

Package ‘linktree’

December 15, 2025

Title Estimate Transmission Assortativity Coefficients

Version 0.1.0

Description Estimates group transmission assortativity coefficients from transmission trees.

Group transmission assortativity coefficients measure the tendency for individuals to transmit within their own group (e.g. age group, vaccination status, or location) compared to other groups. The package requires information on who infected whom, group membership for all individuals, and the relative sizes of each group in the population.

For more details see Geismar et al. (2024) <[doi:10.1371/journal.pone.0313037](https://doi.org/10.1371/journal.pone.0313037)>.

License CC BY 4.0

Encoding UTF-8

RoxygenNote 7.3.3

Suggests knitr, rmarkdown, testthat (>= 3.0.0), pak, epicontacts,
visNetwork

Config/testthat/edition 3

Depends R (>= 3.5)

LazyData true

VignetteBuilder knitr

URL <https://github.com/CyGei/linktree>,

<https://cygei.github.io/linktree/>

BugReports <https://github.com/CyGei/linktree/issues>

NeedsCompilation no

Author Cyril Geismar [aut, cre, cph] (ORCID:
<<https://orcid.org/0000-0002-8486-5890>>)

Maintainer Cyril Geismar <c.geismar21@imperial.ac.uk>

Repository CRAN

Date/Publication 2025-12-15 18:30:02 UTC

Contents

delta2gamma	2
gamma2delta	2
get_delta	3
get_gamma	4
get_pi	4
plot.linktree	5
sim_tree	6

Index	7
--------------	----------

delta2gamma	<i>Convert delta to gamma</i>
-------------	-------------------------------

Description

Convert delta to gamma

Usage

delta2gamma(delta)

Arguments

delta A numeric vector of delta coefficients.

Value

A numeric vector of the corresponding gamma coefficients.

Examples

delta2gamma(delta = c(-1,0,1))

gamma2delta	<i>Convert gamma to delta</i>
-------------	-------------------------------

Description

Convert gamma to delta

Usage

gamma2delta(gamma)

Arguments

gamma A numeric vector of gamma coefficients.

Value

A numeric vector delta coefficients.

Examples

```
gamma2delta(gamma = c(0,1,10, Inf))
```

get_delta	<i>Calculate delta</i>
-----------	------------------------

Description

Computes the scaled transmission assortativity coefficient, see function [gamma2delta](#).

Usage

```
get_delta(from, to, f, alpha = 0.05)
```

Arguments

from A vector of infectors.
to A vector of infectees.
f A named numeric value representing the prevalence of each group in the population or directly the group sizes.
alpha The significance level for the confidence interval.

Value

A data frame with the estimated delta, lower and upper confidence limits for each group.

Examples

```
from <- c("A", "A", NA, "C", "C", "C")  
to <- c("A", "B", "B", "C", "C", "C")  
f <- c(A = 0.3, B = 0.2, C = 0.5)  
get_delta(from, to, f, alpha = 0.05)
```

get_gamma

Calculate gamma

Description

Computes the transmission assortativity coefficient defined as the excess probability of a secondary infection taking place within-group compared to random expectations.

Usage

```
get_gamma(from, to, f, alpha = 0.05)
```

Arguments

from	A vector of infectors.
to	A vector of infectees.
f	A named numeric value representing the prevalence of each group in the population or directly the group sizes.
alpha	The significance level for the confidence interval.

Value

A data frame with the estimated gamma, lower and upper confidence limits for each group.

Examples

```
from <- c("A", "A", NA, "C", "C", "C")
to <- c("A", "B", "B", "C", "C", "C")
f <- c(A = 0.3, B = 0.2, C = 0.5)
get_gamma(from, to, f, alpha = 0.05)
```

get_pi

Calculate Pi Values

Description

Calculates the within-group transmission proportion 'pi' for each group in the data.

Usage

```
get_pi(from, to, alpha = 0.05)
```

Arguments

from A vector of infectors.
 to A vector of infectees.
 alpha The significance level for the confidence intervals.

Value

A data frame with the group names and the corresponding 'pi' values and confidence intervals.

Examples

```
from <- c("A", "A", "NA", "C", "C", "C")
to <- c("A", "B", "B", "C", "C", "C")
get_pi(from, to, alpha = 0.05)
```

plot.linktree	<i>Plot linktree objects</i>
---------------	------------------------------

Description

Plots error bars for objects of class linktree (with subclasses gamma, delta, or pi). The method displays point estimates with confidence intervals for each group. A horizontal dotted line is added at the neutral value: $y = 1$ for subclass gamma and $y = 0$ for subclass delta.

Usage

```
## S3 method for class 'linktree'
plot(x, ...)
```

Arguments

x An object of class linktree (with subclasses gamma, delta, or pi).
 ... Additional arguments passed to the base [plot](#) function.

Value

No return value, called for side effects (produces a plot).

Examples

```
from <- c("A", "A", NA, "C", "C", "C")
to <- c("A", "B", "B", "C", "C", "C")
f <- c(A = 0.3, B = 0.2, C = 0.5)
plot(get_delta(from, to, f))
plot(get_gamma(from, to, f))
```

sim_tree	<i>Simulated transmission tree</i>
----------	------------------------------------

Description

This dataset represents a simulated transmission tree. This simulation was generated using the R package o2groups (see <https://github.com/CyGei/o2groups> for more information). Group HCW is assortative with a gamma coefficient of 2 and group patient is disassortative with a gamma coefficient of 1/1.25. Susceptible group sizes were 100 and 350, respectively. Code to reproduce the data below:

```
pak::pak("CyGei/o2groups")
set.seed(123)
sim_tree <- o2groups::simulate_groups(
  duration = 100,
  group_n = 2,
  size = c(100, 350), # susceptible group sizes
  name = c("HCW", "patient"),
  gamma = c(2, 0.8), # assortativity coefficients
  intro_n = c(1, 3),
  r0 = c(2, 2),
  generation_time = c(0, 0.1, 0.2, 0.4, 0.2, 0.1, 0),
  incubation_period = sample(1:14, 1000, replace = TRUE)
)
```

Usage

```
sim_tree
```

Format

A data frame with 373 rows and 6 columns:

group Character. The group to which the individual belongs.

id Character. Unique identifier for each individual in the study.

source Character. The ID of the individual who was the source of infection, if known. NA indicates an unknown source.

source_group Character. The group of the source individual. NA for unknown sources.

date_infection Numeric. The date of infection. Represented as the number of days since the start of the study.

date_onset Numeric. The date of onset of symptoms. Represented as the number of days since the start of the study.

Source

This dataset is simulated (see R package o2groups) and does not correspond to real-world data.

Index

* **datasets**

sim_tree, [6](#)

delta2gamma, [2](#)

gamma2delta, [2](#), [3](#)

get_delta, [3](#)

get_gamma, [4](#)

get_pi, [4](#)

plot, [5](#)

plot.linktree, [5](#)

sim_tree, [6](#)