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Type Package

Title Optimal Treatment Regimes in Survival Contexts with Kaplan-Meier-Like Estimators

Version 0.2.1

Description Provide methods for estimating optimal treatment regimes in survival contexts with Kaplan-Meier-like estimators when no unmeasured confounding assumption is satisfied (Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) <doi:10.1111/rssb.12201>) and when no unmeasured confounding assumption fails to hold and a binary instrument is available (Xia, J., Zhan, Z., Zhang, J. (2022) <arXiv:2210.05538>).

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Contents

`AIWKME` *The (S)AIWKME estimator.*

Description

Given a predetermined t0 and eta, calculate t0-year potential survival probability based on the (S)AIWKME estimator.

Usage

```
AIWKME(eta, datalist, ps, prep, t0, smooth = TRUE)
```

Arguments

`eta`	The parameters of the regime.
`datalist`	A list used to calculate the (S)AIWKME estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.
`ps`	A list including the probability of receiving treatment given baseline covariates named `fal`. `Fps.AIWKME` can produce `ps` by positing logistic model.
`prep`	A list including the augmented terms in the numerator with treatment all to 1 named `gamma.num.1` and all to 0 named `gamma.num.0` and in the denominator with treatment all to 1 named `gamma.den.1` and all to 0 named `gamma.den.0`; `gamma.num.1` and the others are matrix with ordered observed time as rows and patients as columns. `Fprep.AIWKME` can produce `prep` by positing Cox proportional hazards model.
`t0`	A predetermined time.
`smooth`	A logic variable indicating wether a smoothed estimator should be used.

Details

More details can be found in references.

Value

Estimated potential survival probability given eta and t0.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0 and eta
t0=5
eta=c(1,2,3)

# calculate ps and prep
ps=Fps.AIWKME(datalist)
prep=Fprep.AIWKME(datalist, t0)

AIWKME(eta, datalist, ps, prep, t0, smooth=TRUE)
```

`clipp` *clip function.*

Description

Limit the number not to be too large or too small.

Usage

```
clipp(x)
```

Arguments

`x`	A vector or matrix.

Value

A vector or matrix same as the input.

DRKMEIV *The (S)DRKMEIV estimator.*

Description

Given a predetermined t0 and eta, calculate t0-year potential survival probability based on the (S)DRKMEIV estimator.

Usage

```
DRKMEIV(eta, datalist, ps, prep, t0, smooth = TRUE)
```

Arguments

eta	The parameters of the regime.
datalist	A list used to calculate the (S)DRKMEIV estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving instrument given baseline covariates named fzl, the probability of receiving treatment given baseline covariates and instrument equaling 0 named fal0, the probability of receiving treatment given baseline covariates and instrument equaling 1 named fal1, and the difference between fal1 and fal0 named deltal. Fps.DRKMEIV can produce ps by positing logistic model.
prep	A list including estimates $\hat{\gamma}_1(\boldsymbol{L}; s)$ with treatment all to 1 named gamma.num.1 and all to 0 named gamma.num.0, $\hat{\gamma}_1'(\boldsymbol{L}; s)$ with treatment all to 1 named gammaa.num.1 and all to 0 named gammaa.num.0, $\hat{\gamma}_2(\boldsymbol{L}; s)$ with treatment all to 1 named gamma.den.1 and all to 0 named gamma.den.0, and $\hat{\gamma}_2'(\boldsymbol{L}; s)$ with treatment all to 1 named gammaa.den.1 and all to 0 named gammaa.den.0; gamma.num.1 and the others are matrix with ordered observed time as rows and patients as columns. There are also estimates for the last term of the (S)DRKMEIV estimator. More details can be found in references. Fprep.DRKMEIV can produce prep by positing Cox proportional hazards model.
t0	A predetermined time.
smooth	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

Estimated potential survival probability given eta and t0.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0 and eta
t0=5
eta=c(1,2,3)

# calculate ps and prep
ps=Fps.DRKMEIV(datalist,t0)
prep=Fprep.DRKMEIV(datalist, ps, t0)

DRKMEIV(eta, datalist, ps, prep, t0, smooth=TRUE)
```

Fprep.AIWKME *Cox proportional hazards model for eta-free terms in the (S)AIWKME estimator.*

Description

Cox proportional hazards model for eta-free terms in the (S)AIWKME estimator.

Usage

```
Fprep.AIWKME(datalist, t0)
```

Arguments

`datalist`	A list used to calculate the (S)AIWKME estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.
`t0`	A predetermined t.

Details

More details can be found in references, AIWKME, and Genetic.optim.AIWKME.

