Package ‘survSens’

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comprdata

An example dataset with competing risks outcomes.

Description

An example dataset with competing risks outcomes that can be used for comprSensitivity.

Usage

data("comprdata")

Format

The format is a list of 5, corresponding to t, d, Z, X, U, respectively.

References


Examples

data(comprdata)

compSensitivity

Sensitivity analysis of treatment effect to unmeasured confounding with competing risks outcomes.

Description

compSensitivity performs a dual-parameter sensitivity analysis of treatment effect to unmeasured confounding in observational studies with competing risks outcomes.

Usage

compSensitivity(t, d, Z, X, method, zetaT = seq(-2,2,by=0.5),
       zetat2 = 0, zetaZ = seq(-2,2,by=0.5), theta = 0.5, B = 50, Bem = 200)
Arguments

\( t \)  
- survival outcomes with competing risks.

\( d \)  
- indicator of occurrence of event, with \( d = 0 \) denotes right censoring, \( d = 1 \) denotes event of interest, \( d = 2 \) denotes competing risk.

\( Z \)  
- indicator of treatment.

\( X \)  
- pre-treatment covariates that will be included in the model as measured founders.

\texttt{method}  
- needs to be one of "stoEM_reg", "stoEM_IPW" and "EM_reg".

\texttt{zetaT}  
- range of coefficient of \( U \) in the event of interest response model.

\texttt{zetat2}  
- value of coefficient of \( U \) in the competing risk response model.

\texttt{zetaZ}  
- range of coefficient of \( U \) in the treatment model.

\texttt{theta}  
- marginal probability of \( U = 1 \).

\texttt{B}  
- iteration in the stochastic EM algorithm.

\texttt{Bem}  
- iteration used to estimate the variance-covariance matrix in the EM algorithm.

Details

This function performs a dual-parameter sensitivity analysis of treatment effect to unmeasured confounding by either drawing simulated potential confounders \( U \) from the conditional distribution of \( U \) given observed response, treatment and covariates or the Expectation-Maximization algorithm.

We assume \( U \) is following \( Bernoulli(\pi) \) (default 0.5). Given \( Z, X \) and \( U \), the hazard rate of the \( j \)th type of failure is modeled using the Cox proportional hazards (PH) regression:

\[
\lambda_j(t|Z,X,U) = \lambda_{j0}(t) \exp(\tau_j Z + X' \beta_j + \zeta_j U).
\]

Given \( X \) and \( U \), \( Z \) follows a generalized linear model:

\[
P(Z = 1|X,U) = \Phi(X' \beta_z + \zeta_z U).
\]

Value

\texttt{tau1}  
- a data.frame with \texttt{zetaz}, \texttt{zetat1}, \texttt{zetat2}, \texttt{tau1}, \texttt{tau1.se} and \texttt{t statistic} in the event of interest response model.

\texttt{tau2}  
- a data.frame with \texttt{zetaz}, \texttt{zetat}, \texttt{zetat2}, \texttt{tau2}, \texttt{tau2.se} and \texttt{t statistic} in the competing risks response model.

Author(s)

Rong Huang

References

Examples

# load the dataset included in the package
data(comprdata)
# stochastic EM with regression
tau.sto = comprSensitivity(comprdata$t, comprdata$d, comprdata$Z, comprdata$X,
    "stoEM_reg", zetaT = 0.5, zetaZ = 0.5, B = 3)

# EM with regression
tau.em = comprSensitivity(comprdata$t, comprdata$d, comprdata$Z, comprdata$X,
    "EM_reg", zetaT = 0.5, zetaZ = 0.5, Bem = 50)

plotsens

A contour plot of sensitivity analysis results.

Description

A contour plot of sensitivity analysis results.

