Package 'callback'

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Type Package

Title Computes Statistics from Discrimination Experimental Data

Version 0.1.0

Description In discrimination experiments candidates are sent on the same test (e.g. job, house rental) and one examines whether they receive the same outcome. The number of non negative answers are first examined in details looking for outcome differences. Then various answering rates and their exacts confidence intervals are computed. Last, exact and asymptotic discrimination tests are performed (Student, binomial).

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Encoding UTF-8

LazyData true

RoxygenNote 7.3.1

Imports stats, utils

BuildVignettes true

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

`callback` *Data formatting*

Description

Creates the data set used in the callback package.

Usage

```
callback(data, cluster, candid, callback, comp = "ref")
```

Arguments

`data`	A data frame.
`cluster`	A variable name, identifying the test (e.g. a job offer number).
`candid`	A list of factor names defining the candidates (e.g., gender, origin).
`callback`	A Boolean variable, equal to TRUE for non negative callbacks.
`comp`	An option, equal to "all" or "ref" (the default). "ref" give the comparisons with the reference candidate, and "all" the pairwise comparisons.

Value

A 'callback' object containing the formatted data sets (`fds`), the list of the paired formatted data sets (`pfds`), the list of the clusters retained in the paired formatted data sets (`cfds`), the names of the candidate variables (`candid`) and the name of the callback variable (`callback`). `fds` contains the following variables:

cluster	the cluster variable.
candid	the concatenation of the candidate variables.
callback	the callback variables.

pfds data frames containing the following variables:

callback1	TRUE if candidate 1 had a callback.
callback2	TRUE if candidate 2 had a callback.
c00	TRUE if neither candidate was called back.
c10	TRUE if candidate 1 was the only one called back.
c01	TRUE if candidate 2 was the only one called back.
c11	TRUE if both candidates were called back.
callback	TRUE if either candidate was called back.
calldif	callback difference (callback1-callback2).

cfds data frames containing the cluster variable.

Examples

```
data(inter1)
callback(data=inter1,cluster="offer",candid=c("gender","origin"), callback="callback",comp = "ref")
```

---

gender1 *Gender/Maternity discrimination (commercial and administrative jobs in the financial sector)*

Description

The data were collected in January-March 2002 by Pascale Petit for her PhD thesis.

offer	add number
gender	Woman or Man
age	25 or 37 years old
child	number of children, 0 or 3
educ	education, BAC = Baccalauréat = A-level, BTS = 2 years of vocational training after the A-level
qual	qualification required by the offer, Administrative or Commercial
date	January 2002, February 2002 or March 2002
cv	CV template, A or B
cont	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endin
popp	promotion opportunity, Yes or No
train	training included, Yes or No
negow	negotiable wage, Yes or No
incent	wage depending on output, Yes or No
callback	TRUE if there was a non negative callback

Usage

```
data(gender1)
```

Format

A data frame with 942 rows and 14 variables

References

Duguet E., Petit P., 2005. Hiring discrimination in the French financial sector: an econometric analysis on field experiment data. Annals of Economics and Statistics, 78: 79-102.

Petit P., 2007. The effects of age and family constraints on gender hiring discrimination: A field experiment in the French financial sector. Labor Economics, 14: 371-391.

`inter1` *Gender/Origin discrimination (software developer)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between February and April 2009

`offer`	add number
`fname`	first name (forename)
`lname`	last name (family name, surname)
`gender`	Woman or Man
`origin`	all candidates are French, the origin is suggested by the name. F = French, S = Senegal, M = Morocco, V = Viet
`date`	date of the application
`sentorder`	order in which the application was sent
`callback`	TRUE if there was a non negative callback
`ansorder`	order in which the answer was received when positive, 9 otherwise
`cont`	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endi
`paris`	job located inside Paris, Yes or No

Usage

```
data(inter1)
```

Format

A data frame with 2480 rows and 11 variables

References

Petit P., Duguet E., L'Horty Y., Du Parquet L., Sari F., 2013. Discrimination à l'embauche : les effets du genre et de l'origine se cumulent-ils systématiquement ? Economie et Statistique, 464-465-466: 141-153.

Duguet E., Du Parquet L, L'Horty Y., Petit P., 2015. New Evidence of Ethnic and Gender discriminations in the French Labor Market using experimental data: A ranking extension of responses from correspondence tests. Annals of Economics and Statistics, 117-118: 21-39.

`labour1` *Labour market history discrimination (accountants)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between February and April 2015

`offer`	add number
`date`	date of the application
`sentorder`	order in which the application was sent
`callback`	TRUE if there was a non negative callback
`cont`	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endi
`paris`	job located inside Paris, Yes or No
`hist`	history in the labour market, LTC = Long term contract, LTU = Long term unemployment, STU = Short term un

Usage

```
data(labour1)
```

Format

A data frame with 1475 rows and 7 variables

References

Duguet E., Le Gall R., L'Horty Y., Petit P., 2018. How does labour market history influence the access to hiring interviews? International Journal of Manpower, 39(4), 519-533.

