

Package: GarrettRank (via r-universe)

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Type Package

Title Garrett Ranking Analysis and Visualization

Version 0.1.5

Description Performs Garrett ranking analysis of respondent-ranked items such as constraints, problems, factors, or priorities. The package converts respondent rankings into Garrett scores, calculates mean Garrett scores and final ranks and provides methods for summarizing, tabulating and visualizing ranking results. It also provides Kendall's coefficient of concordance for assessing the degree of agreement among respondents. Garrett ranking does not accommodate tied ranks and Kendall's coefficient of concordance is likewise computed for untied ranking data. For more details see Garrett and Woodworth (1969) <<https://books.google.com/books?id=aoqSmQEACAAJ>> and Buragohain and Dubey (2021) <[doi:10.5958/2454-552X.2021.00055.4](https://doi.org/10.5958/2454-552X.2021.00055.4)>.

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Contents

garrett_example	2
garrett_rank	3
garrett_table	5
kendall_w	5
plot.garrett	6
Index	8

garrett_example	<i>#Example Dataset for Garrett Ranking</i>
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Description

#Example Dataset for Garrett Ranking

Usage

garrett_example

Format

A data frame with 50 rows and 23 columns:

Respondent The name or serial number identifying each respondent.

C1 Rank assigned to constraint 1.

C2 Rank assigned to constraint 2.

C3 Rank assigned to constraint 3.

C4 Rank assigned to constraint 4.

C5 Rank assigned to constraint 5.

C6 Rank assigned to constraint 6.

C7 Rank assigned to constraint 7.

C8 Rank assigned to constraint 8.

C9 Rank assigned to constraint 9.

C10 Rank assigned to constraint 10.

C11 Rank assigned to constraint 11.

C12 Rank assigned to constraint 12.

C13 Rank assigned to constraint 13.

C14 Rank assigned to constraint 14.

C15 Rank assigned to constraint 15.

C16 Rank assigned to constraint 16.

C17 Rank assigned to constraint 17.

C18 Rank assigned to constraint 18.

C19 Rank assigned to constraint 19.

C20 Rank assigned to constraint 20.

C21 Rank assigned to constraint 21.

C22 Rank assigned to constraint 22.

Details

The first column contains the respondent's name or serial number. The remaining 22 columns (C1 to C22) contain the ranks assigned by each respondent to the corresponding constraints. There are 50 respondents in the dataset. No tied ranks are present in the dataset.

An example dataset demonstrating the application of the Garrett ranking method.

The dataset contains ranking responses from 50 respondents for 22 constraints.

Examples

```
data(garrett_example)
#Run Garrett ranking analysis
result <- garrett_rank(garrett_example, respondent = "Respondent")
summary(result)
result$ranking
result$frequency
result$weighted_scores
#Select the plot type
plot(result, type = "bar")
plot(result, type = "lollipop")
plot(result, type = "dot")
plot(result, type = "line")
plot(result, type = "heatmap")
plot(result, type = "cluster")
plot(result, type = "contribution")
plot(result, type = "cluster", k = 3)
plot(result, type = "cluster", scale = "row", show_numbers = TRUE)

#Run Kendall's Coefficient of Concordance
kw<-kendall_w(garrett_example, respondent = "Respondent")
summary(kw)
```

garrett_rank

Garrett Ranking Analysis

Description

Performs Garrett ranking analysis on respondent ranking data.

Usage

```
garrett_rank(data, respondent = NULL)
```

Arguments

data	A data.frame, matrix, CSV file path or Excel file path containing ranking data.
respondent	Optional respondent ID column name or column position to exclude before analysis.

Details

Each row must represent one respondent and each column one factor, constraint, or item. Each respondent must assign every rank from 1 to the number of factors exactly once.

Value

An object of class "garrett", which is a list containing:

ranking A data.frame containing the factor names, mean Garrett scores, and final ranks. Mean_Score is the average Garrett score for each factor across all respondents. Higher mean Garrett scores indicate higher overall priority, and Rank = 1 represents the highest-ranked factor.

frequency A data.frame containing the number of respondents assigning each possible rank to each factor, together with the corresponding percent positions and Garrett scores.

weighted_scores A numeric matrix containing the rank frequencies multiplied by their corresponding Garrett scores. These values are used to calculate the mean Garrett score for each factor.

reference A data.frame containing the standard Garrett conversion table used to convert percent positions into Garrett scores.

respondents An integer giving the number of respondents included in the analysis.

factors An integer giving the number of factors ranked by the respondents.

factor_names A character vector containing the names of the ranked factors.

call The matched function call used to create the object.

