitas and zest. At the moment, only normative values for SAP, 24-2, SITA standard, is distributed with visualFields</td>
</tr>
<tr>
<td>tpattern</td>
<td>test pattern. The pattern of locations used for the perimetric test. Possible values are p24d2 or p10d2. At the moment, only normative values for SAP, 24-2, SITA standard, is distributed with visualFields</td>
</tr>
<tr>
<td>tdate</td>
<td>test date</td>
</tr>
<tr>
<td>ttime</td>
<td>test time</td>
</tr>
<tr>
<td>stype</td>
<td>type of subject. Values can be ctr for controls, pwg for patients with glaucoma, sus for suspect subjects. This is just for information to display in the printouts</td>
</tr>
<tr>
<td>sage</td>
<td>subject age. Important for the calculation of total-deviation values and probabiliby maps.</td>
</tr>
<tr>
<td>seye</td>
<td>eye tested</td>
</tr>
<tr>
<td>sbsx</td>
<td>estimated x-position of the blind spot in degrees of angle of vision</td>
</tr>
<tr>
<td>sbxy</td>
<td>estimated y-position of the blind spot in degrees of angle of vision</td>
</tr>
<tr>
<td>sfp</td>
<td>false positives</td>
</tr>
<tr>
<td>sfn</td>
<td>false negatives</td>
</tr>
<tr>
<td>sfl</td>
<td>fixation losses</td>
</tr>
<tr>
<td>sduration</td>
<td>total duration of the test</td>
</tr>
<tr>
<td>spause</td>
<td>total time of pause</td>
</tr>
</tbody>
</table>

The reminder of the columns can be different things. For threshold sensitivity values, and total-deviation and pattern-deviation values, and their corresponding probability maps, they are:

| L1 .. L54 .. L68 .. L76 | location number. There are up to 54 locations for the 24-2, up to 68 for the 10-2, and 76 for the 30-2. Information about the position of the locations, the size of the stimulus, and the x and y coordinates in degrees of visual angles are specified in saplocmap (for SAP) fdplocmap (for FDP) |

For statistical values of the visual-fields results (mean deviation, pattern standard deviation, and others) and their corresponding probability mapped value, they are:

| msens | mean sensitivity value; or the probability mapped value |
| ssens | standard deviation of the sensitivity values; or the probability mapped value |
| mtdev | mean deviation (mean value of the total-deviation values; or the probability mapped value) |
**stdev** standard deviation of the total-deviation values; or the probability mapped value
**mpdev** mean value of the pattern-deviation values; or the probability mapped value
**stdev** standard pattern deviation (standard deviation pattern-deviation values; or the probability mapped value)

For visual field index (VFI) value and the corresponding probability mapped value, they are:

**mvfi** visual field index (VFI); or the probability mapped value
**svfi** standard deviation of the VFI at each location; or the probability mapped value

**Author(s)**

Ivan Marin-Franch

**See Also**

vfsettings

**Examples**

# DO NOT EXECUTE
# one can load sensitivities using loadvfcsv or loadvfxml the data so
# vf <- loadvfcsv( filename = "foo.csv", , patternMap = saplocmap$p24d2 )
# calculate total deviation values using \code{\link{visualFields}) normative values for
# SAP SITAS 24-2 (and Goldman size III stimulus)
# td <- tdval( vf )
# calculate pattern deviation values using total deviation values SAP SITAS 24-2
# pd <- tdval( td )
# OR
# pd <- tdval( tdval( vf ) )
# calculate total deviation proabiliby maps
# tdp <- tdpmap( td )
# calculate pattern deviation proabiliby maps
# pdp <- pdpmap( pd )

---

**vfplot**

*visual field plot*

**Description**

plots location-specific sensitivity thresholds, or TD or PD values at each location of the visual field with the corresponding color code for the probability map
vfplot

Usage

vfplot( vf, plotType,  
        xmin = NULL, xmax = NULL, ymin = NULL, ymax = NULL,  
        notSeenAsBlack = TRUE, newWindow = FALSE,  
        txtfont = "sans", pointsize = 10, width = 6,  
        showaxis = FALSE, colaxis = "white" )