`labour2` *Labour market history discrimination (sales assistant)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between January and April 2015

`offer`	add number
`date`	date of the application
`sentorder`	order in which the application was sent
`callback`	TRUE if there was a non negative callback
`cont`	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endi

paris	job located inside Paris, Yes or No
hist	history in the labour market, LTC = Long term contract, LTU = Long term unemployment, STU = Short term un

Usage

```
data(labour2)
```

Format

A data frame with 1470 rows and 7 variables

References

Duguet E., Le Gall R., L'Horty Y., Petit P., 2018. How does labour market history influence the access to hiring interviews? International Journal of Manpower, 39(4), 519-533.

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media1 *Origin/Gender discrimination and strongly negative mediatic exposure (information technologist)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between December 2008 and January 2009

offer	add number
date	date of the application
sentorder	order in which the application was sent
callback	TRUE if there was a non negative callback
fname	first name (forename)
lname	last name (family name, surname)
origin	all the candidates are French, the origin is suggested by the name, F = France, M = Morocco
gender	Woman or Man
city	candidate location
reput	reputation of the city, P = privileged, U = Unprivileged
mediaexp	strong negative mediatic exposure, Yes or No

Usage

```
data(media1)
```

Format

A data frame with 3684 rows and 11 variables

References

Duguet E., Gray D., L'Horty Y., Du Parquet L, Petit P., 2020. Labor market effects of urban riots: an experimental assessment. Papers in Regional Science, 99:787-806.

`mobility1` *Gender discrimination and mobility (management controller)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between October 2008 and March 2009

`offer`	add number
`date`	date of the application
`sentorder`	order in which the application was sent
`callback`	TRUE if there was a non negative callback
`ansorder`	order in which the answer was received when positive, 5 otherwise
`fname`	first name (forename)
`lname`	last name (family name, surname)
`gender`	Woman or Man
`licenses`	both moto and car licenses, Yes or No
`cont`	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endi
`paris`	job located inside Paris, Yes or No
`cv`	CV template, A or B

Usage

```
data(mobility1)
```

Format

A data frame with 1200 rows and 12 variables

References

Duguet E., du Parquet L., L'Horty Y., Petit P., 2018. Counterproductive hiring discrimination against women: evidence from a French correspondence test. International Journal of Manpower, 39(1): 37-50.

`origin1` *Origin discrimination (accountants)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between September and November 2006

offer	add number
date	September 2006, October 2006 or November 2006
callback	TRUE if there was a non negative callback
fname	first name (forename)
lname	last name (family name, surname)
educ	education, BAC = Baccalauréat = A-level, BTS = 2 years of vocational training after the A-level
cartime	commuting time by car (minutes)
cont	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endin
paris	job located inside Paris, Yes or No
nation	nationality, M = Moroccan, F = French
fnation	first name sounding, M = Moroccan, F = French
lnation	last name sounding, M = Moroccan, F = French
origin	summary variable made from Nation, Lnation and Fnation. Example: FMF = French nationality, Moroccan famil
city	candidate location
reput	reputation of the city, P = privileged, U = Unprivileged
cv	CV template, A or B
natemp	add obtained from the national employment agency (ANPE at the time of the test, France Travail today)
subsid	the firm is a subsidiary of a large corporation, Yes or No
ansmode	answering channel, email or ordinary mail for all the applications to the same add. M = email, P = postage prepai
email	answered by email by all the candidates, 1 = yes, 0 = No

Usage

```
data(origin1)
```

Format

A data frame with 1097 rows and 20 variables

References

Duguet E., Leandri N., L'Horty Y., Petit P., 2010. Are young French jobseekers of ethnic immigrant origin discriminated against? A controlled experiment in the Paris area. Annals of Economics and Statistics, 99-100: 187-215.

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origin2 *Origin discrimination (waiters)*

Description

The data were collected by the TEPP team (FR CNRS 2042) between September and November 2006

offer	add number
date	September 2006, October 2006 or November 2006
callback	TRUE if there was a non negative callback
fname	first name (forename)
lname	last name (family name, surname)
educ	education, BAC = Baccalauréat = A-level, BTS = 2 years of vocational training after the A-level
cartime	commuting time by car (minutes)
cont	length of labour contract, STC = short term contract (<=1 year), LTC = long term contract (>1 year with no endin
paris	job located inside Paris, Yes or No
nation	nationality, M = Moroccan, F = French
fnation	first name sounding, M = Moroccan, F = French
lnation	last name sounding, M = Moroccan, F = French
origin	summary variable made from Nation, Lnation and Fnation. Example: FMF = French nationality, Moroccan famil
city	candidate location
reput	reputation of the city, P = privileged, U = Unprivileged
cv	CV template, A or B
natemp	add obtained from the national employment agency (ANPE at the time of the test, France Travail today)
subsid	the firm is a subsidiary of a large corporation, Yes or No
ansmode	answering channel, email or ordinary mail for all the applications to the same add. M = email, P = postage prepai
email	answered by email by all the candidates, 1 = yes, 0 = No

Usage

```
data(origin2)
```

Format

A data frame with 936 rows and 20 variables

References

Petit P., Duguet E., L'Horty Y., 2015. Discrimination résidentielle et origine ethnique: une étude expérimentale sur les serveurs en Ile de France. Economie et Prevision, 206-207: 55-69.

