

Package ‘Families’

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Type Package

Title Construct Family Relationships in a Virtual Population Produced
by VirtualPop Package

Version 1.0

Imports msm

Suggests knitr, rmarkdown, ggplot2, lubridate, xml2

BuildResaveData best

VignetteBuilder knitr

LazyData true

Date 2022-06-05

Author Frans Willekens

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Description Tools to study grandparenthood, double burden (presence of children and oldest old parents), and kinship networks in virtual population produced by VirtualPop.

License GPL-2

NeedsCompilation no

Encoding UTF-8

RoxygenNote 7.1.2

Depends R (>= 3.5.0)

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Families-package	<i>Construct Family Relationships in a Virtual Population Produced by VirtualPop Package</i>
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Description

Tools to study grandparenthood, double burden (presence of children and oldest old parents), and kinship networks in virtual population produced by VirtualPop.

Details

The DESCRIPTION file:

```

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Version:      1.0
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Suggests:     knitr, rmarkdown, ggplot2, lubridate, xml2
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Date:         2022-06-05
Author:       Frans Willekens
Maintainer:   Frans Willekens <willekens@nidi.nl>
Description:  Tools to study grandparenthood, double burden (presence of children and oldest old parents), and ki
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```

Index of help topics:

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Dd	Retrieves the date(s) of death in decimal format
Families-package	Construct Family Relationships in a Virtual Population Produced by VirtualPop Package
IDch	Retrieves ID of children of ego
IDfather	Retrieves ID of father of ego
IDgch	Retrieves IDs of granchildren of ego
IDmother	Retrieves ID of mother of ego
IDpartner	Retrieves ID of partner of ego or allocate partner to ego
MSLT_S	Multistate life table: survival function
MSLT_e	Multistate life table: exposure function
Multistate	Computes fertility table by birth order

	(multistate life table)
dataLH	dataLH data
e0	Mean ages at death and probabilities of surviving to selected ages, by sex
rates	rates data

Author(s)

Frans Willekens <Willekens@nidi.nl>

dataLH

*dataLH data***Description**

simulated population of four generations

Usage

data(dataLH)

Format

A data frame with data on 1000 individuals.

ID Identification number

gen Generation

sex Sex. A factor with levels Males Females

bdated Date of birth (decimal date)

ddated Date of death (decimal date)

x_D Age at death (decimal number)

IDpartner ID of partner

IDmother ID of mother

IDfather ID of father

jch Child's line number in the household

nch Number of children ever born

id.1 ID of first child

id.2 ID of 2nd child

id.3 ID of 3rd child

id.4 ID of 4th child

id.5 ID of 5th child

id.6 ID of 6th child

id.7 ID of 7th child

id.8 ID of 8th child

id.9 ID of 9th child

age.1 Age of mother at birth of first child

age.2 Age of mother at birth of 2nd child
 age.3 Age of mother at birth of 3rd child
 age.4 Age of mother at birth of 4th child
 age.5 Age of mother at birth of 5th child
 age.6 Age of mother at birth of 6th child
 age.7 Age of mother at birth of 7th child
 age.8 Age of mother at birth of 8th child
 age.9 Age of mother at birth of 9th child

Source

Simulation uses period mortality rates and fertility rates by birth order from the United States 2019. The data are downloaded from the Human Mortality Database (HMD) and the Human Fertility Database (HFD).

Db	<i>Retrieves the date(s) of birth in decimal format</i>
----	---

Description

Retrieves the date(s) of birth from the database

Usage

```
Db(id, dataLH)
```

Arguments

id	vector of IDs of egos
dataLH	Name of database. If absent, the name 'dataLH' is used.

Value

Returns the dates of birth

Author(s)

Frans Willekens

Examples

```
# Date of birth of first individual in database
data(dataLH)
Db(1,dataLH)
```

Dd	<i>Retrieves the date(s) of death in decimal format</i>
----	---

Description

Retrieves the date(s) of death from the database

Usage

```
Dd(id, dataLH)
```

Arguments

id	vector of IDs of egos
dataLH	Name of database. If absent, the name 'dataLH' is used

Value

Returns the date of death

Author(s)

Frans Willekens

Examples

