

Package ‘kineticF’

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Description

A collection of functions covering data cleaning, processing, visualisation and analysis for manual (Goldmann) and automated (Octopus 900) kinetic visual field data. The analysis is primarily aimed at summarising normative data, with code provided to allow programmers to adapt the basic functions to their specific needs.

Details

Package: kineticF
Type: Package
Version: 1.0
Date: 2015-06-04
License: GPL (>= 2)

Author(s)

Dipesh E Patel <dipesh_patel@ucl.ac.uk> and Mario Cortina-Borja <m.cortina@ucl.ac.uk>

`delete.points`

Removal of unwanted points from a kinetic isopter

Description

Deletes unwanted (practice or error) points from a kinetic isopter. Only called by function kFsubj to clean files when `perimeter = '0'`. This assumes that all Goldmann data have been cleaned and ordered at the point of digitisation. This function is for internal use and is not meant to be called by the user.

Usage

```
delete.points(outer.iso)
```

Arguments

`outer.iso` A matrix of coordinates

Value

matrix of coordinates excluding deleted points

Author(s)

Dipesh E Patel & Mario Cortina-Borja

dist2full *Distance structure to full symmetric matrix*

Description

Creates a symmetric distance matrix from a lower triangular vector structure. It is used to calculate distances within other functions. This function is for internal use and is not meant to be called by the user.

Usage

```
dist2full(dis)
```

Arguments

dis	a distance structure
-----	----------------------

Value

a full symmetric matrix of distances

References

Becker, R.A.; Chambers, J.M. (1984). *S: An Interactive Environment for Data Analysis and Graphics*. Pacific Grove, CA, USA: Wadsworth & Brooks/Cole. ISBN 0-534-03313-X.

do.rose.diag *Rose diagrams of sector frequencies*

Description

Generates rose diagrams from sector frequencies and thus can only be called after calling `kf.sort`.

Usage

```
do.rose.diag(Sector, freqs, shrink = 1/2, col = "salmon", prop = 1,
             rotation = NULL)
```

Arguments

Sector	numeric, vector of sector values
freqs	numeric, vector of frequencies of values within each sector
shrink	parameter that controls the size of the plotted circle. Default is 1. Larger values shrink the circle, while smaller values enlarge the circle
col	character, fill colour
prop	numerical constant determining the radii of the sectors. By default, prop = 1
rotation	numeric, angle of rotation

Value

figure	Rose diagram graphical output
circ.freqs	numeric, vector of aggregated frequencies in 24 sectors

Author(s)

Dipesh E Patel & Mario Cortina-Borja

References

rose.diag{circular}

Examples

```
## kf.sort must be run before do.rose.diag

test<- kf.sort()

try3<- do.rose.diag(test$mat.output$Sector, test$mat.output$fIII4e,
                     shrink=0.9, prop=2.5, col='salmon', rotation=0)

mtext(text='III4e points plotted', side=3, line=-18, cex=1.2)
```

Description

Populates a matrix containing all cleaned individual Goldmann area and KPRM data.

Usage

gcomp(inf = NULL, perimeter = "G", no.kprm = TRUE)

Arguments

inf	name of the demographics matrix used
perimeter	character, to remain as "G"
no.kprm	logical, TRUE if no kinetic perimetry reliability measure (KPRM) has been used

Value

matrix containing information on ID, eye tested and areas

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
## Not run:
gcomp()
## End(Not run)
```

Goldmann.demogr

Goldmann demographics

Description

A matrix of subject demographics for Goldmann perimetry. Called with analysis functions.

Usage

```
data("Goldmann.demogr")
```

Format

A data frame with 2 observations on the following 5 variables:

Study.ID.No. a factor with levels on Study ID

Eye a factor with levels Left and Right

Sex a factor with levels Male and Female

Age a numeric vector

Quality.of.test a factor with levels Good witness, Fair witness and Poor witness

Details

This sample matrix demonstrates the required demographics format to the user.

Source

DEP and MCB

Examples

```
data(Goldmann.demogr)
```

kf.sector	<i>Point extraction into 24 sectors</i>
-----------	---

Description

Extracts coordinate data from an individual dataset into sectors (every 15 degrees) and distances (from origin).

Usage

```
kf.sector(file.name, is.octopus = FALSE)
```

Arguments

file.name	file name using format defined for study ID and eye designation (either "R" or "L")
is.octopus	logical, TRUE if Octopus perimeter has been used

Value

matrix containing sectors, frequencies and distances

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
kf.sector('M0001R', is.octopus=TRUE)
```

kf.sort	<i>Visualisation of summary statistics</i>
---------	--

Description

Plots summary statistics to aid data visualisation.

