Package ‘jointCompRisk’

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Type Package

Title Joint Inference for Competing Risks Data Using Multiple Endpoints

Version 0.1.0

Maintainer Wenqing Zhang <`wzhan115@jhu.edu`>

Description Tools for competing risks trials that allow simultaneous inference on recovery and mortality endpoints. Provides data preparation helpers, standard cumulative incidence estimators (restricted mean time gained/lost), and severity weighted extensions that integrate longitudinal ordinal outcomes to summarise treatment benefit. Methods follow Wen, Wang, and Hu (2023) Biometrics 79(3):1635-1645 <doi:10.1111/biom.13752>.

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Encoding UTF-8

LazyData false

Imports dplyr, magrittr, stats, rlang, survival

RoxygenNote 7.3.2

Depends R (>= 3.5)

Suggests knitr, rmarkdown, readr, testthat (>= 3.0.0)

VignetteBuilder knitr

Config/testthat/edition 3

URL `https://github.com/cathyzzzhang/jointCompRisk`

BugReports `https://github.com/cathyzzzhang/jointCompRisk/issues`

NeedsCompilation no

Author Wenqing Zhang [aut, cre],
Jiyang Wen [aut],
Chen Hu [aut],
Meicheng Wang [aut]

Repository CRAN

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Contents

`do_cif_analysis` *Run Standard CIF Analysis*

Description

Given a prepped data list from `prep_data_cif`, run the standard CIF analysis.

Usage

```
do_cif_analysis(prepped, tau = 15)
```

Arguments

`prepped`	A list returned by `prep_data_cif()`, containing `Treatment` and `Control`.
`tau`	Numeric, time horizon (e.g. 15 or 29).

Details

- RMLT1 uses parameters `(a,b,c) = (0,1,0)` for recovery/discharge analysis. - RMLT2 uses `(a,b,c) = (0,0,1)` for death analysis.

Value

A list with formatted results for RMLT1 and RMLT2.

`do_weighted_cif_analysis` *Run Weighted CIF Analysis*

Description

Given the list from `prep_data_weighted_cif`, run Weighted RMLT1 (recovery/discharge) and Weighted RMLT2 (death) at a user-specified time horizon `tau`.

Usage

```
do_weighted_cif_analysis(prepped, tau)
```

Arguments

`prepped`	A list returned by `prep_data_weighted_cif()`.
`tau`	Numeric time horizon (e.g., 15 or 29).

Details

- Weighted RMLT1 uses `eta=1` for recovery/discharge analysis. - Weighted RMLT2 uses `eta=2` for death analysis.

Value

A list with formatted results for WRMLT1 and WRMLT2.

`long_df` *Longitudinal Severity Scores Dataset*

Description

Repeated measurements of ordinal severity scores over time for the same patients in the main_df dataset, with treatment-specific trajectory patterns.

Usage

```
data(long_df)
```

Format

A data frame with variable rows per patient:

PersonID Patient identifier matching ID in main_df (character)

OrdinalScore Severity score on 1-8 scale (numeric)

RelativeDay Study day (numeric) starting from day 0 (baseline)

Details

Measurements are taken at scheduled visits: days 0 (baseline), 1, 3, 5, 7, 10, 14, 18, 21, 25, 28. The trajectory follows treatment-specific probabilities: treatment patients have 45 and 15 worsening probability, creating realistic differential clinical progression patterns.

Source

Simulated data using treatment-specific random walk with boundaries

Examples

```
data(long_df)
data(main_df)
head(long_df)
# See data for first patient
subset(long_df, PersonID == "Patient_001")
# Compare average scores by treatment
long_df %>%
  dplyr::left_join(main_df[,c("ID","Treatment")], by=c("PersonID"="ID")) %>%
  dplyr::group_by(Treatment) %>%
  dplyr::summarise(mean_score = mean(OrdinalScore))
```

`main_df` *Main Competing Risks Dataset Simulated clinical trial data with competing risks survival outcomes. This dataset follows the structure of Adaptive COVID-19 Treatment Trials (ACTT) with built-in treatment effects for demonstration purposes.*

Description

Main Competing Risks Dataset Simulated clinical trial data with competing risks survival outcomes. This dataset follows the structure of Adaptive COVID-19 Treatment Trials (ACTT) with built-in treatment effects for demonstration purposes.