Arguments

vf            vf-object with sensitivity thresholds, or TD or PD values
plotType      Type of plot to show. It can be visual sensitivities (vf), total-deviation values (td), or pattern-deviation values (pd)
xmin, xmax, ymin, ymax  
minimum and maximum limits on the x and y axes, in degrees of visual angle.  
If NULL, then the limits are the maximum and minimum location values + 2.5 percent of the range. Default is NULL.
notSeenAsBlack whether to plot non-seen as black. Default is TRUE
newWindow     whether to generate a new window for the plot. This becomes important when working with RStudio. Default value is TRUE
txtfont       font face of the text with visual-sensitivity values. Default is sans
pointsize     size of the text with visual-sensitivity values. Default is 10
width         width of the window. height is calculated using the width, xmin, xmax, ymin, and ymax. Default is 6
showaxis      Whether to show axis or not. Default is FALSE
colaxis       Color of the axis to show, if showaxis is TRUE. Default is white

Details

This function The vfplot function operates on a single row of visual fields (vf). Depending on the plot type it will generate a plot representing the sensitivity at each location. The color scheme elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in black. Blind spots have been excluded from the plot

Author(s)

Chaitanya Khadilkar, Ivan Marin-Franch

See Also

vfplotloc

Examples

vfplot( vf91016right[15,], plotType = "td" )
vfplot2

**visual field plot**

**Description**

plots location-specific sensitivity thresholds, or TD or PD values at each location of the visual field with the corresponding color code for the probability map

**Usage**

```r
vfplot2(vf, plotTypeL notseenasblack = TRUE, newWindow = FALSE,
        txtfontL pointsize = 7, width = 6,
        xminmax = 29, yminmax = 29,
        outerSymbol = "circles", innerSymbol = "circles",
        outerSize = 1, innerSize = 1,
        outerInch = 0.14, innerInch = 0.08,
        lengthLines = 4.25, thicknessLines = 2 )
```

**Arguments**

- **vf**: `vf`-object with sensitivity thresholds, or TD or PD values
- **plotType**: Type of plot to show. It can be visual sensitivities (`vf`), total-deviation values (`td`), or pattern-deviation values (`pd`)
- **notseenasblack**: whether to plot non-seen as black. Default is `TRUE`
- **newWindow**: whether to generate a new window for the plot. This becomes important when working with RStudio. Default value is `TRUE`
- **txtfont**: font face of the text with visual-sensitivity values. Default is Helvetica
- **pointsize**: size of the text with visual-sensitivity values. Default is 7
- **width**: width of the window. height is calculated using the width, xminmax, and yminmax. Default is 6
- **xminmax**: minimum and maximum limits on the x axis, in degrees of visual angle. Default is 29
- **yminmax**: minimum and maximum limits on the y axis, in degrees of visual angle. Default is 29
- **outerSymbol**: The outer symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
- **innerSymbol**: The inner symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
- **outerSize**: Relative size of the outer symbol. Default is 1
- **innerSize**: Relative size of the inner symbol. Default is 1
- **outerInch**: Maximum size of the outer symbol in inches. Default is 0.14
- **innerInch**: Maximum size of the inner symbol in inches. Default is 0.08
- **lengthLines**: length of the lines denoting the orientation of the RNFL bundle. Default is 4.25
- **thicknessLines**: thickness of the lines denoting the orientation of the RNFL bundle. Default is 2
Details

This function The vfplot function operates on a single row of visual fields (vf). Depending on the
plot type it will generate a plot representing the sensitivity at each location. The color scheme
elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in
black. Blind spots have been excluded from the plot.