Usage

```
kf.sort(inf = NULL, is.octopus = FALSE, range.sex = NULL,  
range.age = NULL, range.qual = NULL, plot.isopter = "III4e",  
CI.or.Quant = "CI", force23 = TRUE)
```

Arguments

inf	name of the demographics matrix used
is.octopus	logical, TRUE if Octopus perimeter has been used
range.sex	character, either NULL (use all data) or "Male" or "Female"
range.age	numeric, either NULL (use all data) or single value or a vector of length 2 specifying a closed age range
range.qual	character, either NULL (use all data) or a single value from "Good witness", "Fair witness", "Poor witness"
plot.iso	character, "III4e", "I4e", or "I2e"
CI.or.Quant	character, either "CI" or "Quant" for 95% CI's or 95% quantile envelope
force23	logical, FALSE to define the closure of the bands at sectors 23 and 1; TRUE to define it at sectors 23 and 2

Value

mat.output	data.frame, containing 24 rows (sectors) for each individual with columns: ID, sector, dists x 3, freqs x 3 (corresponding to 3 isothers)
regions	list with elements, inner, middle and outer - matrices containing coordinates of output statistics
areas	character, vector of area values defined by output statistics

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
kf.sort()
```

kFcheck

Visualisation of isopter values

Description

Plots curves or points for multiple individuals on a kinetic grid

Usage

```
kFcheck(mat.output, name.iso, plot.lines = TRUE, title1 = " ")
```

Arguments

mat.output	data.frame generated by kf.sort
name.iso	character, one of "III4e", "I4e" or "I2e"
plot.lines	logical, if TRUE individual isothers are plotted, otherwise individual data points are displayed
title1	character, specifying plot title

Value

Graphical output

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
## Only runs after kf.sort has run
test3<- kf.sort()
kFcheck(test3$mat.output, "III4e", title1="III4e data", plot.lines=FALSE)
```

kFquant

Quantile regression modelling of kinetic field data
Description

Fits quantile regression models to kinetic field data and displays predicted isothe values for selected quantiles. Used to generate normative/control isothe values.

Usage

```
kFquant(inf = NULL, is.octopus = FALSE, range.sex = NULL,
        range.age = NULL, range.qual = NULL, plot.iso = "III4e",
        show.raw = FALSE, tau = c(0.025, 0.25, 0.5, 0.75, 0.975))
```

Arguments

inf	character, name of the demographics matrix
is.octopus	logical, TRUE if Octopus perimeter data
range.sex	character, either NULL (use all data) or "Male" or "Female"
range.age	numeric, either NULL (use all data) or single value or a vector of length 2 specifying a closed age range
range.qual	character, either NULL (use all data) or a single value from "Good witness", "Fair witness", "Poor witness"
plot.iso	character, "III4e", "I4e", or "I2e"

<code>show.raw</code>	logical, superimpose raw data points on grid? Default is FALSE.
<code>tau</code>	numeric, vector of quantiles to be fitted. Default is 5%, 25%, 50%, 75% and 95%.

Value

Graphical output

Author(s)

Dipesh E Patel & Mario Cortina-Borja

References

Geraci, M and Bottai, M. (2014) Linear quantile mixed models. *Statistics and Computing*, **24**(3), 461-479. doi: 10.1007/s11222-013-9381-9.

Examples

```
## This requires sufficient data to generate robust models

kf.sort()
kFquant(range.qual="Good witness", range.age= 8:400,
         plot.iso="III4e", show.raw=FALSE)
```

kFsubj

Plots a subject's kinetic data

Description

Displays Goldmann and Octopus perimetry data. Octopus data can also be cleaned and re-ordered by this function. Isopter area values are calculated and displayed.

Usage

```
kFsubj(obj.name, perimeter = "G", no.cleaning = TRUE, no.kprm = TRUE, no.flip = TRUE)
```

Arguments

<code>obj.name</code>	object (subject) name using format defined for study ID - (please note: ID can only be 5 characters in length)
<code>perimeter</code>	either character, "G" (Goldmann) or "O" (Octopus)
<code>no.cleaning</code>	logical, TRUE if data have been cleaned and ordered
<code>no.kprm</code>	logical, TRUE if no kinetic perimetry reliability measure (KPRM) has been used
<code>no.flip</code>	logical, if FALSE, function displays mirror image along the y-axis for left-eye data

Value

Graphical output of isopters and list of values

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
data(Goldmann.demogr, package='kineticF', envir = environment())
data(M0001RGIII4e, package='kineticF', envir = environment())
data(M0001RGI4e, package='kineticF', envir = environment())
data(M0001RGblind, package='kineticF', envir = environment())
test<- kFsubj(obj.name='M0001R', perimeter='G',
                no.cleaning=TRUE,
                no.kprm=TRUE, no.flip=TRUE)
```

M00010raw

Octopus raw data

Description

Sample data. Simulates Octopus raw .txt file string for subject 1.

Usage

```
data("M00010raw")
```

Format

A text string

Details

This dataset assumes a direct export from an Octopus 900 perimeter.

Source

DEP and MCB

Examples

```
data(M00010raw)
```

M0001RGblind

Goldmann raw data

Description

Sample data. Goldmann blind spot data for subject 1.

Usage

```
data("M0001RGblind")
```

Format

A data frame with 7 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001RGblind)
```

M0001RGI4e

Goldmann raw data

Description

Sample data. Goldmann isopter I4e data for subject 1.

