Package: mrPStrata (via r-universe)

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Type Package

Title Multiply Robust Estimation in Causal Survival Analysis with Treatment Noncompliance

Version 0.1.0

Description Provides multiply robust estimators of principal survival causal effects among always-takers, compliers, and never-takers in studies with treatment noncompliance. The methods are based on Cheng et al. (2026) <doi:10.1214/25-AOAS2117>.

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Encoding UTF-8

LazyData true

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`BootEst.MO.SA` *Bootstrap confidence intervals for the bias-corrected multiply robust estimator under violations of monotonicity*

Description

Bootstrap confidence intervals for the bias-corrected multiply robust estimator under violations of monotonicity

Usage

```
BootEst.MO.SA(
  times,
  propensity.model,
  principal.model,
  censor.model,
  failure.model,
  data,
  zeta,
  estimand = c("NACE", "CACE", "AACE", "DACE"),
  bootstrap = 50
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`propensity.model`	propensity score model
`principal.model`	principal score model
`censor.model`	censoring model
`failure.model`	outcome model
`data`	dataset

`zeta`	the sensitivity parameter zeta
`estimand`	the estimands of interest
`bootstrap`	number of bootstrap replications

Value

The bootstrap confidence intervals

`BootEst.PI.SA` *Bootstrap confidence intervals for the multiply robust estimator*

Description

Bootstrap confidence intervals for the multiply robust estimator

Usage

```
BootEst.PI.SA(
  times,
  propensity.model,
  principal.model,
  censor.model,
  failure.model,
  data,
  xi0,
  xi1,
  eta0,
  eta1,
  estimand = c("NACE", "CACE", "AACE"),
  bootstrap
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`propensity.model`	propensity score model
`principal.model`	principal score model
`censor.model`	censoring model
`failure.model`	outcome model
`data`	dataset
`xi0`	sensitivity parameter xi_0
`xi1`	sensitivity parameter xi_1

`eta0`	sensitivity parameter eta_0
`eta1`	sensitivity parameter eta_1
`estimand`	the estimands of interest
`bootstrap`	number of bootstrap replications

Value

The bootstrap confidence intervals

`mrPStrata` *Multiply robust estimator for calculating the principal survival causal effects among always takers, compliers, and never takers*

Description

Multiply robust estimator for calculating the principal survival causal effects among always takers, compliers, and never takers

Usage

```
mrPStrata(
  times,
  data,
  Xpi_names,
  Xe_names,
  Xc_names,
  Xt_names,
  Z_name,
  S_name,
  U_name,
  delta_name,
  B = 100
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`data`	the dataset
`Xpi_names`	names of the covariates for the propensity score model
`Xe_names`	names of the covariates for the principal score model
`Xc_names`	names of the covariates for the censoring model
`Xt_names`	names of the covariates for the failure outcome model
`Z_name`	name of the treatment assignment status
`S_name`	name of the true treatment receipt status
`U_name`	name of the observed failuture time
`delta_name`	name of the censoring indicator
`B`	number of the bootstrap replications (default 100)

Value

The PSCE estimates and their 95% confidence intervals

Examples

```
# example code
attach(sim_data)
sim_data = sim_data[1:1000,]
res = mrPStrata(times=c(1,2,3,4,5,6,7,8),
                data = sim_data,
                Xpi_names = c("X1","X2","X3","X4","X5"),
                Xe_names = c("X1","X2","X3","X4","X5"),
                Xc_names = c("X1","X2","X3","X4","X5"),
                Xt_names = c("X1","X2","X3","X4","X5"),
                Z_name = "z",
                S_name = "s",
                U_name ="U",
                delta_name = "delta",
                B=3)
res
```

`mrPStrata_MO_SA` *Bias-corrected multiply robust estimator of the PSCE under violation of monotonicity*

Description

Bias-corrected multiply robust estimator of the PSCE under violation of monotonicity

Usage

```
mrPStrata_MO_SA(
  times,
  data,
  Xpi_names,
  Xe_names,
  Xc_names,
  Xt_names,
  Z_name,
  S_name,
  U_name,
  delta_name,
  zeta = 0.01,
  B = 100
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`data`	the dataset
`Xpi_names`	names of the covariates for the propensity score model
`Xe_names`	names of the covariates for the principal score model
`Xc_names`	names of the covariates for the censoring model
`Xt_names`	names of the covariates for the outcome model
`Z_name`	name of the treatment assignment status
`S_name`	name of the true treatment receipt status
`U_name`	name of the observed failuture time
`delta_name`	name of the censoring indicator
`zeta`	sensitivity parameter zeta
`B`	number of the bootstrap replications (default 100)