Value

A list including the augmented terms in the numerator with treatment all to 1 named gamma.num.1 and all to 0 named gamma.num.0 and in the denominator with treatment all to 1 named gamma.den.1 and all to 0 named gamma.den.0; gamma.num.1 and the others are matrix with ordered observed time as rows and patients as columns. More details can be found in references.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

Fprep.DRKMEIV *Cox proportional hazards model for eta-free terms in the (S)DRKMEIV estimator.*

Description

Cox proportional hazards model for eta-free terms in the (S)DRKMEIV estimator.

Usage

```
Fprep.DRKMEIV(datalist, ps, t0)
```

Arguments

datalist	A list used to calculate the (S)DRKMEIV estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving instrument given baseline covariates named fzl, the probability of receiving treatment given baseline covariates and instrument equaling 0 named fal0, the probability of receiving treatment given baseline covariates and instrument equaling 1 named fal1, and the difference between fal1 and fal0 named deltal. Fps.DRKMEIV can produce ps by positing logistic model.
t0	A predetermined t.

Details

More details can be found in references, DRKMEIV, and Genetic.optim.DRKMEIV.

Value

A list including estimates $\hat{\gamma}_1(\boldsymbol{L}; s)$ with treatment all to 1 named `gamma.num.1` and all to 0 named `gamma.num.0`, $\hat{\gamma}_1'(\boldsymbol{L}; s)$ with treatment all to 1 named `gammaa.num.1` and all to 0 named `gammaa.num.0`, $\hat{\gamma}_2(\boldsymbol{L}; s)$ with treatment all to 1 named `gamma.den.1` and all to 0 named `gamma.den.0`, and $\hat{\gamma}_2'(\boldsymbol{L}; s)$ with treatment all to 1 named `gammaa.den.1` and all to 0 named `gammaa.den.0`; `gamma.num.1` and the others are matrix with ordered observed time as rows and patients as columns. There are also estimates for the last term of the (S)DRIWKMEIV estimator. More details can be found in references.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

`Fps.AIWKME` *Logistic regression for observed treatment used for the (S)AIWKME estimator.*

Description

Logistic regression for observed treatment used for the (S)AIWKME estimator.

Usage

```
Fps.AIWKME(datalist)
```

Arguments

`datalist`	A list used to calculate the (S)AIWKME estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.

Details

More details can be found in references, `AIWKME`, and `Genetic.optim.AIWKME`.

Value

A list including the probability of receiving treatment given baseline covariates named `fal`.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

`Fps.DRKMEIV` *Logistic regression for observed treatment and instrument used for the (S)DRKMEIV estimator.*

Description

Logistic regression for observed treatment and instrument used for the (S)DRKMEIV estimator.

Usage

```
Fps.DRKMEIV(datalist, t0)
```

Arguments

`datalist`	A list used to calculate the (S)DRKMEIV estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.
`t0`	A predetermined t.

Details

More details can be found in references, `DRKMEIV`, and `Genetic.optim.DRKMEIV`.

Value

A list including the probability of receiving instrument given baseline covariates named `fzl`, the probability of receiving treatment given baseline covariates and instrument equaling 0 named `fal0`, the probability of receiving treatment given baseline covariates and instrument equaling 1 named `fal1`, the difference between `fal1` and `fal0` named `deltal`, and the censoring survival function given baseline covariates and treatment 1 or 0 named `surv.C.1` or `surv.C.0`.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

`Fps.IWKME` *Logistic regression for observed treatment used for the (S)IWKME estimator.*

Description

Logistic regression for observed treatment used for the (S)IWKME estimator.

Usage

```
Fps.IWKME(datalist)
```

Arguments

`datalist`	A list used to calculate the (S)IWKME estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.

Details

More details can be found in references, `IWKME`, and `Genetic.optim.IWKME`.

Value

A list including the probability of receiving treatment given baseline covariates named `fal`.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

`Fps.IWKMEIV` *Logistic regression for observed treatment and instrument used for the (S)IWKMEIV estimator.*

Description

Logistic regression for observed treatment and instrument used for the (S)IWKMEIV estimator.

Usage

```
Fps.IWKMEIV(datalist, t0)
```

Arguments

datalist	A list used to calculate the (S)IWKMEIV estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
t0	A predetermined t.

Details

More details can be found in references, IWKMEIV, and Genetic.optim.IWKMEIV.

Value

A list including the probability of receiving instrument given baseline covariates named fzl, the difference between fal1 and fal0 named deltal, where fal0 denotes the probability of receiving treatment given baseline covariates and instrument equaling 0, and fal1 denotes the probability of receiving treatment given baseline covariates and instrument equaling 1, and the censoring survival function given baseline covariates and treatment 1 or 0 named surv.C.1 or surv.C.0.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

Genetic.optim.AIWKME *The optimal treatment regime based on the (S)AIWKME estimator.*

Description

Given a predetermined t0, estimate the optimal treatment regime by maximizing t0-year survival probability based on the (S)AIWKME estimator.