Examples

```
result <- garrett_rank(garrett_example, respondent = "Respondent")
summary(result)
result$ranking
result$frequency
result$weighted_scores
```

garrett_table	<i>Garrett Conversion Table It is a standard Garrett conversion table used by the package.</i>
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Description

Garrett Conversion Table It is a standard Garrett conversion table used by the package.

Usage

```
garrett_table()
```

Value

A data.frame with two columns:

Percent_Position The percent position values used to determine Garrett scores from respondent ranks.

Garrett_Score The corresponding Garrett scores assigned to the percent positions.

Examples

```
table<-garrett_table()
print(table)
```

kendall_w	<i>Kendall's Coefficient of Concordance</i>
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Description

Computes Kendall's coefficient of concordance (W) for complete, untied ranking data.

Usage

```
kendall_w(data, respondent = NULL)
```

Arguments

data A data.frame, matrix, CSV file path, or Excel file path containing ranking data.

respondent Optional respondent ID column name or column position to exclude before analysis.

Details

Each row must represent one respondent and each column one factor. Each respondent must assign every rank from 1 to the number of factors exactly once. Tied ranks are not supported.

Value

An object of class "kendall_w", which is a list containing:

statistic Kendall's coefficient of concordance (W), ranging from 0 to 1, where larger values indicate stronger agreement among respondents.

chisq The chi-square statistic used to test the statistical significance of the concordance.

df Degrees of freedom for the chi-square test.

p.value The p-value associated with the chi-square test.

respondents The number of respondents included in the analysis.

factors The number of ranked factors.

rank_sum A named numeric vector containing the sum of ranks assigned to each factor across respondents.

call The matched function call.

Examples

```
data(garrett_example)
kw <- kendall_w(garrett_example, respondent = "Respondent")
kw
summary(kw)
```

plot.garrett

Plot Garrett Ranking Results

Description

Produces graphical representations of Garrett ranking results.

Usage

```
## S3 method for class 'garrett'
plot(
  x,
  type = c("bar", "lollipop", "dot", "line", "heatmap", "cluster", "contribution"),
  top = NULL,
  color = "#2C7FB8",
  label = TRUE,
  point_size = 3,
  line_size = 1,
  cluster_rows = TRUE,
  cluster_cols = FALSE,
  distance = "euclidean",
  clustering_method = "complete",
  scale = "none",
  show_numbers = FALSE,
  ...
)
```

Arguments

x	An object of class "garrett" created by garrett_rank .
type	Type of plot. Options are "bar", "lollipop", "dot", "line", "heatmap", "cluster", and "contribution".
top	Number of top-ranked factors to display. Default is NULL, which displays all factors. Applies to ranking plots.
color	Colour used for ranking plots.
label	Logical. Should Garrett scores be displayed as labels?
point_size	Size of points used in dot, lollipop, and line plots.
line_size	Width of lines used in lollipop and line plots.
cluster_rows	Logical. Should factors be hierarchically clustered in cluster plots?
cluster_cols	Logical. Should ranks be hierarchically clustered?
distance	Distance measure used for hierarchical clustering.
clustering_method	Method used for hierarchical clustering.
scale	Should heatmap data be scaled by rows, columns, or not scaled? Options are "none", "row", or "column".
show_numbers	Logical. Should matrix values be displayed inside heatmap cells?
...	Additional arguments passed to <code>pheatmap::pheatmap</code> .

Value

For "bar", "lollipop", "dot", and "line" plots, a ggplot object. For "heatmap", "cluster", and "contribution" plots, a pheatmap object returned invisibly. The returned object contains the graphical representation of the Garrett ranking results.

Examples

```
data(garrett_example)
result <- garrett_rank(garrett_example, respondent = "Respondent")
#Select the plot type
plot(result, type = "bar")
plot(result, type = "lollipop")
plot(result, type = "dot")
plot(result, type = "line")
plot(result, type = "heatmap")
plot(result, type = "cluster")
plot(result, type = "contribution")
plot(result, type = "cluster", k = 3)
plot(result, type = "cluster", scale = "row", show_numbers = TRUE)
```

Index

* **datasets**

garrett_example, [2](#)

garrett_example, [2](#)

garrett_rank, [3](#), [7](#)

garrett_table, [5](#)

kendall_w, [5](#)

plot.garrett, [6](#)