Package 'div'

October 13, 2022

Type Package

Title Report on Diversity and Inclusion in a Corporate Setting

Version 0.3.1

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License AGPL (>= 3)

URL <http://www.de-brouwer.com/div/>

BugReports <https://github.com/DrPhilippeDB/div/issues/>

Description Facilitate the analysis of teams in a corporate setting:
assess the diversity per grade and job, present the results,
search for bias (in hiring and/or promoting processes).
It also provides methods to simulate the effect of bias, random team-data, etc.
White paper: 'Philippe J.S. De Brouwer' (2021) <[http:
//www.de-brouwer.com/assets/div/div-white-paper.pdf](http://www.de-brouwer.com/assets/div/div-white-paper.pdf)>.
Book (chapter 36): 'Philippe J.S. De Brouwer' (2020, ISBN:978-1-119-63272-
6) and 'Philippe J.S. De Brouwer' (2020) <[doi:10.1002/9781119632757](https://doi.org/10.1002/9781119632757)>.

Encoding UTF-8

Collate 'headers.R' 'diversity.R' 'div_conf_colour.R'
'div_fake_team.R' 'div_ci_median.R' 'div_paygap.R'
'div_parse_paygap.R' 'div_round_paygap.R' 'div_gauge_plot.R'
'div_plot_paygap_distribution.R' 'div_add_median_label.R'
'print.paygap.R' 'summary.paygap.R'

Depends R (>= 3.4.0), tidyverse

Imports rlang, dplyr, tibble, tidyr, stringr, magrittr, ggplot2,
gridExtra, plotly, pryr, rpart, kableExtra

Suggests flexdashboard, knitr, rmarkdown, grid, lattice

RoxygenNote 7.1.1

NeedsCompilation no

Repository CRAN

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Date/Publication 2021-05-06 08:00:02 UTC

R topics documented:

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diversity	*Calculate the diversity index*

Description

This function calculates the entropy of a system with discrete states

Usage

```
diversity(x, prior = NULL)
```

Arguments

x	numeric vector, observed probabilities of the classes
prior	numeric vector, the prior probabilities of the classes

Value

the entropy or diversity measure

Examples

```
x <- c(0.4, 0.6)
diversity(x)
```

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div_add_median_label	*Adds a column with new labels (H)igh and (L) for a given colName (within a given grade and jobID)*

Description

This function calculates the entropy of a system with discrete states

Usage

```
div_add_median_label(
  d,
  colName = "age",
  value1 = "T",
  value2 = "F",
  newColName = "isYoung"
)
```

Arguments

d	tibble, a tibble with team data columns as defined in the documentation (at least the column colName (as set by next parameter), 'grade', and 'jobID')
colName	the name of the columns that contains the factor object to be used as explaining dimension for the paygap (defaults to 'gender')
value1	character, the label to be used for the first half of observations (the smallest ones)
value2	character, the label to be used for the second half of observations (the biggest ones)
newColName	the value in new column name that will hold the values value1 and value2

Value

dataframe (with columns grade, jobID, salary_selectedValue, salary_others, n_selectedValue, n_others, paygap, confidence) , where "confidence" is one of the following: NA = not available (numbers are too low), "" = no bias detectable, "." = there might be some bias, but we're not sure, "*" = bias detected wit some degree of confidence, "**" = quite sure there is bias, "***" = trust us, this is biased.

Examples

```
df <- div_add_median_label(div_fake_team())
colnames(df)
```

| `div_ci_median` | *Function to calculate the confidence interval for the median* |

Description

Function to calculate the confidence interval for the median

Usage

```
div_ci_median(x, conf = 0.95)
```

Arguments

x	numeric, data from which the median is calcualted
conf	numeric, the confidence interval as 1 - P(x < x0)

Value

ci (confidence interval object)

Examples

```
x <- 1:100
div_ci_median(x)
```

| `div_conf_colour` | *return a colour code given a number of stars for the confidence level of bias* |

Description

This function returns a colour (R named colour) based on the confidence level

Usage

```
div_conf_colour(x)
```

Arguments

x	the string associated to the paygap confidence: NA, ", ',', '*', '***', '***'

Value

string (named colour)

Examples

```
div_conf_colour("*")
```

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div_fake_team   *Generate randomly team-data*

Description

This function generates a data frame with data for a team (with salaries, gender, FTE, etc). This is a good start to test the package and to experiment what level of bias will be visible in the paygap for example.

Usage

```
div_fake_team(
  seed = 100,
  N = 200,
  genders = c("F", "M", "O"),
  gender_prob = c(0.4, 0.58, 0.02),
  gender_salaryBias = c(1, 1.1, 1),
  jobIDs = c("sales", "analytics"),
  jobID_prob = c(0.6, 0.4),
  citizenships = c("Polish", "German", "Italian", "Indian", "Other"),
  citizenship_prob = c(0.6, 0.2, 0.1, 0.05, 0.05)
)
```

Arguments

seed	numeric, the seed to be used in set.seed()
N	numeric, the size of the team to be used (default = 200)
genders	character, a vector of the genders to be used
gender_prob	numeric, relative probabilities of the different genders to occur (must have the same length as 'genders')
gender_salaryBias	
	numeric, vector with the relative salaries of the different genders (must have the same length as 'genders')
jobIDs	character, a vector with the labels of the job categories in the team (they will appear in each grade)
jobID_prob	numeric, a vector with the relative sizes of the different jobs in the team (must have the same length as 'jobIDs')
citizenships	character, a vector of the citizenships to be generated
citizenship_prob	
	numeric, relative probabilities of the different citizenships to occur (must have the same length as 'citizenships')

Value

dataframe (employees of the random team)

Examples

```
library(div)
d <- div_fake_team()
head(d)
diversity(table(d$gender))
```

---

div_gauge_plot   *Uses ggplot2 to produce a gauge plot in RAG colour*

Description

This function produces one or more gauge plots coloured in red (R), amber (A) or green (G) for a
value between 0 and 1.