Author(s)

Chaitanya Khadilkar, Ivan Marin-Franch

See Also

vfplotloc2

Examples

vfplot2( vf91016right[15,,], plotType = "td" )

vfplot2_poplr

Description

plots the slope values and the corresponding probability category for each location

Usage

vfplot2_poplr( sl, pval, vfinfo, newWindow = FALSE, txtfont = "mono",
    pointsize = 7, width = 6,
    xminmax = 29, yminmax = 29,
    outerSymbol = "circles", innerSymbol = "circles",
    outerSize = 1, innerSize = 1,
    outerInch = 0.24, innerInch = 0.12,
    lengthLines = 0, thicknessLines = 0,
    colormapType = "pval", colorscale = NULL,
    ringMapType = NULL, ringScale = NULL,
    impairedvision = 10, borderThickness = 2,
    idxNotSeen = NULL, rangeNormal = NULL,
    conormal = NULL )

Arguments

sl slopes
pval pvalues calculated for the slope
vfinfo information about the visual field
newWindow boolean value- TRUE will generate a new window for the plot. Default value is TRUE
txtfont
font of the text with visual-sensitivity values. Default is mono

pointsize
size of the text with visual-sensitivity values. Default is 7

width
width of the window. height is calculated using the width, xminmax and yminmax

xminmax
minimum and maximum limits on the x axis

yminmax
minimum and maximum limits on the y axis

outerSymbol
The outer symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle

innerSymbol
The inner symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle

outerSize
Relative size of the outer symbol. Default is 1

innerSize
Relative size of the inner symbol. Default is 1

outerInch
Maximum size of the outer symbol in inches. Default is 0.2

innerInch
Maximum size of the inner symbol in inches. Default is 0.1

lengthLines
length of the lines denoting the orientation of the RNF bundle

thicknessLines
thickness of the lines denoting the orientation of the RNF bundle

colorMapType
what does color map categorizes. It can be pvals, slopes, or years blind. Default is pvals

colorScale
Color mapping to use. Default is NULL. A different default is given depending on colormapType

ringMapType
what concentric rings categorizes. It can be pvals or slopes, or years blind. Default is NULL, for which no rings are shown.

ringScale
Ring mapping to use. Default is NULL. A different default is given depending on ringMapType

impairedVision
sensitivity below which it is considered impairment. Default is 10

borderThickness
Thickness of the borders if ringMapType is not NULL. Default is 5

idxNotSeen
index of locations that are not seen. These locations will be displayed with a solid black circle. Default is NULL.

rangeNormal
range to indicate which slopes are normal. All significance from data points within the range will be removed. Default is NULL.

conormal
if a rangeNormal is defined, then this specifies the within-normal category. Default is NULL. If colorMapType = "pval", then it is 95, if colorMapType = "slope", then it is 0.5

Details
The vfplot function operates on a single row of visual fields (vf). Depending on the plot type it will generate a plot representing the sensitivity at each location. The color scheme elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in black. Blind spots have been excluded from the plot
vfplotloc

Author(s)
Ivan Marin-Franch, Chaitanya Khadilkar

References

See Also
poplr, hist_poplr, poplr_cstat, poplr_pstat, vflayout2_poplr

Examples
res <- poplr(vf91016right)
vfplot2_poplr(res$s1, res$pval, res$vndata)

Description
plots location-specific data at each location of the visual field. It is the function called by vfplot

Usage
vfplotloc( vals, patternMap, vftiles, vf hull, loccol,
xmin, xmax, ymin, ymax,
txtfont = "sans", pointsize = 10,
showaxis = FALSE, colaxis = "white" )

Arguments
vals sensitivity threshold, TD or PD values, or other location-specific values
patternMap locations where to plot symbols, the TD and PD values
vftiles Tiles for the tessellation calculated with Voronoi polygons
vf hull Hull defined for the visual field test.
loccol color to apply to each location. Typically calculated from the normative values
xmin, xmax, ymin, ymax minimum and maximum limits on the x and y axes, in degrees of visual angle.
txtfont font of the text with visual-sensitivity values. Default is sans
pointsize size of the text with visual-sensitivity values. Default is 10
showaxis Whether to show axis or not. Default is FALSE
colaxis Color of the axis to show, if showaxis is TRUE. Default is white
Details
The vfplot function operates on a single row of visual fields (vf). Depending on the plot type it will generate a plot representing the sensitivity at each location. The color scheme elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in black. Blind spots have been excluded from the plot.