```
# Date of death of first individual in database
data(dataLH)
Dd(1,dataLH)
```

e0	<i>Mean ages at death and probabilities of surviving to selected ages, by sex</i>
----	---

Description

Computes (a) Life expectancy at birth, (b) Probability of surviving at age 65, and (c) Probability of surviving at age 85

Usage

```
e0(dataLH)
```

Arguments

dataLH	The name of the database. If omitted, the name 'dataLH' is used.
--------	--

Value

e0	Mean ages at death
Prob65	Probability of surviving at age 65
Prob85	Probability of surviving at age 85

Author(s)

Frans Willekens

Examples

```
data(dataLH)
e0(dataLH)
```

IDch	<i>Retrieves ID of children of ego</i>
------	--

Description

Retrieves ID of children of ego or children of vector of egos

Usage

```
IDch(id, dataLH, keep_ego = FALSE)
```

Arguments

id	ID of ego(s)
dataLH	Database.
keep_ego	Option to link show ID of ego together with ID of mother

Value

ID of children or (if keep_ego=TRUE, data frame with ID of ego and ID of children). If ego has no children or IDs of children are not included in database, numeric(0) is returned and the message "No (grand)children of ego in database". If keep_ego=TRUE, an data frame is returned with the following columns: IDego, ID of mother of children, ID of father of children, ID of children, character sequence denoting the sex of parent and sex of child.

Author(s)

Frans Willekens

Examples

```
data(dataLH)
IDch(1, dataLH)
IDch(sample (dataLH$ID, 10), dataLH, keep_ego=TRUE)
```

IDfather	<i>Retrieves ID of father of ego</i>
----------	--------------------------------------

Description

Function to retrieve the ID of father of ego or fathers of vector of egos

Usage

```
IDfather(id, dataLH, keep_ego=FALSE)
```

Arguments

id	ID
dataLH	Database. If missing, datac = dataLH
keep_ego	Option to link show ID of ego together with ID of father

Value

ID of father or (if keep_ego=TRUE, object with ID of ego and ID of father). Returns NA if ID of father is not included in the database

Author(s)

Frans Willekens

Examples

```
data(dataLH)
IDfather (sample (dataLH$ID,10),dataLH)
```

IDgch	<i>Retrieves IDs of grandchildren of ego</i>
-------	--

Description

Retrieves IDs of grandchildren of vector of egos

Usage

```
IDgch(id, dataLH, keep_ego = FALSE)
```

Arguments

id	vector of IDs of egos
dataLH	Database. If missing, datac=datab
keep_ego	Option to show ID of ego together with ID of mother

Details

IDgch uses IDch

Value

ID of grandchildren or (if keep_ego=TRUE, data frame with ID of members of multiple generations). If ego has no grandchildren or IDs of grandchildren are not included in database, numeric(0) is returned and the message "No (grand)children of ego in database". If keep_ego=TRUE, an data frame is returned with the following columns: IDego, ID of ego's child that is mother or father of grandchildren, IDs of mother and father of grandchildren, ID of grandchildren, character sequence denoting the sex of grandparent, parent and sex of child.

Author(s)

Frans Willekens

Examples

```
data(dataLH)
# Grandchildren of ego with ID 1
IDgch(1,dataLH)
# Grandchildren of member of first generation
IDgch(sample(dataLH$ID[dataLH$gen==1],3),dataLH,keep_ego=TRUE)
```

IDmother

Retrieves ID of mother of ego

Description

Retrieves the ID of mother of ego or mothers of vector of egos

Usage

```
IDmother(id, dataLH, keep_ego=FALSE)
```

Arguments

id	ID
dataLH	Database. If missing, datac = dataLH
keep_ego	Option to show ID of ego together with ID of mother

Value

ID of mother or (if keep_ego=TRUE, object with ID of ego and ID of mother). Returns NA if ID of mother is not included in the database

Author(s)

Frans Willekens

Examples

```
data(dataLH)
IDmother (sample (dataLH$ID,10),dataLH)
IDmother(sample (dataLH$ID,10),dataLH,keep_ego=TRUE)
```

IDpartner

*Retrieves ID of partner of ego or allocate partner to ego***Description**

Retrieves ID of partners of vector of egos or randomly allocates partners to egos

Usage