Usage

```
data(main_df)
```

Format

A data frame with 150 rows and 7 variables:

ID	Patient identifier (character)
TimeToRecovery	Time to recovery event in days (numeric)
TimeToDeath	Time to death event in days (numeric)
RecoveryCensoringIndicator	Recovery censoring indicator (0=event observed, 1=censored)
DeathCensoringIndicator	Death censoring indicator (0=event observed, 1=censored)
BaselineScore	Baseline severity score, range 4-7 (numeric)
Treatment	Treatment arm indicator (0=control, 1=treatment)

Details

This is a simulated dataset created for demonstration purposes with realistic treatment effects built in: treatment group has 1.5× faster recovery times and 1.8× improved survival compared to control. The data represents a clinical trial with competing risks where patients can either recover or die, with administrative censoring at 30 days.

Source

Simulated data based on Weibull distributions with treatment-specific parameters

Examples

```
data(main_df)
head(main_df)
summary(main_df)
# Compare outcomes by treatment
tapply(main_df$TimeToRecovery, main_df$Treatment, summary)
tapply(main_df$TimeToDeath, main_df$Treatment, summary)
```

`prep_data_cif` *Prepare Data for Standard CIF*

Description

Cleans and prepares a single dataset for standard (competing risks) CIF analysis.

Usage

```
prep_data_cif(
  data,
  ID = "USUBJID",
  TimeToRecovery = "TTRECOV",
  TimeToDeath = "TTDEATH",
  Recov_Censoring = "RECCNSR",
  Death_Censoring = "DTHCNSR",
  Treatment = "trt"
)
```

Arguments

`data`	A data frame with columns for ID, time to recovery, time to death, recovery censor, death censor, and treatment indicator.
`ID`	Name of the patient ID column. Default is "USUBJID".
`TimeToRecovery`	Name of the time-to-recovery column. Default "TTRECOV".
`TimeToDeath`	Name of the time-to-death column. Default "TTDEATH".
`Recov_Censoring`	Name of the recovery-censor column. Default "RECCNSR" (0=event,1=censor).

`Death_Censoring`	Name of the death-censor column. Default "DTHCNSR" (0=event,1=censor).
`Treatment`	Name of the treatment indicator column (0=control,1=treatment). Default "trt".

Value

A list with:

- `data.w`: The processed data frame with columns `cn`, `etime`, `estatus`, `etype2`, `Treatment`.
- `Treatment`: Subset of `data.w` where `Treatment==1`.
- `Control`: Subset of `data.w` where `Treatment==0`.

`prep_data_weighted_cif`

Prepare Data for Weighted CIF (Legacy Wrapper)

Description

Convenience wrapper that mirrors the original Part II data preparation workflow for weighted restricted mean analyses. The function now delegates to `prep_data_weighted_cif2` to provide consistent checks and support for arbitrary ordinal state definitions.

Usage

```
prep_data_weighted_cif(
  data_main,
  data_long,
  wID_main = "USUBJID",
  wTimeToRecovery_main = "TTRECOV",
  wTimeToDeath_main = "TTDEATH",
  wRecov_Censoring_main = "RECCNSR",
  wDeath_Censoring_main = "DTHCNSR",
  wBaselineScore_main = "ordscr_bs",
  wTreatment_main = "trt",
  wID_long = "USUBJID",
  wADY_long = "ADYC",
  wScore_long = "ORDSCOR",
  wStates_death = c(4, 5, 6, 7),
  wWeights_death = c(2, 1.5, 1, 0.5),
  wStates_discharge = c(4, 5, 6, 7),
  wWeights_discharge = c(0.5, 1, 1.5, 2)
)
```