Usage

```
div_gauge_plot(df, breaks = c(0, 0.8, 0.95, 1), ncol = NULL, nbrSize = 6)
```

Arguments

df	tibble, a tibble with columns "value" and "label" (value = the values between 0 and 1; - label = text to show e.g. paste("group", colnames(t)))
breaks	numeric vector with the lower limit, the border between green and amber, the border between amber and red, and the upper limit
ncol	numeric, the number of columns to produce
nbrSize	numeric, the font size for the label

Value

ggplot object

Examples

```
d <- div_fake_team()
tbl_gender_div <- table(d$gender, d$grade) %>%
   apply(2, diversity, prior = c(50.2, 49.8)) %>%
   tibble(value = ., label = paste("Grade", names(.)))
div_gauge_plot(tbl_gender_div, ncol = 2, nbrSize = 4)
```

---

div_parse_paygap   *Prepare the paygap matrix to be published in LaTeX*

Description

This function formats the paygap matrix (created by div_paygap()) and prepares it for printing via the function knitr::kable()

Usage

```
div_parse_paygap(
  pg,
  label = NULL,
  min_nbr_show = NULL,
  max_length_jobID = 12,
  max_length_colnames = 9
)
```

Arguments

pg	paygap object as created by div::div_paygap(). This is an S3 object with a specific structure
label	character, the label to be used in the caption of the kable object
min_nbr_show	numeric, if provided then only groups that have more than min_nbr_show employees in both categories (selectedValue and others) will be shown
max_length_jobID	
	numeric, if provided the maximal length of the column jobID (in characters)
max_length_colnames	
	numeric, if provided the maximal length of the column names (in characters)

Value

knitr::kable object (for LaTeX)

Examples

```
d  <- div_fake_team()
pg <- div_paygap(d)
div_parse_paygap(pg)
```

---

div_paygap   *Function to calculate the paygap as a ratio.*

Description

This function calculates the entropy of a system with discrete states

Usage

```
div_paygap(d, x = "gender", y = "salary", x_ctrl = "F", ctrl_var = "age")
```

Arguments

d	tibble, a tibble with columns as definded
x	the name of the columns that contains the factor object to be used as explaining dimension for the paygap (defaults to 'gender')
y	the name of the columns that contains the numeric value to be used to calculate the paygap (could be salary or bonus for example)
x_ctrl	the value in the column defined by x that should be isolated (this versus the others), defaults to 'F'
ctrl_var	a control variable to be added (shows median per group for that variable)

Value

dataframe (with columns grade, jobID, salary_x_ctrl, salary_others, n_x_ctrl, n_others, paygap, confidence) , where "confidence" is one of the following: NA = not available (numbers are too low), "" = no bias detectable, "." = there might be some bias, but we're not sure, "*" = bias detected wit some degree of confidence, "**" = quite sure there is bias, "***" = trust us, this is biased.

Examples

```
df <- div_paygap(div_fake_team())
df
```

---

div_plot_paygap_distribution
                         Produce a histogram and normal distribution

---

Description

Plots a histogram, a normal distribution with the same standard deviation and mean as well as one with a mean centred around 1

Usage

```
div_plot_paygap_distribution(x, label = "Gender", mu_unbiased = 1)
```

Arguments

x	numeric vector, column of paygap observations
label	character, prefix for the title
mu_unbiased	numeric, the mean of the unbiased distribution (for paygaps this should be 1)

Value

ggplot2 object

Examples

```
d <- div_fake_team()
pg <- div_paygap(d)
div_plot_paygap_distribution(pg$data$paygap)
```

---

div_round_paygap   *Rounds all numbers in the paygap data-frame*

Description

This function all numbers to zero decimals, except the paygap (which is rounded to 2 decimals):

Usage

```
div_round_paygap(x)
```

Arguments

x	paygap object (output of div::div_paygap())

Value

the paygap data-frame (tibble only, not the whole paygap object)

Examples

```
d <- div_fake_team()
pg <- div_paygap(d)
div_round_paygap(pg)
```

---

print.paygap   *print the paygap object in the terminal*

Description

print the paygap object in the terminal

Usage

```
## S3 method for class 'paygap'
print(x, ...)
```

Arguments

x	paygap object, as created by the function div_paygpa()
...	arguments passed on to the generic print function: print(x$data)

Value

text output

Examples

```
library(div)
div_fake_team() %>%
  div_paygap    %>%
  print
```

---

summary.paygap   *Title*

Description

Title

Usage

```
## S3 method for class 'paygap'
summary(object, ...)
```

Arguments

object	paygap S3 object, as created by the function dif_paygap()
...	passed on to summary()

Value

a summary of the paygap object

Examples

```
library(div)
d <- div_fake_team()
pg <- div_paygap(d)
summary(pg)
```

Index