```
IDpartner(idego = NULL,dataLH)
```

Arguments

idego vector of ID of egos. If idego is missing, then the function allocates partners (from opposite sex) to egos. The allocation is random.

dataLH Database. If missing, database 'datap' is used.

Value

IDs of partners. If the argument idego is missing, then a data frame similar to 'dataLH' is returned with IDs of partners completed.

Author(s)

Frans Willekens

Examples

```
data(dataLH)
IDpartner(idego=1,dataLH)
# Allocate partner to egos with ID 4,9,30.
IDpartner(idego=dataLH$ID[c(4,9,30)],dataLH)
```

MSLT_e

*Multistate life table: exposure function***Description**

The function MSLT_e uses the multistate life table method to estimate expected state occupation times by state.

Usage

```
MSLT_e(SS, radix)
```

Arguments

SS	The multistate survival function. An object of class 'MSLT.S'
radix	The radix, which is the distribution of the population by state at the initial (reference) age

Value

The function MSLT_e returns an object with the following components:

L	For each state, the expected sojourn time by age. It is the number of time units (years, months) a person at the beginning of his or her career (e.g. at birth or at a reference age) may expect to spend in the given state during each age interval.
e0	The total expected sojourn time in each state. If life histories are considered from birth, e0 gives the life expectancy by state. If life histories are truncated at a given age, the life expectancy is the total expected sojourn time in a state between birth and that maximum age.
e.p	Population-based life expectancies by age and state. Population-based measures are independent on the state occupied at the reference age.
e.s	Status-based life expectancies by age and state. Status-based measures depend on the state occupied at the reference age.

Author(s)

Frans Willekens

Examples

```
data(rates)
SS <- MSLT_S (rates$ratesM)
radix <- 10000
e <- MSLT_e(SS,radix)
```

MSLT_S

Multistate life table: survival function

Description

The function MSLT_S estimates the multistate survival function from cumulative transition rates. The multistate life table is produced by two functions:

Usage

```
MSLT_S(rates)
```

Arguments

rates	transition rates. Either the Nelson-Aalen estimators or the occurrence-exposure rates.
-------	--

Value

The function MSLT.S returns:

S	The multistate survival function
P	Age-specific transition probabilities

Author(s)

Frans Willekens

References

Rogers, A. (1975) Introduction to multiregional mathematical demography. Wiley, New York

Willekens, F. (1987) The marital status life-table. In: J. Bongaarts, T. Burch and K.W. Wachter eds. Family demography: models and applications. Oxford: Clarendon Press. pages 125-149.

Palloni, A. (2001) Increment-decrement life tables. In: S.H. Preston, P. Heuveline and M. Guillot Demography. Measuring and modelling population processes. Blackwell, Oxford, Chapter12, pp. 256-272.

Examples

```
data(rates)
lt <- MSLT_S (rates$ratesM)
```

Multistate

Computes fertility table by birth order (multistate life table)

Description

Computes multistate life table from female death rates and birth-order specific fertility rates

Usage

```
Multistate(rates, mortality = 1)
```

Arguments

rates	Object with age- and sex-specific death rates (ASDR) and age- and birth-order specific fertility rates (ASFR). The object is created to Getrates_refyear.
mortality	If mortality=1, mortality included (default). If mortality=0, mortality disregarded

Value

A list of two objects: (a) the multistate survival function (S) and multistate transition probabilities (P), and (b) other measures of the multistate life table: person-years; sojourn times in the various states, expected at birth; expected sojourn times at various ages.

Author(s)

Frans Willekens

See Also

The multistate life table is computed using the function `MSLT.S` from the `Biograph` package.

Examples

```
data(rates)
z <- Multistate (rates)
```

<code>rates</code>	<i>rates data</i>
--------------------	-------------------

Description

Mortality rates by age and sex: fertility rates by age and birth order

Usage

```
data(rates)
```

Format

A list of three objects with mortality and fertility rates.

ASDR Mortality rates

ASFR Fertility rates

ratesM Multistate transition rates

Source

The data are downloaded from the Human Mortality Database (HMD) and the Human Fertility Database (HFD). Country: USA. Year: 2019

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