Usage

plotsens(tau.res, zetaz, zetat, tau1, coeff0)

Arguments

- `tau.res`: a data.frame that can be generated from either `survSensitivity` or `comprSensitivity`.
- `zetaz`: the name of sensitivity parameter in the treatment model.
- `zetat`: the name of sensitivity parameter in the response model.
- `tau1`: the name of estimated treatment effect.
- `coeff0`: the value of estimated treatment effect ignoring any confounding.

Details

This function gives a contour plot in order to visualize results from either `survSensitivity` or `comprSensitivity`.

Value

A contour plot corresponding to the output from either `survSensitivity` or `comprSensitivity`.

Author(s)

Rong Huang

Examples

data(tau.res) # an example output
plotsens(tau.res, "zetaz", "zetat", "tau1", coeff0 = 1.131)
survdata

An example dataset with survival outcomes.

Description

An example dataset with survival outcomes that can be used for survSensitivity.

Usage

data("survdata")

Format

The format is a list of 5, corresponding to t, d, Z, X, U, respectively.

References


Examples

data(survdata)

survSensitivity

Sensitivity analysis of treatment effect to unmeasured confounding with survival outcomes.

Description

survSensitivity performs a dual-parameter sensitivity analysis of treatment effect to unmeasured confounding in observational studies with survival outcomes.

Usage

survSensitivity(t, d, Z, X, method, zetaT = seq(-2,2,by=0.5), zetaZ = seq(-2,2,by=0.5), theta = 0.5, B = 50, Bem = 200)
Arguments

t survival outcomes.
d indicator of occurrence of event, with \( d = 0 \) denotes right censoring.
Z indicator of treatment.
X pre-treatment covariates that will be included in the model as measured confounders.
method needs to be one of "stoEM_reg", "stoEM_IPW", and "EM_reg".
zetaT range of coefficient of \( U \) in the response model.
zetaZ range of coefficient of \( U \) in the treatment model.
theta marginal probability of \( U = 1 \).
B iteration in the stochastic EM algorithm.
Bem iteration used to estimate the variance-covariance matrix in the EM algorithm.

Details

This function performs a dual-parameter sensitivity analysis of treatment effect to unmeasured confounding by either drawing simulated potential confounders \( U \) from the conditional distribution of \( U \) given observed response, treatment and covariates or the Expectation-Maximization algorithm. We assume \( U \) is following Bernoulli(\( \pi \)) (default 0.5). Given \( Z, X \) and \( U \), the hazard rate is modeled using the Cox proportional hazards (PH) regression:

\[
\lambda(t|Z, X, U) = \lambda_0(t) \exp(\tau Z + X' \beta + \zeta U).
\]

Given \( X \) and \( U \), \( Z \) follows a generalized linear model:

\[
P(Z = 1|X, U) = \Phi(X' \beta_z + \zeta_z U).
\]

Value
tau a data.frame with zetaz, zetat, tau1, tau1.se and t statistic.

Author(s)
Rong Huang

References

Examples

#load the dataset included in the package.
data(survdata)
#stochastic EM with regression
tau.sto = survSensitivity(survdata$t, survdata$d, survdata$Z, survdata$X,
            "stoEM_reg", zetaT = 0.5, zetaZ = 0.5, B = 3)

#EM with regression
tau.em = survSensitivity(survdata$t, survdata$d, survdata$Z, survdata$X,
            "EM_reg", zetaT = 0.5, zetaZ = 0.5, Bem = 50)

---

tau.res  

Sensitivity analysis output example

Description

An example output from survSensitivity.

Usage

data("tau.res")

Format

A data frame with 81 observations on the following 5 variables.

zetaz  a numeric vector, corresponding to the sensitivity parameter in the treatment model.
zetat  a numeric vector, corresponding to the sensitivity parameter in the response model.
tau1   a numeric vector, corresponding to the estimated treatment effect.
tau1.se a numeric vector, corresponding to the standard error of the estimated treatment effect.
t      a numeric vector, corresponding to the t statistic.

Examples

data(tau.res)
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