Value

The PSCE estimates and their 95% confidence intervals

`mrPStrata_PI_SA` *Bias-corrected multiply robust estimator of the PSCE under violation of the principal ignorability assumption*

Description

Bias-corrected multiply robust estimator of the PSCE under violation of the principal ignorability assumption

Usage

```
mrPStrata_PI_SA(
  times,
  data,
  Xpi_names,
  Xe_names,
  Xc_names,
  Xt_names,
  Z_name,
  S_name,
  U_name,
  delta_name,
  xi0 = 0,
  xi1 = 0,
  eta0 = 1,
  eta1 = 1,
  B = 100
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`data`	the dataset
`Xpi_names`	names of the covariates for the propensity score model
`Xe_names`	names of the covariates for the principal score model
`Xc_names`	names of the covariates for the censoring model
`Xt_names`	names of the covariates for the outcome model
`Z_name`	name of the treatment assignment status
`S_name`	name of the true treatment receipt status
`U_name`	name of the observed failuture time
`delta_name`	name of the censoring indicator
`xi0`	sensitivity parameter xi_0
`xi1`	sensitivity parameter xi_1
`eta0`	sensitivity parameter eta_0
`eta1`	sensitivity parameter eta_1
`B`	number of the bootstrap replications (default 100)

Value

The PSCE estimates and their 95% confidence intervals

`plot.psce` *Plot of the PSCEs and their associated 95% pointwise confidence intervals*

Description

Plot of the PSCEs and their associated 95% pointwise confidence intervals

Usage

```
## S3 method for class 'psce'
plot(res)
```

Arguments

`res`	an output from mrPStrata

Value

The PSCE point estimates and 95% pointwise confidence intervals

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`PointEst.MO.SA` *Point estimation for the multiply robust estimator under violation of monotonicity assumption*

Description

Point estimation for the multiply robust estimator under violation of monotonicity assumption

Usage

```
PointEst.MO.SA(
  times,
  propensity.model,
  principal.model,
  censor.model,
  failure.model,
  data,
  zeta,
  estimand = c("NACE", "CACE", "AACE", "DACE")
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`propensity.model`	propensity score model
`principal.model`	principal score model
`censor.model`	censoring model
`failure.model`	outcome model
`data`	dataset
`zeta`	the sensitivity parameter zeta
`estimand`	the estimands of interest

Value

The PSCE point estimates

`PointEst.PI.SA` *Point estimation for the multiply robust estimator*

Description

Point estimation for the multiply robust estimator

Usage

```
PointEst.PI.SA(
  times,
  propensity.model,
  principal.model,
  censor.model,
  failure.model,
  data,
  xi0,
  xi1,
  eta0,
  eta1,
  estimand = c("NACE", "CACE", "AACE")
)
```

Arguments

`times`	a vector of time when the principal survival causal effects (PSCEs) are of interest
`propensity.model`	propensity score model
`principal.model`	principal score model
`censor.model`	censoring model
`failure.model`	outcome model
`data`	dataset
`xi0`	sensitivity parameter xi_0
`xi1`	sensitivity parameter xi_1
`eta0`	sensitivity parameter eta_0
`eta1`	sensitivity parameter eta_1
`estimand`	the estimands of interest

Value

The PSCE point estimates

`sim_data` *Simulated survival dataset*

Description

A simulated dataset used to illustrate the functions in this package.

Usage

```
sim_data
```

Format

A data frame with rows corresponding to individuals and the following variables:

U Observed event time.

delta Event indicator, where 1 indicates that the event was observed and 0 indicates censoring.

z Treatment assignment status.

s Treatment receipt status.

X1 Baseline covariate 1.

X2 Baseline covariate 2.

X3 Baseline covariate 3.

X4 Baseline covariate 4.

X5 Baseline covariate 5.

Details

The dataset contains simulated observations with an observed event time, event indicator, treatment assignment status, treatment receipt status, and five baseline covariates.

Source

Simulated by the package authors for illustration purposes.

Examples

```
data(sim_data)
head(sim_data)
```

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