Package: decompositionLE (via r-universe)

October 6, 2026

Title Provides Easy Methods to Perform Life Expectancy Decomposition

Version 1.0.0

Description Provides an easy to use implementation of life expectancy decomposition formulas for age bands, derived from Ponnapalli, K. (2005). A comparison of different methods for decomposition of changes in expectation of life at birth and differentials in life expectancy at birth. Demographic Research, 12, pp.141–172. <doi:10.4054/demres.2005.12.7> In addition, there is a decomposition function for disease cause breakdown and a couple helpful plot functions.

License GPL (>= 3)

Depends R (>= 3.5)

Imports dplyr, magrittr, stringr, tidyr, purrr, ggplot2, rlang

Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

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Suggests testthat (>= 3.0.0), tibble, forcats

Config/testthat/edition 3

URL https://github.com/herts-phei/decompositionLE

BugReports https://github.com/herts-phei/decompositionLE/issues

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Repository https://herts-phei.r-universe.dev

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Contents

decomp_age 2
decomp_disease 3
india_china_males_1990 4
plot_age 5
plot_disease 6
us_females 7

Index **8**

`decomp_age` *Title decomp_age*

Description

Function for performing life expectancy decomposition for age bands

Usage

```
decomp_age(df, method = "arriaga3", age_col, e1, e2, l1, l2, append = TRUE)
```

Arguments

`df`	An outputted life table with columns for age bands, number of persons alive at each age band and expectation of life at each age band
`method`	Methods to use for life expectancy decomposition. Defaults to 'arriaga3'. Current methods available are: 'arriaga3', 'chandrasekaran1', 'chandrasekaran2'.
`age_col`	Column providing ordered age bands with the final age group being an open-ended interval suffxied with '+', e.g. '90+'.. Of factor type.
`e1`	Column name for expectation of life at age group x, in the 1st group of comparison.
`e2`	Column name for expectation of life at age group x, in the 2nd group of comparison.
`l1`	Column name for the proportion of persons alive at age group x, in the 1st group of comparison.
`l2`	Column name for the proportion of persons alive at age group x, in the 2nd group of comparison.
`append`	Whether to append the decomposition columns to the original data frame. Default to TRUE.

Value

A data frame with attached life expectancy age breakdown decomposition values

`decomp_disease` *Title decomp_disease*

Description

Function for performing life expectancy decomposition for disease groups

Usage

```
decomp_disease(
  df,
  breakdown,
  diseases,
  age_col,
  group_1,
  group_1_m,
  group_2,
  group_2_m,
  nDx
)
```

Arguments

`df`	An outputted life table with relevant columns of interest
`breakdown`	Whether disease breakdowns are raw mortality rates or a decimal proportion of total all-cause mortality rate. Accepts either 'proportion' or 'raw'.
`diseases`	Character vector of diseases which are suffixed to `group_1` and `group_2`, and found in both groups. There should be no other characters after these diseases for the function to capture the group-disease combinations.
`age_col`	Column providing ordered age bands with the final age group being an open-ended interval suffxied with '+', e.g. '90+'.. Of factor type.
`group_1`	Unique matching stem prefix in columns for group 1 related disease cause breakdowns
`group_1_m`	Column name for group 1 all-cause mortality rate between ages x and x + n
`group_2`	Unique matching stem prefix in columns for group 2 related disease cause breakdowns
`group_2_m`	Column name for group 2 all-cause mortality rate between ages x and x + n
`nDx`	Column name for contribution of all-cause mortality differences in groups 1 and 2 in age groups x to x + n. Computationally the same as the total effect column computed from `decomp_LE()`.

Value

A data frame with attached life expectancy disease breakdown decomposition values

`india_china_males_1990`

Age and Cause Decomposition of Difference in Life Expectancies at Birth, India and China, males, 1990

Description

A subset of data from The Global Burden of Disease Study 1996.

Usage

```
india_china_males_1990
```

Format

A data frame with 7 rows and 10 columns:

Age ordered age groups as factor type

India_nmx all-cause mortality rate between ages x and x + n for males in India, 1990

India_CD proportion of deaths from communicable diseases between ages x and x + n for males in India, 1990

India_NCD proportion of deaths from non-communicable diseases between ages x and x + n for males in India, 1990

India_Injuries proportion of deaths from injuries between ages x and x + n for males in India, 1990

China_nmx all-cause mortality rate between ages x and x + n for males in China, 1990

China_CD proportion of deaths from communicable diseases between ages x and x + n for males in China, 1990

China_NCD proportion of deaths from non-communicable diseases between ages x and x + n for males in China, 1990

China_Injuries proportion of deaths from injuries between ages x and x + n for males in China, 1990

nDx contribution of all-cause mortality differences in groups 1 and 2 in age groups x to x + n. Computationally the same as the total effect column computed from `decomp_LE()`.

where n = length of the age interval

Source

Murray, C. J. and A. D. Lopez, 1996. *The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020*. Boston, Harvard University, School of Public Health.

plot_age *Title plot_age*

Description

S3 method for `plot()` that visualizes age-related decomposition breakdowns from a data frame. It pivots columns from `decomp_age()` output into a long format and creates a formatted bar plot.