Author(s)
Chaitanya Khadilkar, Ivan Marin-Franch

See Also
vfplot

vfplotloc2

Description
plots location-specific data at each location of the visual field. It is the function called by vfplot

Usage
vfplotloc2( vals, eye, patternMap, outerColor, innerColor = NULL, bs = NULL, axesCol = "black", txtfont = "mono", pointsize = 7, txtcolor = NULL, xminmax = 29, yminmax = 29, outerSymbol = "circles", innerSymbol = "circles", outerSize = 1, innerSize = 1, outerInch = 0.2, innerInch = 0.1, lengthLines = 0, thicknessLines = 0, outerBorderColor = NULL, innerBorderColor = NULL, outerBorderThickness = 2, innerBorderThickness = 2 )

Arguments
vals sensitivity threshold, TD or PD values, or other location-specific values
eye eye being tested
patternMap locations where to plot symbols, the TD and PD values
outerColor colors to use for the outer symbols in the graph
innerColor colors to use for the outer symbols in the graph. Default is NULL, meaning white
bs location of the blind spot. Default is NULL meaning do not show blind spot
axesCol color of the axes. Default is black
txtfont font of the text with visual-sensitivity values. Default is mono
pointsize size of the text with visual-sensitivity values. Default is 7
txtcolor color of text. Default is black
xminmax minimum and maximum limits on the x axis
yminmax minimum and maximum limits on the y axis
outerSymbol The outer symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
innerSymbol The inner symbol at all locations. Can be any of circles, squares, rectangles, stars. Default is circle
outerSize Relative size of the outer symbol. Default is 1
innerSize Relative size of the inner symbol. Default is 1
outerInch Maximum size of the outer symbol in inches. Default is 0.2
innerInch Maximum size of the inner symbol in inches. Default is 0.1
lengthLines length of the lines denoting the orientation of the RNF bundle
thicknessLines thickness of the lines denoting the orientation of the RNF bundle
outerBorderColor Border for outer symbol denoting statistical significance. Default is NULL
innerBorderColor Color of the inner border that represents statistical significance. Default is NULL.
outerBorderThickness Thickness of outer border for outer symbol denoting statistical significance. Default is 2
innerBorderThickness Thickness of the inner border that represents statistical significance. Default is 2

Details

The vfplot function operates on a single row of visual fields (vf). Depending on the plot type it will generate a plot representing the sensitivity at each location. The color scheme elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in black. Blind spots have been excluded from the plot.

Author(s)

Chaitanya Khadilkar, Ivan Marin-Franch

See Also

vfplot2
vfplot_poplr

plot with the PoPLR analysis

Description

plots the slope values and the corresponding probability category for each location

Usage

vfplot_poplr( sl, pval, vinfo, newWindow = FALSE,
            xmin = NULL, xmax = NULL, ymin = NULL, ymax = NULL,
            colormapType = "pval", colorscale = NULL,
            txtfont = "sans", pointsize = 10, width = 6,
            showaxis = FALSE, colaxis = "white" )

Arguments

sl  slopes
pval  pvalues calculated for the slope
vinfo  information about the visual field
newWindow  boolean value- TRUE will generate a new window for the plot. Default value is TRUE
xmin, xmax, ymin, ymax  minimum and maximum limits on the x and y axes, in degrees of visual angle. If NULL, then the limits are the maximum and minimum location values + 2.5 percent of the range. Default is NULL.
colormapType  what does color map categorizes. It can be pvals, slopes, or years blind. Default is pvals
colorscale  Color mapping to use. Default is NULL. A different default is given depending on colormapType
txtfont  font of the text with visual-sensitivity values. Default is sans
pointsize  size of the text with visual-sensitivity values. Default is 10
width  width of the window. height is calculated using the width, xminmax and ymin-max
showaxis  Whether to show axis or not. Default is FALSE
colaxis  Color of the axis to show, if showaxis is TRUE. Default is white

Details

The vfplot function operates on a single row of visual fields (vf). Depending on the plot type it will generate a plot representing the sensitivity at each location. The color scheme elucidates the degree of sensitivity at that location. Locations with zero sensitivity are shown in black. Blind spots have been excluded from the plot.
Author(s)