---

print.callback *Prints the structure of the experiment*

Description

Computes the number of tests available for each pair of candidates

Usage

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

Arguments

x	A stat_count object.
...	further arguments passed to or from other methods.

Value

Printed output.

Examples

```
data(labour1)
x <- callback(data=labour1,cluster="offer",candid="hist",callback="callback",
comp = "all")
print(x)
```

---

print.stat_comp *Print the callback comparison statistics*

Description

Print the results of the the Student and binomial tests of equality between the callback rates.

Usage

```
## S3 method for class 'stat_comp'
print(x, digits = 5, ...)
```

Arguments

x	A stat_comp object.
digits	minimal number of significant digits.
...	further arguments passed to or from other methods.

Value

Printed output.

Examples

```
data(labour1)
print(stat_comp(callback(data=labour1, cluster="offer",candid="hist",
callback="callback", comp = "all")))
```

print.stat_count *Print the callback counts analysis*

Description

Computes the callback numbers for each candidate.

Usage

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

Arguments

x	A stat_count object.
...	further arguments passed to or from other methods.

Value

Printed output.

Examples

```
data(labour1)
print(stat_count(callback(labour1, "offer", "hist", "callback",
comp = "all")))
```

print.stat_prop *Print the callback proportions analysis*

Description

Computes the callbacks rates for each candidate, with their confidence intervals.

Usage

```
## S3 method for class 'stat_prop'
print(x, digits = 3, ...)
```

Arguments

x	A stat_prop object.
digits	minimal number of significant digits.
...	further arguments passed to or from other methods.

Value

Printed output.

Examples

```
data(labour1)
x <- callback(labour1, "offer", "hist", "callback", comp = "all")
print(stat_prop(x,level=0.99))
```

`stat_comp` *Comparison statistics on matched data*

Description

Comparison statistics on matched data

Usage

```
stat_comp(x)
```

Arguments

`x`	A `callback` object.

Value

A `stat_comp` objects including two data frames. The first data frame is `Student` and includes the following variables:

`p_callback1-p_callback2`	callback rates difference
`Student`	Student statistics for `dif(cand1-cand2)`
`p_value`	p-value for `Student`

The second data frame is `binom` and includes the following variables:

`r_cand1`	proportion of callbacks received by the 1st candidate
`r_dif`	`r_cand-0.5`
`r_pvalue`	p-value of the binomial test `r_cand1=0.5`

Examples

```
data(labour1)
x <- callback(data=labour1,cluster="offer",candid="hist",callback="callback")
stat_comp(x)
```

stat_count *Callback counts on paired data*

Description

Computes the callback count statistics from the paired data sets.

Usage

```
stat_count(x)
```

Arguments

x	A callback object.

Value

A data frame containing the following variables:

callback1	number of callbacks for candidate 1
callback2	number of callbacks for candidate 2
c00	number of test without a callback
c10	number of tests with callbacks for candidate 1 only
c01	number of tests with callbacks for candidate 2 only
c11	number of tests with callbacks for both candidates
callback	number of tests with at least one callback for either candidate
calldif	difference in callback numbers (callback1-callback2)

Examples

```
data(labour2)
x <- callback(data=labour2,cluster="offer",candid="hist",callback="callback")
stat_count(x)
```

stat_prop *Callback rates on paired data*

Description

Computes the callback rates and their confidence intervals.

Usage

```
stat_prop(x, level = 0.95)
```

Arguments

x	A callback object.
level	A number, containing the level of the confidence intervals (0.95 by default).

Value

A data frame containing the following components (p refers to a proportion of tests, r refers to a proportion of callbacks):

tests	number of tests
Lxx_p_callback	overall callback rate, lower bound
p_callback	overall callback rate
Uxx_p_callback	overall callback rate, upper bound
Lxx_p_cand1	1st candidate callback rate, lower bound
p_cand1	1st candidate callback rate
Uxx_p_cand1	1st candidate callback rate, upper bound
Lxx_p_cand2	2nd candidate callback rate, lower bound
p_cand2	2nd candidate callback rate
Uxx_p_cand2	2nd candidate callback rate, upper bound
callback	number of callbacks
Lxx_r_cand1	1st candidate proportion of callbacks, lower bound
r_cand1	1st candidate proportion of callbacks
Uxx_r_cand1	1st candidate proportion of callbacks, upper bound
Lxx_r_cand2	2nd candidate proportion of callbacks, lower bound
r_cand2	2nd candidate proportion of callbacks
Uxx_r_cand2	2nd candidate proportion of callbacks, upper bound

Examples

```
data(labour1)
x <- callback(data=labour1,cluster="offer",candid="hist",callback="callback")
stat_prop(x,level=0.99)
```

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