Package ‘MIIPW’

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Type Package

Title IPW and Mean Score Methods for Time-Course Missing Data

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Description Contains functions for data analysis of Repeated measurement continuous,categorical data using MCMC. Data may contain missing value in response and covariates. Mean Score Method and Inverse Probability Weighted method for parameter estimation when there is missing value in covariates are also included.
Reference for mean score method, inverse probability weighted method is
Wang et al(2007)<doi:10.1093/biostatistics/kxl024>.

Imports R2jags, utils,matlib,stats

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R topics documented:

`agedata` *Continuous repeated measurement data*

Description

dataset of observations made at various timepoints,variable age with no missing value and agemiss with missing value

Usage

```
data(agedata)
```

Format

A `tibble` with 6 columns which are :

age age of subject

agemiss age with missing value

1 Observation on timepoint 1

2 Observation on timepoint 2

3 Observation on timepoint 3

4 Observation on timepoint 4

`aipw1` *Estimate of linear regression parameter from AIPW1*

Description

provides augmented inverse probability weighted estimates of parameters for linear regression model of response variable using different covariance structure

Usage

```
aipw1(cvstr = "unstructured", Dep, Id, Time, m, n, prob, data)
```

Arguments

`cvstr`	"unstuctured","compound","ToE","AR1","markov", "independence"
`Dep`	column name of dependent variable in the dataset
`Id`	column name of id of subjects in the dataset
`Time`	column name of timepoints in the dataset
`m`	starting column number of covariates
`n`	ending column number of covariates
`prob`	vector of probabilities not having missing value in covariate, which must be known by the user from previous studies. In the example we consider 4 observations for each subject,so we create a vector of 4 and applied in the function.
`data`	balanced longitudinal data set where each subject's outcome has been measured at same time points and number of visits for each patient is similar covariance structure of the outcome variable like "unstuctured","compound","ToE","AR1" ,"markov","independence"

Details

It uses the inverse probability weighted method to reduce the bias due to missing covariate in linear regression model. The estimating equation is

$$\sum_{i=1}^{k}\sum_{j=1}^{n}(\frac{\delta_{ij}}{\pi_{ij}}S(Y_{ij},\mathbf{X}_{ij},\mathbf{X}'_{ij})+(1-\frac{\delta_{ij}}{\pi_{ij}})\phi(\mathbf{V}=\mathbf{v}))=0$$

where $\delta_{ij}=1$ if there is missing value in covariates and 0 otherwise, $\mathbf{X}$ is fully observed all subjects and $\mathbf{X}'$ is partially missing, where $\mathbf{V}=(Y,\mathbf{X})$

Value

estimated parameter value for multiple linear regression model,AIC,BIC

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
data(srdata)
aipw1(cvstr="ToE",Dep="C6kine",Id="ID",Time="Visit",m=5,n=10,prob=rep(0.1,4),data=srdata)
```

---

aipw2 *Estimate of linear regression parameter from AIPW2*

Description

provides augmented inverse probability weighted estimates of parameters for linear regression model of response variable using different covariance structure

Usage

```
aipw2(cvstr = "unstructured", Dep, Id, Time, m, n, data)
```

Arguments

cvstr	"unstuctured","compound","ToE","AR1","markov", "independence"
Dep	column name of dependent variable in the dataset
Id	column name of id of subjects in the dataset
Time	column name of timepoints in the dataset
m	starting column number of covariates
n	ending column number of covariates
data	balanced longitudinal data set where each subject's outcome has been measured at same time points and number of visits for each patient is same, covariance structure of the outcome variable

Details

It uses the inverse probability weighted method to reduce the bias due to missing covariate in linear regression model. The estimating equation is

$$\sum_{i=1}^{k}\sum_{j=1}^{n}(\frac{\delta_{ij}}{\pi_{ij}}S(Y_{ij},\mathbf{X}_{ij},\mathbf{X}'_{ij})+(1-\frac{\delta_{ij}}{\pi_{ij}})\phi(\mathbf{V}=\mathbf{v}))=0$$

where $\delta_{ij}=1$ if there is missing value in covariates and 0 otherwise, $\mathbf{X}$ is fully observed all subjects and $\mathbf{X}'$ is partially missing, where $\mathbf{V}=(Y,\mathbf{X})$ and π_{ij} are estimated value.

Value

estimated parameter value for multiple linear regression model,AIC,BIC

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
data(srdata)
aipw2(cvstr="ToE",Dep="C6kine",Id="ID",Time="Visit",m=5,n=10,data=srdata)
```

---

bbern *Bayesian analysis of generalized mixed linear model using MCMC*

Description

Provides bayesian analysis of generalized mixed linear model where the repeated measure(with missing value) follows bernoulli distrbution using MCMC

Usage

```
bbern(m, n, nc, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`nc`	number of MCMC chains
`data`	dataset with entries 0,1. column names are age,grp(group),gen(gender),0,1,2,3,4 (time points)

Details

The model for the response variable is given by

$$Y_{ij} \sim Bernoulli(\mu_{ij})$$

where link function is

$$logit(\mu_{ij}) = \beta_1 + \beta_2 t_j + \beta_3 t_j^2 + \beta_4 age_i + \beta_5 gen_i \beta_6 grp_i + b_{1i}$$

where i is the ith individual and j is the timepoint.

Value

posterior distribution results of parameters.

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(catadata)
bbern(m=1,n=3,nc=1,data=catadata)
##
```