Ivan Marin-Franch, Chaitanya Khadilkar

References


See Also

poplr, hist_poplr, poplr_cstat, poplr_pstat, vflayout_poplr

Examples

```r
res <- poplr( vf91016right )
vfplot_poplr( res$s1, res$pval, res$vdata )
```

vfsegmentcoord

`vfsegmentcoord` calculate line segments to plot in `vfplot` representing the overall orientation of the retinal nerve fibre layer bundles according to Janssion's map [1]

Description

This function geneartes coordinates for the line segments to be plotted

Usage

`vfsegmentcoord( lineMap, length = 2.5 )`

Arguments

- `lineMap` patternMap having x,y and slope values
- `length` length of the line segment in inches. Default is 3.75

Details

This function geneartes coordinates for the line segments to be plotted. Based on the location (x,y) and slope, this function calculates the coordinate set (x1,y1),(x2,y2) which is used to plot the line segments

Author(s)

Chaitanya Khadilkar, Ivan Marin-Franch
References


vfselectvisit

*select visits per subject from a vf-object*

Description

select a determined amount of visits a vf-object. This is done if the interest is to select the last n visits, or the first n visits, or visits within a range, etc.

Usage

vfselectvisit( vf, sel = "last", numTests = 1, beginDate = NA, endDate = NA )

Arguments

vf a vf-object
sel Type of selection, do we want visits from last, from first, within a date range, or specific visit numbers. Default is last
numTests number of tests to select from last, first, or a date range. If sel is an array of indices or set to a date range, numTests is overruled. Default is 1
beginDate when sel = "date" is date from (inclusive). If it is NA, then the data is set to 1900-01-01. Default is NA
endDate when sel = "date" is date to (inclusive). If it is NA, then the data is set to today. Default is NA

Value

returns the subselected visits per subject. For those subject for which at least numTests visits could not be selected are completely removed

Author(s)

Ivan Marin-Franch

Examples

vfselectvisit( vf91016left )
vfsettings

Description

Specifies the structure of a vf object (see vf) and information pertaining test patterns and their statistical analysis.

Usage

data( vfsettings )

Format

This structure contains a variable specifying the number of columns with patient and subject data, locini and several sub-structures with relevant information pertaining different pattern of locations and their analysis. Information exists for the test patterns p24d2, p30d2, p10d2, and sgrnfl. Each sub-structure contains three items:

- bs: locations that correspond to the ananomical region where the blind spot is. For 24-2, those are locations 26 and 35. There are none for the 10-2.
- locnum: total number of locations of the testing pattern in which stimuli are presented. For 24-2 there are 54 locations, for 30-2 there are 76, for 10-2 there are 68.
- locrpd: specifies the rank TD value to be used for the derivation of TD. For 24-2, that ranked location would be 7, corresponding approximately (but not very) to the 85th percentile. For 30-2 the ranked location taken is 10, but this needs fixing???. The way PD is calculated really for 30-2 is by taking the 24-2 locations and finding the seventh largest.

Author(s)

Ivan Marin-Franch

See Also

vf

SUNY-IU control data for static automated perimetry 10-2 SITA Standard

Description

SUNY-IU control data for static automated perimetry 10-2 SITA Standard
Usage

data(vfShafi2011)

Format

It is a vf-object

Author(s)

Ivan Marin-Franch, William H Swanson, Harry J Wyatt, Mitchell W Dul

References


vfobject

Description

sorts a vf-object by id, eye tested, and date and time of test

Usage

vfobject( vf, decreasing = FALSE )

Arguments

vf a vf-object

decreasing logical. Should the sort order be increasing or decreasing?. Default is FALSE

Value

return a sorted vf

Author(s)

Ivan Marin-Franch

Examples

vfobject( vf91016left, decreasing = TRUE )
vfstats

vfstats

Description

calculates the visual field stats

Usage

cvfstats( vf )