Usage

```
Genetic.optim.AIWKME(datalist, ps, prep, t0, smooth = TRUE)
```

Arguments

datalist	A list used to calculate the (S)AIWKME estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving treatment given baseline covariates named fal. Fps.AIWKME can produce ps by positing logistic model.

prep	A list including the augmented terms in the numerator with treatment all to 1 named gamma.num.1 and all to 0 named gamma.num.0 and in the denominator with treatment all to 1 named gamma.den.1 and all to 0 named gamma.den.0; gamma.num.1 and the others are matrix with ordered observed time as rows and patients as columns. Fprep.AIWKME can produce prep by positing Cox proportional hazards model.
t0	A predetermined time.
smooth	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

A numeric vector in which the last number is the estimated optimal t0-year survival probability and others are the estimated parameters of the optimal treatment regime.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0
t0=5

# calculate ps and prep
ps=Fps.AIWKME(datalist)
prep=Fprep.AIWKME(datalist, t0)

Genetic.optim.AIWKME(datalist, ps, prep, t0, smooth=TRUE)
```

`Genetic.optim.DRKMEIV` *The optimal treatment regime based on the (S)DRKMEIV estimator.*

Description

Given a predetermined t0, estimate the optimal treatment regime by maximizing t0-year survival probability based on the (S)DRKMEIV estimator.

Usage

```
Genetic.optim.DRKMEIV(datalist, ps, prep, t0, smooth = TRUE)
```

Arguments

`datalist`	A list used to calculate the (S)DRKMEIV estimator including instrument named `z`, treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.
`ps`	A list including the probability of receiving instrument given baseline covariates named `fzl`, the probability of receiving treatment given baseline covariates and instrument equaling 0 named `fal0`, the probability of receiving treatment given baseline covariates and instrument equaling 1 named `fal1`, and the difference between fal1 and fal0 named `deltal`. `Fps.DRKMEIV` can produce `ps` by positing logistic model.
`prep`	A list including estimates $\hat{\gamma}_1(\boldsymbol{L}; s)$ with treatment all to 1 named `gamma.num.1` and all to 0 named `gamma.num.0`, $\hat{\gamma}_1'(\boldsymbol{L}; s)$ with treatment all to 1 named `gammaa.num.1` and all to 0 named `gammaa.num.0`, $\hat{\gamma}_2(\boldsymbol{L}; s)$ with treatment all to 1 named `gamma.den.1` and all to 0 named `gamma.den.0`, and $\hat{\gamma}_2'(\boldsymbol{L}; s)$ with treatment all to 1 named `gammaa.den.1` and all to 0 named `gammaa.den.0`; `gamma.num.1` and the others are matrix with ordered observed time as rows and patients as columns. There are also estimates for the last term of the (S)DRKMEIV estimator. More details can be found in references. `Fprep.DRKMEIV` can produce `prep` by positing Cox proportional hazards model.
`t0`	A predetermined time to point out that t0-year survival probability is our estimate
`smooth`	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

A numeric vector in which the last number is the estimated optimal t0-year survival probability and the others are the estimated parameter of the optimal treatment regime.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

Examples

```
# load data
data(simulation)

# order the data by observed time and select the first 200 patients to speed up
simulation=simulation[order(simulation$Survival)[1:200],]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0
t0=1

# calculate ps and prep
ps=Fps.DRKMEIV(datalist, t0)
prep=Fprep.DRKMEIV(datalist, ps, t0)


Genetic.optim.DRKMEIV(datalist, ps, prep, t0, smooth=TRUE)
```

Genetic.optim.IWKME *The optimal treatment regime based on the (S)IWKME estimator.*

Description

Given a predetermined t0, estimate the optimal treatment regime by maximizing t0-year survival probability based on the (S)IWKME estimator.

Usage

```
Genetic.optim.IWKME(datalist, ps, t0, smooth = TRUE)
```

Arguments

`datalist`	A list used to calculate the (S)IWKME estimator including treatment named `a`, observed time named `obs.t`, censoring indicator (0, censored) named `delta`, and baseline covariates used to assign treatment named `l`. Notice that all the data in the datalist should be ordered by observed time.
`ps`	A list including the probability of receiving treatment given baseline covariates named `fal`. `Fps.IWKME` can produce `ps` by positing logistic model.
`t0`	A predetermined time.
`smooth`	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

A numeric vector in which the last number is the estimated optimal t0-year survival probability and the others are the estimated parameter of the optimal treatment regime.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0
t0=5

# calculate ps
ps=Fps.IWKME(datalist)

Genetic.optim.IWKME(datalist, ps, t0, smooth=TRUE)
```

Genetic.optim.IWKMEIV *The optimal treatment regime based on the (S)IWKMEIV estimator.*

Description

Given a predetermined t0, estimate the optimal treatment regime by maximizing t0-year survival probability based on the (S)IWKMEIV estimator.

