Package 'DandEFA'

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Type Package

Title Dandelion Plot for R-Mode Exploratory Factor Analysis

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Depends R(>= 3.2.3), gplots, polycor

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Description Contains the function used to create the Dandelion Plot. Dandelion Plot is a visualization method for R-mode Exploratory Factor Analysis.

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NeedsCompilation no

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R topics documented:

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dandelion   *Dandelion Plot*

Description

A Dandelion plot for R-mode Exploratory Factor Analysis methods. The loading matrix and the factor variances are being visualized.

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Usage

```
dandelion(fact_load, bound = 0.5, mcex=c(1,1), palet)
```

Arguments

fact_load   A "loadings" class object. Factor loading matrix.

bound   Minimum loadings to visualize. It should be set between 0 and 1. For example, bound=0.5 will only visualize loadings more than 0.5.

mcex   A vector with two points. First value determines the size of labels within dandelion plot, and the second determines the size of labels within uniquenesses and communalities graphs

palet   A vector of color pallette. The first and the last elements of the vector are the colors of positive and negative loadings.

Details

A Dandelion Plot visualizes both factor variances and loadings in the same time. Each central line represents a different factor and is connected to a star graph. These star graphs visualize the factor loadings for the corresponding factor. Negative and positive loadings are indicated by two different colors. Explained variance of each factor can be observed by the size of each star graph or by the angle between the current and the consecutive central line. For example, explained variance of first factor is determined by the angle between the first and second central line. Communalities and uniquenesses are also given on the right hand side along barchart of cummulative explanation ratios of factors (with individual variances on top).

Author(s)

Artur Manukyan, Ahmet Sedef, Erhan Cene, Ibrahim Demir

References

Artur Manukyan, Erhan Cene, Ahmet Sedef, Ibrahim Demir, *Dandelion plot: a method for the visualization of R-mode exploratory factor analyses*. Computational Statistics 29.6 (2014): 1769-1791.

Examples

```
# E.F.A. of Timss 2011 Student Questionnaire Example for 5 and 8 number of factors
data(timss2011)
timss2011 <- na.omit(timss2011)
dandpal <- rev(rainbow(100, start = 0, end = 0.2))
facl <- factload(timss2011,nfac=5,method="prax",cormeth="spearman")
dandelion(facl,bound=0,mcex=c(1,1.2),palet=dandpal)
facl <- factload(timss2011,nfac=8,method="mle",cormeth="pearson")
dandelion(facl,bound=0,mcex=c(1,1.2),palet=dandpal)
```

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factload   *R-mode Exploratory Factor Analysis*

Description

This function produces a factor loading matrix given by the specified factor extraction method, number of factors and rotation method. R-mode Exploratory Factor Analysis is based on the factorization of the variables. See "References" for more details.

Usage

```
factload(data, cormeth = "spearman", data.cor,
         method = "pc", nfac = 1, rotation = "varimax")
```

Arguments

data	Dataset to be analyzed for R-mode Exploratory Factor Analysis
cormeth	Correlation coefficient. Type polycor for polychoric correlation coefficient (see polychor), for else see cor. If data is NULL, and data.cor is specified; cormeth will be ignored.
data.cor	Given correlation matrix. However, if data is specified, data.cor will be replaced.
method	Factor extraction method. Type pc for Principal component factor analysis, mle for Maximum likelihood estimation and prax for Principal axis factor analysis (see "References")
nfac	The number of factors
rotation	Rotation method. Type varimax for orthogonal and promax for oblique rotation.

Value

Returns a loadings class factor loading matrix

References

Reyment, R., Joreskog, K.G., 1993. Applied Factor Analysis in the Natural Sciences. Cambridge University Press, Cambridge, United Kingdom.

Klinke, S., Wagner, C., 2008. Visualizing exploratory factor analysis models, in: Paulo, B. (Ed.), Compstat 2008: Proceedings in Computational Statistics: 18th Symposium Held in Porto, Portugal, 2008.