Arguments

`data_main`	A data.frame with ID, TTR, TTD, RECCNSR, DTHCNSR, baseline score, trt, etc.
`data_long`	A data.frame with repeated clinical scores over time (e.g. ADYC, ORDSCOR).
`wID_main`	Name of the patient ID column in the main dataset (default "USUBJID").
`wTimeToRecovery_main`	Name of the time-to-recovery column (default "TTRECOV").
`wTimeToDeath_main`	Name of the time-to-death column (default "TTDEATH").
`wRecov_Censoring_main`	Name of the recovery-censor column (default "RECCNSR").
`wDeath_Censoring_main`	Name of the death-censor column (default "DTHCNSR").
`wBaselineScore_main`	Name of the baseline ordinal column (default "ordscr_bs").
`wTreatment_main`	Name of the treatment indicator column (0=control,1=treatment). Default "trt".
`wID_long`	Name of the patient ID column in the long dataset (default "USUBJID").
`wADY_long`	Name of the day-since-treatment column in the long dataset (default "ADYC").
`wScore_long`	Name of the ordinal score column in the long dataset (default "ORDSCOR").
`wStates_death`	Vector of ordinal states for death weighting (default c(4,5,6,7)).
`wWeights_death`	Numeric weights, same length as wStates_death (default c(2,1.5,1,0.5)).
`wStates_discharge`	Vector of states for discharge weighting (default c(4,5,6,7)).
`wWeights_discharge`	Numeric weights, same length as wStates_discharge (default c(0.5,1,1.5,2)).

Value

See `prep_data_weighted_cif2`.

`prep_data_weighted_cif2`

Prepare Data for Weighted CIF

Description

Prepares merged competing-risks and longitudinal severity data for weighted restricted mean analyses. The routine removes patients with zero follow-up or missing baseline severity, handles discharge-to-die cases, merges the longitudinal trajectory, and computes user-specified weighted time summaries for death-focused and discharge-focused analyses.

Usage

```
prep_data_weighted_cif2(
  data_main,
  data_long,
  wID_main = "USUBJID",
  wTimeToRecovery_main = "TTRECOV",
  wTimeToDeath_main = "TTDEATH",
  wRecov_Censoring_main = "RECCNSR",
  wDeath_Censoring_main = "DTHCNSR",
  wBaselineScore_main = "ordscr_bs",
  wTreatment_main = "trt",
  wID_long = "USUBJID",
  wADY_long = "ADYC",
  wScore_long = "ORDSCOR",
  wStates_death = c(4, 5, 6, 7),
  wWeights_death = c(2, 1.5, 1, 0.5),
  wStates_discharge = c(4, 5, 6, 7),
  wWeights_discharge = c(0.5, 1, 1.5, 2)
)
```

Arguments

`data_main`	A data.frame with ID, TTR, TTD, RECCNSR, DTHCNSR, baseline score, trt, etc.
`data_long`	A data.frame with repeated clinical scores over time (e.g. ADYC, ORDSCOR).
`wID_main`	Name of the patient ID column in the main dataset (default "USUBJID").
`wTimeToRecovery_main`	Name of the time-to-recovery column (default "TTRECOV").
`wTimeToDeath_main`	Name of the time-to-death column (default "TTDEATH").
`wRecov_Censoring_main`	Name of the recovery-censor column (default "RECCNSR").
`wDeath_Censoring_main`	Name of the death-censor column (default "DTHCNSR").
`wBaselineScore_main`	Name of the baseline ordinal column (default "ordscr_bs").
`wTreatment_main`	Name of the treatment indicator column (0=control,1=treatment). Default "trt".
`wID_long`	Name of the patient ID column in the long dataset (default "USUBJID").
`wADY_long`	Name of the day-since-treatment column in the long dataset (default "ADYC").
`wScore_long`	Name of the ordinal score column in the long dataset (default "ORDSCOR").
`wStates_death`	Vector of ordinal states for death weighting (default c(4,5,6,7)).
`wWeights_death`	Numeric weights, same length as wStates_death (default c(2,1.5,1,0.5)).
`wStates_discharge`	Vector of states for discharge weighting (default c(4,5,6,7)).
`wWeights_discharge`	Numeric weights, same length as wStates_discharge (default c(0.5,1,1.5,2)).

Value

A list containing:

- `data.ws.death` and `data.ws.discharge`: Full merged datasets with an added `wU` column for (death) or (discharge).
- `Treatment.death` and `Control.death`: Subsets for weighted WRMLT2 (death-focused).
- `Treatment.discharge` and `Control.discharge`: Subsets for weighted WRMLT1 (recovery-focused).

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