Package 'HighestMedianRules'

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Type Package

Title Implementation of Voting Rules Electing the Candidate with
Highest Median Grade

Version 1.0

Description Computes the scores and ranks candidates according to voting rules electing the highest median grade.
Based on ``Tie-breaking the highest median: alternatives to the majority judgment", A. Fabre, Social Choice & Welfare (forthcoming as of 2020). The paper is available here: <https://github.com/bixiou/highest_median/raw/master/Tie-breaking%20Highest%20Median%20-%20Fabre%202019.pdf>.
Functions to plot the voting profiles can be found on github: <https://github.com/bixiou/highest_median/blob/master/packages_functions_data.R>.

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aggregate_scores *Aggregate scores*

Description

Aggregator of scores: returns a vector with the score of each row (i.e. candidate) in a matrix (i.e. the voting profile). See function 'score'.

Usage

```
aggregate_scores(
  grades,
  rule = "mj",
  k = 0.5,
  scale = c(),
  names = row.names(grades),
  print = FALSE,
  return_text = FALSE,
  rounds = 3
)
```

Arguments

grades	A voting profile, i.e. a matrix with the shares of grades of each candidate on each row, from the lowest grade to the highest.
rule	The voting rule to be used. Default to 'mj'. Possible values: 'mj' (majority judgment), 'd' (difference), 's' (relative share), 'n' (normalized difference), 'mean' (range voting). For more details, see "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
k	The quantile used to compute the gauge. Default to 0.5 (the median). For more details, see paragraph Extensions in 3.2.1 of "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
scale	A numeric vector containing the values of the scale of grades. Default to c((floor(-length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).
names	String vector, each string to be printed along the gauges in case print = TRUE and return_text = FALSE. Defaults to "".
print	Prints the gauges and the argument 'names'. Default to FALSE
return_text	Prints the gauges. Defaults to FALSE.
rounds	Number of rounding digits. Default to 3.

Value

A double vector or a character vector. The scores (double) if return_text = FALSE, the gauges (character) otherwise.

Examples

```
aggregate_scores(elec2012, rule='d', scale=-2:4)
```

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elec2012	*Example voting profile*

Description

Matrix containing the shares of grades (in -2:4) of candidates on each row. Taken from Balinski & Laraki (2016), "Majority Judgment vs Majority Rule" p. 14. Grades given by a non-representative sample of 737 voters for the 2012 French presidential election.

Usage

```
elec2012
```

Format

An object of class matrix with 10 rows and 7 columns.

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gauge	*Gauge*

Description

This function returns a custom description of the grades of a candidate in terms of the shares of proponents (p), opponents (q), median grades (g), and the gauge (i.e. the median grade followed by + or -, a + corresponding to a larger share of proponents than opponents).

Usage

```
gauge(grades, k = 0.5, scale = c(), return = "qp")
```

Arguments

grades	A numeric vector containing the shares of each grades of a candidate, from the lowest grade to the highest.
k	The quantile used to compute the gauge. Default to 0.5 (the median). For more details, see paragraph Extensions in 3.2.1 of "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
scale	A numeric vector containing the values of the scale of grades. Default to c((floor(-length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).
return	A string containing the information to return. Default to 'qp' (shares of opponents and proponents). Possible values: 'g', 'p', 'q', 'pq', 'qp', 'qpg', 'pqg', 'gpq', 'gqp', 'text' (i.e. the gauge), 'all'. If the string does not match one of the above, 'all' is returned.

Value

A double, a character vector or a double vector. Depending on what is passed in `return`.

Examples

```
gauge(elec2012['Hollande',], return = 'gqp')
```

---

gauges   *Gauges*

Description

Aggregator of 'gauge': returns the gauge of each row (i.e. candidate) from a matrix (i.e. the voting profile). See function 'gauge'.

Usage

```
gauges(grades, k = 0.5, scale = c(), return = "qp")
```

Arguments

grades   A numeric vector containing the shares of each grades of a candidate, from the
              lowest grade to the highest.

k   The quantile used to compute the gauge. Default to 0.5 (the median). For more
              details, see paragraph Extensions in 3.2.1 of "Tie-Breaking the Highest Me-
              dian", Fabre, Social Choice & Welfare (forthcoming).

scale   A numeric vector containing the values of the scale of grades. Default to c((floor(-
              length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).

return   A string containing the information to return. Default to 'qp' (shares of oppo-
              nents and proponents). Possible values: 'g', 'p', 'q', 'pq', 'qp', 'qpg', 'pqg',
              'gpq', 'gqp', 'text' (i.e. the gauge), 'all'. If the string does not match one of the
              above, 'all' is returned.