Arguments

vf
-vf-object with sensitivity thresholds

Details

calculates the visual field stats: mean sensitivity (msens), std of sensitivities (ssens), mean total
deviation (mtdev), std of total deviation (stdev), mean pattern deviation (mpdev), std of pattern
deviation (spdev). All are weighted means and stds

Author(s)

Ivan Marin-Franch

References


See Also

vfstatspmap, vfindex, vfindexpmap

Examples

cvfs <- vfstats( vf2016right )
vfstatspmap

probability values for visual field global indices

Description

calculates the probability values for visual field global indices

Usage

vfstatspmap( vindices )

Arguments

vindices视觉场全局指标

Details

calculates the probability values for visual field global indices (see vfstats)

Author(s)

Ivan Marin-Franch

References


See Also

vfstats, vindex, vindexpmap

Examples

vfs <- vfstats( vf91016right )
vfsp <- vfstatspmap( vfs )
vftessellation Voronoi tessellation of vf spatial testing locations

Description

calculates the Voronoi tessellation of vf spatial testing locations

Usage

vftessellation( locmap, dist = 3 )

Arguments

locmap a vf-object
dist This function calculates the outer convex hull of the Voronoi diagram. This
parameter specifies how much in degrees we want to extend the outer convex
hull. Default is 3 degrees

Value

returns the Voronoi diagrams and the outer convex hull of the visual field area tested.

Author(s)

Ivan Marin-Franch

Examples

vftess <- vftessellation( saplocmap$p24d2 )

xmlblock extracts a block from the XML file

Description

extracts a block from the XML file

Usage

xmlblock( tag, xmllines, capitalize = TRUE )

Arguments

tag tag to look at
xmllines lines from loaded XML files
capitalize Whether we need to capitalize or not. Default is TRUE
xmldevval

extracts total-deviation values, pattern-deviation values, total-deviation probability values, and pattern-deviation probability values

Description

extracts total-deviation values, pattern-deviation values, total-deviation probability values, and pattern-deviation probability values

Usage

xmldevval( xmllines, patternMap, typeData = c("td"),
            group = c(4, 3, 2, 1, 0),
            cutoffs = c(0.5, 1, 2, 5, 95))

Arguments

xmllines             lines from loaded XML files
patternMap           pattern of stimulus locations. Default is saplocmap$pd242
typeData             Type of data to load; visual field (vf), total deviations (td), pattern deviations (pd),
                      global indices (gi), visual-field index (vfi), total-deviation p-values (tdp),
                      pattern-deviation p-values (pdp), global indices probability maps (gip),
                      visual-field-index probability map (vfp). Default is vf
group                for probability maps: the probability group coding
cutoffs              for probability maps: the corresponding p-value for each group code

Value

total-deviation values, pattern-deviation values, total-deviation probability values, and pattern-deviation probability values

Author(s)

Ivan Marin-Franch
See Also
loadvfxml, xmlvfval

xmlitem
extracts from a loaded XML file the info of a tag

Description
extracts from a loaded XML file the info of a tag

Usage
xmlitem( tag, xmllines, capitalize = TRUE )

Arguments
tag tag to look at
xmllines lines from loaded XML files
capitalize Whether we need to capitalize or not. Default is TRUE

Details
extracts from a loaded XML file the info of a tag

Author(s)
Ivan Marin-Franch

See Also
loadvfxml, loadvfcsv, xmlblock

xmlvfval
extracts visual-field sensitivity values

Description
extracts visual-field sensitivity values

Usage
xmlvfval( xmllines, patternMap, extractionType = c("average") )
xmlvfxy

xmlvfxy <- function(xml) {
  # Function to extract (x,y)-coordinates of tested locations

  # Arguments
  xml <- as.data.frame(xml)  # Convert input to data frame
  x_coords <- xml[, x_col]  # Extract x-coordinates
  y_coords <- xml[, y_col]  # Extract y-coordinates

  # Combine x and y coordinates
  points <- data.frame(x = x_coords, y = y_coords)

  return(points)
}

# Example usage
xml_data <- xmlvfxy(xml)
print(xml_data)

Author(s)
Ivan Marin-Franch

See Also
loadvfxml, xmlvfval
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