Usage

```
data("M0001RGI4e")
```

Format

A data frame with 15 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001RGIII4e)
```

M0001RGIII4e

Goldmann raw data

Description

Sample data. Goldmann isopter III4e data for subject 1.

Usage

```
data("M0001RGIII4e")
```

Format

A data frame with 16 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001RGIII4e)
```

M0001R0blindproc *Octopus processed data*

Description

Sample data. Octopus blind spot data for subject 1, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0001R0blindproc")
```

Format

A data frame with 8 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001R0blindproc)
```

M0001R0blindraw *Octopus unprocessed data*

Description

Sample data. Octopus blind spot data for subject 1, that requires cleaning and ordering, before analysis.

Usage

```
data("M0001R0blindraw")
```

Format

A data frame with 10 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001R0blindraw)
```

M0001ROI4eproc

Octopus processed data

Description

Sample data. Octopus isopter I4e data for subject 1, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0001ROI4eproc")
```

Format

A data frame with 17 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001ROI4eproc)
```

M0001ROI4eraw *Octopus unprocessed data*

Description

Sample data. Octopus isopter I4e data for subject 1, that requires cleaning and ordering, before analysis.

Usage

```
data("M0001ROI4eraw")
```

Format

A data frame with 17 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001ROI4eraw)
```

M0001ROI4eproc *Octopus processed data*

Description

Sample data. Octopus isopter III4e data for subject 1, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0001ROI4eproc")
```

Format

A data frame with 19 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001ROIII4eproc)
```

M0001ROIII4eraw

Octopus unprocessed data

Description

Sample data. Octopus isopter III4e data for subject 1, that requires cleaning and ordering, before analysis.

Usage

```
data("M0001ROIII4eraw")
```

Format

A data frame with 23 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0001ROIII4eraw)
```

M0002LGblind *Goldmann raw data*

Description

Sample data. Goldmann blind spot data for subject 2.

Usage

```
data("M0002LGblind")
```

Format

A data frame with 8 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LGblind)
```

M0002LGI2e *Goldmann raw data*

Description

Sample data. Goldmann isopter I2e data for subject 2.

Usage

```
data("M0002LGI2e")
```

Format

A data frame with 24 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LGI2e)
```

M0002LGI4e

Goldmann raw data

Description

Sample data. Goldmann isopter I4e data for subject 2.

Usage

```
data("M0002LGI4e")
```

Format

A data frame with 24 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LGI4e)
```

M0002L0blindproc *Octopus processed data*

Description

Sample data. Octopus blind spot data for subject 2, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0002L0blindproc")
```

Format

A data frame with 7 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002L0blindproc)
```

M0002L0blindraw *Octopus unprocessed data*

Description

Sample data. Octopus blind spot data for subject 2, that requires cleaning and ordering, before analysis.

Usage

```
data("M0002L0blindraw")
```

Format

A data frame with 7 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002L0blindraw)
```

M0002LOI2eproc

Octopus processed data

Description

Sample data. Octopus isopter I2e data for subject 2, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0002LOI2eproc")
```

Format

A data frame with 14 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LOI2eproc)
```

M0002LOI2eraw *Octopus unprocessed data*

Description

Sample data. Octopus isopter I2e data for subject 1, that requires cleaning and ordering, before analysis.

Usage

```
data("M0002LOI2eraw")
```

Format

A data frame with 17 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LOI2eraw)
```

M0002LOI4eproc *Octopus processed data*

Description

Sample data. Octopus isopter I4e data for subject 2, that is cleaned and ordered, ready for analysis.

Usage

```
data("M0002LOI4eproc")
```

Format

A data frame with 16 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LOI4eproc)
```

M0002LOI4eraw

Octopus unprocessed data

Description

Sample data. Octopus isopter I4e data for subject 2, that requires cleaning and ordering, before analysis.

Usage

```
data("M0002LOI4eraw")
```

Format

A data frame with 21 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0002LOI4eraw)
```

M00020raw

Octopus raw data

Description

Sample data. Simulates Octopus raw .txt file string for subject 2.

Usage

```
data("M00020raw")
```

Format

A text string

Details

This dataset assumes a direct export from an Octopus 900 perimeter.