Harman, Harry H., and Wayne H. Jones. "Factor analysis by minimizing residuals (minres)." Psychometrika 31.3 (1966): 351-368.

Examples

```
data(timss2011)
timss2011 <- na.omit(timss2011)
factload(timss2011,nfac=5,method="prax",cormeth="spearman")
factload(timss2011,nfac=8,method="pc",cormeth="pearson",rotation="promax")
timsscor <- cor(timss2011)
factload(data.cor=timsscor,nfac=10,method="mle")
```

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timss2011   *Science Perception of Eigth Grade Students, TIMSS 2011*

Description

The data set on the perception of science and attitude towards science for eigth grade students in Turkey data of TIMSS 2011. Data set is obtained from TIMSS 2011 Student Questionnaire. Among 42 questions, first 16 questions are on students' general opinion about school, and last 26 questions are on students' attitude and perception towards science lessons. The variables are measured with likert type scale with four choices where '1' indicates "Every Day or Almost Every Day / Agree A Lot / At Least Once A Week" and '4' indicates "Never or Almost Never / Disagree A Lot / Never" depending on the question.

Usage

```
data(timss2011)
```

Format

Data consists of 6925 students with their 42 perception variables. Variables have been assigned according to last three letters of their coding in the questionnaire.

X10A How often do you use a computer at home?

X10B How often do you use a computer at school?

X10C How often do you use a computer at some other place?

X11A How often do your parents ask what you learned in school?

X11B How often do you talk about schoolwork with your parents at home?

X11C How often do your parents make sure that you set aside time for your homework?

X11D How often do your parents check if you do your homework?

X12A How much do you agree that you like being in school?

X12B How much do you agree that you feel safe when you are at school?

X12C How much do you agree that you feel like you belong at your school?

X13A During this year, how often were you made fun of or called names at school?

X13B During this year, how often were you left out of games or activities by other students at school?

X13C During this year, how often did someone spread lies about you at school?

X13D During this year, how often was something stolen from you at school?

X13E During this year, how often were you hit or hurt by other student(s) at school?

X13F During this year, how often were you made to do things you didn't want to do by other students at school?

X17A How much do you agree that you enjoy learning science?

X17B How much do you agree that you wish you did not have to study science?

X17C How much do you agree that you read about science in your spare time?

X17D How much do you agree that science is boring?

X17E How much do you agree that you learn many interesting things in science?

X17F How much do you agree that you like science?

X17G How much do you agree that it is important to do well in science?

X18A How much do you agree that you know what your teacher expects you to do in your science lessons?

X18B How much do you agree that you think of things not related to the lesson in your science lessons?

X18C How much do you agree that your teacher is easy to understand in your science lessons?

X18D How much do you agree that you are interested in what your teacher is saying in your science lessons?

X18E How much do you agree that your teacher gives you interesting things to do in your science lessons?

X19A How much do you agree that you usually do well in science?

X19B How much do you agree that science is more difficult for you than for many of your classmates?

X19C How much do you agree that science is not one of your strengths?

X19D How much do you agree that you learn things quickly in science?

X19E How much do you agree that science makes you confused and nervous?

X19F How much do you agree that you are good at working out difficult science problems?

X19G How much do you agree that your teacher thinks you can do well in science <programs/classes/lessons> with difficult materials?

X19H How much do you agree that your teacher tells you that you are good at science?

X19I How much do you agree that science is harder for you than any other subject?

X19J How much do you agree that learning science will help you in your daily life?

X19K How much do you agree that you need science to learn other school subjects?

X19L How much do you agree that you need to do well in science to get into the <university> of your choice?

X19M How much do you agree that you need to do well in science to get the job you want?

X19N How much do you agree that you would like a job that involves using science?

Source

TIMSS 2011 Student Questionnaire http://timssandpirls.bc.edu/timss2011/frameworks.html

References

TIMSS 2011 User Guide for the International Database. 2013 International Association for the Evaluation of Educational Achievement

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