Value

An array with as many columns as elements of `grades`, with the return of gauge in each column.

Examples

```
gauges(grades = elec2012, return = 'gqp')
```

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ranking   *Ranking*

Description

Returns a matrix with the scores of candidates sorted in decreasing order, for a given voting rule.

Usage

```
ranking(
  grades,
  rule = "mj",
  k = 0.5,
  scale = c(),
  names = row.names(grades),
  print = FALSE
)
```

Arguments

grades	A voting profile, i.e. a matrix with the shares of grades of each candidate on each row, from the lowest grade to the highest.
rule	The voting rule to be used. Default to 'mj'. Possible values: 'mj' (majority judgment), 'd' (difference), 's' (relative share), 'n' (normalized difference), 'mean' (range voting). For more details, see "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
k	The quantile used to compute the gauge. Default to 0.5 (the median). For more details, see paragraph Extensions in 3.2.1 of "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
scale	A numeric vector containing the values of the scale of grades. Default to c((floor(-length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).
names	String vector, each string to be printed in case print = TRUE. Defaults to c().
print	Prints the argument 'names'. Default to FALSE

Value

A character matrix with as many rows as elements of grades, and with the name, gauge and score (according to rule) on each row.

Examples

```
ranking(elec2012, rule='d', scale=-2:4)
```

---

rankings   *Rankings*

Description

Returns a matrix with the scores of candidates sorted in decreasing order of score mj, for the five following voting rules (with k=0.5): mj, d, s, n, mean. See function 'score' for more details.

Usage

```
rankings(
  grades,
  scale = c(),
  names = row.names(grades),
  return_distance = FALSE,
  rounds = TRUE
)
```

Arguments

grades	A voting profile, i.e. a matrix with the shares of grades of each candidate on each row, from the lowest grade to the highest.
scale	A numeric vector containing the values of the scale of grades. Default to c((floor(-length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).
names	String vector, each string to be printed in case print = TRUE. Defaults to c().
return_distance	
	If TRUE, returns the Kendall distance between the rules (using AllKendall) instead of the matrix of scores. Default to FALSE.
rounds	If TRUE, rounds the scores (to 3 digits for highest median rules and 2 digits for range voting). Default to TRUE.

Value

A character matrix with as many rows as elements of grades, and with the name, gauge and scores (according to five different rules) on each row.

Examples

```
rankings(elec2012, scale=-2:4)
```

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score *Score*

Description

This function returns the score of a candidate, using a custom voting rule.

Usage

```
score(
  rule = "mj",
  grades = elec2012["Hollande", ],
  k = 0.5,
  scale = c(),
  name = "",
  print = TRUE,
  return_text = FALSE
)
```

Arguments

rule	The voting rule to be used. Default to 'mj'. Possible values: 'mj' (majority judgment), 'd' (difference), 's' (relative share), 'n' (normalized difference), 'mean' (range voting). For more details, see "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
grades	A numeric vector containing the shares of each grades of a candidate, from the lowest grade to the highest.
k	The quantile used to compute the gauge. Default to 0.5 (the median). For more details, see paragraph Extensions in 3.2.1 of "Tie-Breaking the Highest Median", Fabre, Social Choice & Welfare (forthcoming).
scale	A numeric vector containing the values of the scale of grades. Default to c((floor(-length(grades)/2)+1):(length(grades)+floor(-length(grades)/2))).
name	Text to be printed along the gauge in case print = TRUE and return_text = FALSE. Defaults to "".
print	Prints the gauge and the argument 'name'. Default to TRUE.
return_text	Prints the gauge. Defaults to FALSE. The gauge is less informative than the score, it is the median grade and + if there are grades higher than the median than lower, - otherwise.

Value

A double or a character. The score (a double) if `return_text` = `FALSE`, the gauge (a character) otherwise.

Examples

```
score(rule='d', elec2012['Hollande',], scale=-2:4, name="Hollande")
```

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