Source

DEP and MCB

Examples

```
data(M00020raw)
```

M0003RGIII4e

Goldmann raw data

Description

Sample data. Goldmann isopter III4e data for subject 3.

Usage

```
data("M0003RGIII4e")
```

Format

A data frame with 23 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0003RGIII4e)
```

M0004LGIII4e

Goldmann raw data

Description

Sample data. Goldmann isopter III4e data for subject 4.

Usage

```
data("M0004LGIII4e")
```

Format

A data frame with 13 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0004LGIII4e)
```

M0005RGIII4e*Goldmann raw data***Description**

Sample data. Goldmann isopter III4e data for subject 5.

Usage

```
data("M0005RGIII4e")
```

Format

A data frame with 23 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0005RGIII4e)
```

M0005RGrmeas*Goldmann raw data***Description**

Sample data. Goldmann Kinetic Perimetry Reliability Measure (KPRM) data for subject 5.

Usage

```
data("M0005RGrmeas")
```

Format

A data frame with 4 observations on the following 2 variables.

- X a numeric vector, the x co-ordinate value
- Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0005RGrmeas)
```

M0006RGIII4e

Goldmann raw data

Description

Sample data. Goldmann isopter III4e data for subject 6.

Usage

```
data("M0006RGIII4e")
```

Format

A data frame with 18 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0006RGIII4e)
```

M0007LGIII4e*Goldmann raw data*

Description

Sample data. Goldmann isopter III4e data for subject 7.

Usage

```
data("M0007LGIII4e")
```

Format

A data frame with 23 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0007LGIII4e)
```

M0008RGIII4e*Goldmann raw data*

Description

Sample data. Goldmann isopter III4e data for subject 8.

Usage

```
data("M0008RGIII4e")
```

Format

A data frame with 23 observations on the following 2 variables.

X a numeric vector, the x co-ordinate value

Y a numeric vector, the y co-ordinate value

Source

DEP and MCB

Examples

```
data(M0008RGIII4e)
```

ocomp*Input and output of Octopus data*

Description

Populates a matrix containing all cleaned individual Octopus area and KPRM data.

Usage

```
ocomp(inf = NULL, no.kprm = TRUE, perimeter = "O")
```

Arguments

inf	name of the demographics matrix used
no.kprm	logical, TRUE if no kinetic perimetry reliability measure (KPRM) has been used
perimeter	character, either "G" or "O"

Value

matrix containing information on ID, eye tested and areas

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
## Not run:  
ocomp(no.kprm=TRUE)  
## End(Not run)
```

`Octopus.demogr` *Octopus demographics*

Description

A sample matrix of subject demographics for Octopus perimetry. Called with analysis functions.

Usage

```
data("Octopus.demogr")
```

Format

A data frame with 2 observations on the following 5 variables.

`Study.ID.No.` a factor with levels M0001 M0002

`Eye` a factor with levels Left and Right

`Sex` a factor with levels Male and Female

`Age` a numeric vector

`Quality.of.test` a factor with levels Good witness, Fair witness and Poor witness

Details

This sample matrix demonstrates the required demographics format to the user.

Source

DEP and MCB

Examples

```
data(Octopus.demogr)
```

`preprocess.octopus` *Octopus data cleaner*

Description

Transforms text strings into coordinate values by isopters, one subject at a time. NOTE: For this function to run, a demographics file must exist (columns: Study ID No, Eye, Sex, Age, Quality of test). Only subjects with values on at least Study ID No and Eye can be processed.

Usage

```
preprocess.octopus(octopus.file, octopus.demogr = Octopus.demogr)
```

Arguments

octopus.file name of the matrix containing individual raw data text string
octopus.demogr name of the demographics matrix

Value

Matrix of coordinates and isopter values

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
## For example, import raw data with:  
# M00010raw<- paste(scan("C:\\Data\\Octopus_raw\\M0001.txt", sep=';', what=''), collapse=';')  
  
preprocess.octopus(M00010raw)
```

set.template *Kinetic visual field template*

Description

Opens a plot window and displays a kinetic perimetry grid

Usage

```
set.template(void = TRUE)
```

Arguments

void Adds the 'void' areas of a Goldmann field to the kinetic plot. Default is TRUE.

Value

Graphical output

Author(s)

Dipesh E Patel & Mario Cortina-Borja

Examples

```
set.template(void=FALSE)
```

stop.identify	<i>Stops the process of re-ordering a matrix of coordinates</i>
---------------	---

Description

Changes the order in which a matrix of coordinates is plotted to allow closure on a polygon. This function is for internal use and is not meant to be called by the user.

Usage

```
stop.identify(xy)
```

Arguments

xy	matrix of coordinates
----	-----------------------

Value

A re-ordered matrix of coordinates

Author(s)

Dipesh E Patel & Mario Cortina-Borja

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