Package 'stabilo'

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Type Package

Title Stabilometric Signal Quantification

Version 0.1.1

Description Functions for stabilometric signal quantification.
The input is a data frame containing the x, y coordinates of the center-of-pressure displacement.
Jose Magalhaes de Oliveira (2017) <doi:10.3758/s13428-016-0706-4> ``Statokinesigram normalization method";
T E Prieto, J B Myklebust, R G Hoffmann, E G Lovett, B M Myklebust (1996) <doi:10.1109/10.532130> ``Measures of postural steadiness: Differences between healthy young and elderly adults";
L F Oliveira et al (1996) <doi:10.1088/0967-3334/17/4/008> ``Calculation of area of stabilometric signals using principal component analisys".

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R topics documented:

`sttkangle` *Quantifies the Angle of a Statokinesigram*

Description

Computes the angle of of a given statokinesigram, with respect to the x axis, by fitting an ellipse containing 95 percent of statokinesigram's points.

Usage

```
sttkangle(dados)
```

Arguments

`dados`	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The angle, in degrees, of the fitted ellipse on the given statokinesigram `sttkangle`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkarea`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPangle <- sttkangle(COP)
```

`sttkarea` *Quantifies the Area of a Statokinesigram (Center-of-Pressure displacement)*

Description

Computes the area of of a given statokinesigram by fitting an ellipse containing 95 percent of statokinesigram's points.

Usage

```
sttkarea(dados)
```

Arguments

`dados`	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The area of the given statokinesigram `sttkarea`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COParea <- sttkarea(COP)
```

`sttkeccentr` *Estimates the Eccentricity of a Statokinesigram.*

Description

Computes the eccentricity of the confidence ellipse of a given statokinesigram.

Usage

```
sttkeccentr(dados)
```

Arguments

`dados`	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The eccentricity of the given statokinesigram `eccentr`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkarea`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPeccentr <- sttkeccentr(COP)
```

`sttkellipseplot` *Points of the Confidence Ellipse of a Statokinesigram*

Description

Computes the contour of the confidence ellipse of a given statokinesigram, containing 95 percent of statokinesigram's points.

Usage

```
sttkellipseplot(dados)
```

Arguments

`dados`	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The contour of the ellipse fitted to the given statokinesigram `ellctr`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPellipseplot <- sttkellipseplot(COP)
```

sttklength *Quantifies the length of a given Center-of-pressure trajectory (statokinesigram)*

Description

Computes the length of of a given Center-of-pressure trajectory.

Usage

```
sttklength(dados)
```

Arguments

dados	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The length of the given COP trajectory `sttklength`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPlength <- sttklength(COP)
```

`sttknorm` *Standardizes Statokinesigrams*

Description

confines a given statokinesigram in a circumference of radius equal to 1, without spatially distorting its shape. The circumference contains 95 percent of statokinesigram's points.

Usage

```
sttknorm(dados)
```

Arguments

`dados`	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The normalized statokinesigram `stknorm`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkarea`, `sttklength`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPnorm <- sttknorm(COP)
```

sttksdx *Quantifies the Lateral Sway Amplitude of a Statokinesigram*

Description

Computes the standard deviation of lateral displacement of the center of pressure.

Usage

```
sttksdx(dados)
```

Arguments

dados	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The standard deviation of x sdx.

Author(s)

Jose Magalhaes de Oliveira

See Also

sttksdy, sttkangle

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPxsd <- sttksdx(COP)
```

sttksdy *Quantifies the front-and-back Sway Amplitude of a Statokinesigram*

Description

Computes the standard deviation of front-and-back displacement of the center of pressure.

Usage

```
sttksdy(dados)
```

Arguments

dados	data frame with two columns "x" and "y"

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The standard deviation of y sdy.

Author(s)

Jose Oliveira

See Also

sttksdx, sttkellipseplot

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPysd <- sttksdy(COP)
```

sttkveloc *Velocity of a Center-of-pressure displacement*

Description

Computes the mean velocity of a given Center-of-pressure displacement in the horizontal plane.

Usage

```
sttkveloc(dados, fs)
```

Arguments

dados	Data frame with two columns "x" and "y"
fs	The sampling frequency used in data recording

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center-of-pressure acquired in a period of time.

Value

The velocity of the COP displacement sttkveloc.

Author(s)

Jose Magalhaes de Oliveira

See Also

sttkangle, sttkellipseplot

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)
fs <- 50

COPvelocity <- sttkveloc(COP,fs)
```

sttkxmdfreq *Quantifies the Median Frequency of the Lateral Displacement of COP.*

Description

Computes the median frequency of the lateral displacement of the center of pressure.

Usage

```
sttkxmdfreq(dados, sampfreq)
```

Arguments

dados	data frame with two columns "x" and "y"
sampfreq	number The sampling frequency

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The median frequency of the x displacement for the given statokinesigram FMx.

Author(s)

Jose Magalhaes de Oliveira

See Also

sttkangle, sttkellipseplot

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPxmdfreq <- sttkxmdfreq(COP, 50)
```

`sttkxveloc` *Mean lateral velocity of Center-of-pressure displacement*

Description

Computes the mean lateral velocity of a given Center-of-pressure displacement.

Usage

```
sttkxveloc(dados, fs)
```

Arguments

`dados`	Data frame with two columns "x" and "y"
`fs`	The sampling frequency used in data recording

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center-of-pressure acquired in a period of time.

Value

The lateral velocity of the COP displacement `sttkxveloc`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)
fs <- 50

COPxvelocity <- sttkxveloc(COP,fs)
```

`sttkymdfreq` *Quantifies the Median Frequency of the Anteroposterior Displacement of COP.*

Description

Computes the median frequency of the anteroposterior displacement of the center of pressure.

Usage

```
sttkymdfreq(dados, sampfreq)
```

Arguments

`dados`	data frame with two columns "x" and "y"
`sampfreq`	number The sampling frequency

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center of pressure acquired in a period of time.

Value

The median frequency of the y displacement for the given statokinesigram `FMy`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)

COPymdfreq <- sttkymdfreq(COP, 50)
```

`sttkyveloc` *Mean front-to-back velocity of Center-of-pressure displacement*

Description

Computes the mean front-to-back velocity of a given Center-of-pressure displacement.

Usage

```
sttkyveloc(dados, fs)
```

Arguments

`dados`	Data frame with two columns "x" and "y"
`fs`	The sampling frequency used in data recording

Details

'dados' is a data frame containing two columns named "x" and "y". The pairs (x, y) are the coordinates of the center-of-pressure acquired in a period of time.

Value

The velocity of the front-to-back COP displacement `sttkyveloc`.

Author(s)

Jose Magalhaes de Oliveira

See Also

`sttkangle`, `sttkellipseplot`

Examples

```
x <- c(1,3,7,5,9,4,3,6,8,2,8,9,4,5,7,3,4,7,9,3,2,5,3,4,8,2,9,7,4,2)
y <- c(6,3,9,1,3,7,4,9,6,1,7,3,9,7,2,6,3,4,8,1,9,3,6,8,1,6,2,9,8,3)

COP <- data.frame(x, y)
fs <- 50

COPyvelocity <- sttkyveloc(COP,fs)
```

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