Usage

```
Genetic.optim.IWKMEIV(datalist, ps, t0, smooth = TRUE)
```

Arguments

datalist	A list used to calculate the (S)IWKMEIV estimator including instrument named z, treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving instrument given baseline covariates named fzl and the difference between fal1 and fal0 named deltal, where fal0 denotes the probability of receiving treatment given baseline covariates and instrument equaling 0, and fal1 denotes the probability of receiving treatment given baseline covariates and instrument equaling 1. Fps.IWKMEIV can produce ps by positing logistic model.
t0	A predetermined time.
smooth	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

A numeric vector in which the last number is the estimated optimal t0-year survival probability and others are the estimated parameter of the optimal treatment regime.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0
t0=1

# calculate ps and prep
ps=Fps.IWKMEIV(datalist, t0)

Genetic.optim.IWKMEIV(datalist, ps, t0, smooth=TRUE)
```

IWKME *The (S)IWKME estimator.*

Description

Given a predetermined t0 and eta, calculate t0-year potential survival probability based on the (S)IWKME estimator.

Usage

```
IWKME(eta, datalist, ps, t0, smooth = TRUE)
```

Arguments

eta	The parameters of the regime.
datalist	A list used to calculate the (S)IWKME estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Fps.IWKME can produce ps by positing logistic model. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving treatment given baseline covariates named fal.
t0	A predetermined time.
smooth	A logic variable indicating wether a smoothed estimator should be used.

Details

More details can be found in references.

Value

Estimated potential survival probability given eta and t0.

References

Jiang, R., Lu, W., Song, R., and Davidian, M. (2017) On estimation of optimal treatment regimes for maximizing t-year survival probability. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **79:** 1165-1185. DOI:10.1111/rssb.12201

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
```

```
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# calculate ps
ps=Fps.IWKME(datalist)

# predetermined t0 and eta
t0=5
eta=c(1,2,3)

IWKME(eta, datalist, ps, t0, smooth=TRUE)
```

IWKMEIV *The (S)IWKMEIV estimator.*

Description

Given a predetermined t0 and eta, calculate t0-year potential survival probability based on the (S)IWKMEIV estimator.

Usage

```
IWKMEIV(eta, datalist, ps, t0, smooth = TRUE)
```

Arguments

eta	The parameters of the regime.
datalist	A list used to calculate the (S)IWKMEIV estimator including treatment named a, observed time named obs.t, censoring indicator (0, censored) named delta, and baseline covariates used to assign treatment named l. Notice that all the data in the datalist should be ordered by observed time.
ps	A list including the probability of receiving instrument given baseline covariates named fzl and the difference between fal1 and fal0 named deltal, where fal0 denotes the probability of receiving treatment given baseline covariates and instrument equaling 0, and fal1 denotes the probability of receiving treatment given baseline covariates and instrument equaling 1. Fps.IWKMEIV can produce ps by positing logistic model.
t0	A predetermined time.
smooth	A logic variable indicating wether a smoothed version should be used.

Details

More details can be found in references.

Value

Estimated potential survival probability given eta and t0.

References

Xia, J., Zhan, Z., Zhang, J. (2022) Estimating optimal treatment regime in survival contexts using an instrumental variable. Under Review.

Examples

```
# load data
data(simulation)
simulation=simulation[order(simulation$Survival),]

# convert the data into a datalist
datalist=list(z=simulation$Instrument,a=simulation$Treatment,
              obs.t=simulation$Survival,delta=simulation$Status,
              l=cbind(simulation$Covariate1,simulation$Covariate2))

# predetermined t0 and eta
t0=5
eta=c(1,2,3)

# calculate ps and prep
ps=Fps.IWKMEIV(datalist, t0)

IWKMEIV(eta, datalist, ps, t0, smooth=TRUE)
```

`simulation` *Simulation*

Description

A simulation data to help understand and implement the functions in the package. 'Instrument' denotes the binary instrumental variable. 'Treatment' denotes the binary treatment. 'Survival' denotes the observed survival time. 'Status' denotes whether the the data is censoring where '0' means censoring. 'Covariate' denotes the baseline characteristics.

Usage

```
simulation
```

Format

An object of class `data.frame` with 500 rows and 6 columns.

Examples

```
head(simulation)
```

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