Usage

```
plot_age(x, method, plot_type, line = FALSE)
```

Arguments

`x`	A data frame containing unmodified `decomp_age()` output.
`method`	Method used for age decomposition. Same as method argument in `decomp_age()`
`plot_type`	Plot either total contribution in years or segmented effect contribution. Options: "total", "segment_dodge".
`line`	Logical for additional line geom showing total effect if 'segment_dodge' `plot_type` is selected. FALSE by default. Not available for 'chandrasekaran1' and 'chandrasekaran2' methods.

Details

Plot age decomposition breakdown

Value

A `ggplot` object showing disease breakdown values

Examples

```
age_output <- decomp_age(us_females,
  method = "arriaga3", age_col = "Age", e1 = "e1x",
  e2 = "e2x", l1 = "l1x", l2 = "l2x"
)

plot_age(age_output, method = "arriaga3", plot_type = "segment_dodge")
plot_age(age_output, method = "arriaga3", plot_type = "segment_dodge", line = TRUE)
plot_age(age_output, method = "arriaga3", plot_type = "total", line = TRUE)
```

plot_disease *Title plot_disease*

Description

Visualize disease-related deltas from a data frame. It pivots columns starting with "delta" and ending with user-specified suffixes (e.g., c("CD", "NCD", "Injuries")) into a long format and creates a formatted stacked bar plot.

Usage

```
plot_disease(x, suffixes, nDx, line = TRUE)
```

Arguments

x	A data frame containing decomp_disease() output.
suffixes	A character vector of disease suffixes to match (e.g., c("CD", "NCD", "Injuries")). Essentially the same as diseases argument in decomp_disease().
nDx	Column name for contribution of all-cause mortality differences in groups 1 and 2 in age groups x to x + n.
line	Logical for additional line geom showing total effect. TRUE by default.

Details

Plot disease decomposition breakdown

Value

A ggplot object showing disease breakdown values

Examples

```
disease_data <- decomp_disease(india_china_males_1990,
  breakdown = "proportion", age_col = "Age", diseases = c("CD", "NCD", "Injuries"),
  group_1 = "India", group_1_m = "India_nmx", group_2 = "China",
  group_2_m = "China_nmx", nDx = "nDx"
)

plot_disease(disease_data, c("delta_CD", "delta_NCD", "delta_Injuries"), "nDx", line = FALSE)
plot_disease(disease_data, c("delta_CD", "delta_NCD", "delta_Injuries"), "nDx", line = TRUE)
```

us_females *Life table values for United States, Females, 1935 and 1995*

Description

A subset of data from 'Life Tables for the United States Social Security Area, 1900-2080' for United States women born in 1935 and 1995.

Usage

```
us_females
```

Format

A data frame with 19 rows and 7 columns:

Age ordered age groups as factor type

nm1x age specific death rate in the age group x; x + n in the initial time period '1935'

l1x number of persons alive at exact age x, in the initial time period '1935' expressed as decimal form and as a proportion of the starting the age group

e1x expectation of life at exact age x, in the initial time period '1935'

nm2x age specific death rate in the age group x; x + n in the latter time period '1995'

l2x number of persons alive at exact age x, in the latter time period '1995' expressed as decimal form and as a proportion of the starting the age group

e2x expectation of life at exact age x, in the latter time period '1995'

where n = length of the age interval

Source

Murthy, P.K. (2005). A comparison of different methods for decomposition of changes in expectation of life at birth and differentials in life expectancy at birth. Demographic Research, 12, pp.141–172. doi: doi:10.4054/demres.2005.12.7, Appendix 1, available at https://www.demographic-research.org/volumes/vol12/7/12-7.pdf

Bell, F.C., A.H. Wade and S.C. Goss, (1992), Life Tables for the United States Social Security Aria: 1900-2080. Baltimore, Maryland, US Social Security Administration Office of the Actuary, Actuarial Study No.107, [nmx, and ex columns were calculated from lx; nLx and Tx columns given in: Preston, S.H., P.Heuveline and M.Guillot (2001) Demography: Measuring and Modeling Population Processes, United Kingdom: Blackwell Publishers Ltd., Box: 3.4, P.65]

Index

∗ **datasets**
india_china_males_1990, 4
us_females, 7

decomp_age, 2
decomp_disease, 3

india_china_males_1990, 4

plot_age, 5
plot_disease, 6

us_females, 7