`bgnml` *Bayesian analysis of generalised linear mixed model for Poisson outcome variable with two random effect*

Description

provides bayesian analysis of generalised linear mixed model with log link function for categorical response using MCMC

Usage

```
bgnml(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with integer entries(including NA values), first row represents time points. In this function we are using observations at four timepoints, function takes first four columns of the countdata for the example given in the package

Details

The response variable Y_{ij} follows poisson distribution ,mean and variance given random effects $E(Y_{ij}|b_{1i}, b_{2i}) = Var(Y_{ij}|b_{1i}, b_{2i})$ with link function $log(\mu_{ij}) = \beta_1 + b_{1i} + (\beta_2 + b_{2i})(X_{ij} - \beta_3)$ where i is the ith subject and j is the timepoint.

Value

posterior distribution result of parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(countdata)
bgnml(m=1,n=2,n.chains = 1,data=countdata)
##
```

`bnpos` *Bayesian analysis of generalised nonlinear mixed model with one random effect*

Description

Bayesian analysis of generalized nonlinear mixed model where response follows poisson distribution using MCMC

Usage

```
bnpos(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with integer entries with missing values. first row represents proportion,size of dataset should be 11 by 6. Inside the function we are taking first 6 column of the propdata in this package for the example given.

Details

Here the response variable Y_{ij} has poisson distribution mean and variance given one random effect as $E(Y_{ij}|b_i) = Var(Y_{ij}|b_i)$ where link function is

$$log(E(Y_{ij}|b_i)) = \beta_1 + b_{1i} + \beta_2 exp(-\beta_3 x_{ij})$$

where i is the ith subject and j is the timepoint and $b_i \sim N(0, \sigma_1^2)$ are independent.

Value

posterior distribution result of parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(propdata)
bnpos(m=1,n=3,n.chains=1,data=propdata)
##
```

---

bpois *Bayesian analysis of generalized mixed linear model using MCMC*

Description

provides Bayesian analysis of generalized mixed linear model where the repeated measure(with missing value) has poisson distrbution using MCMC

Usage

```
bpois(m, n, n.chains, data)
```

Arguments

m	starting column number
n	ending column number
n.chains	number of MCMC chains
data	dataset whose first row is the respective time points at which observations(integers) are taken where timepoints are the respective column names,dimension should be 26 by 3 and design matrix with column names X1,X2,X3,X4

Details

The model for this function is

$$Y_{ij} \sim Poisson(\mu_{ij})$$

with link function

$$log(\mu_{ij}|b_{1i}, b_{2i}) = \beta_1 + \beta_2 t_j + \beta_3 X_1 + \beta_4 X_2 + \beta_5 X_3 + \beta_6 X_4 + b_{1i} + b_{2i} t_j$$

where the b_{1i}, b_{2i}, i = 1,2,...,N are independent and have a two-dimensional normal distribution with a 2 by 1 mean vector 0 and unknown 2 by 2 covariance matrix Σ

Value

posterior distribution result of the parameter

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(catdata)
bpois(m=1,n=3,n.chains=1,data=catdata)
##
```

---

bposa — *Bayesian analysis of generalized mixed linear model using MCMC*

Description

provides Bayesian analysis of generalized mixed linear model where the repeated measure(with missing value) has poisson distrbution using MCMC

Usage

```
bposa(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset whose first row is the respective time points at which observations(integers) are taken where timepoints are the respective column names,dimension have to be 26 by 3.

Details

The model for this function is

$$Y_{ij} \sim Poisson(\mu_{ij})$$

with link function

$$log(\mu_{ij}|b_{1i}, b_{2i}) = \beta_1 + \beta_2 t_j + b_{1i} + b_{2i} t_j$$

where the b_{1i}, b_{2i}, i = 1,2,. . . ,N are independent and have a two-dimensional normal distribution with a 2 by 1 mean vector 0 and unknown 2 by 2 covariance matrix Σ

Value

posterior distribution result of the parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(catdata)
bposa(m=1,n=2,n.chains=1,data=catdata)
##
```

`bprp` *Bayesian analysis of generalised nonlinear mixed model with one random effect using MCMC*

Description

provides Bayesian analysis of generalized nonlinear mixed model where response follows Poisson distribution using MCMC

Usage

```
bprp(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with entries 0,1. first row represents proportion;size of dataset should be 11 by 6. Inside the function we are taking first 6 column of the propdata in this package for the given example

Details

The response variable Y_{ij} follows poisson distribution with conditional mean and variance $E(Y_{ij}|b_i) = Var(Y_{ij}|b_i)$ b_i are independent $N(0, \sigma^2)$ and link function is

$$logit(\theta_{ij}) = \beta_1 + \beta_2(1 - x_{ij}^{\beta_3 + b_i})$$

where $\theta_{ij} = P(Y_{ij} = 1/b_i)$, x_{ij} is the proportion

Value

posterior distribution result of parameters.

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(propdata)
bprp(m=1,n=4,n.chains=1,data=propdata)
##
```

`brgan` *Bayesian analysis of mean response model with autoregressive covariance matrix*

Description

Bayesian analysis of mean response over time and age (quadratic trends) using MCMC for AR1 covariance structure,where age follows normal distribution

Usage

```
brgan(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with first column is age(there are missing values in age),and columns other than age are observation at four different timepoints, where timepoints are the respective column names.

Details

The model for the response is

$$Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_3 t_{ij}^2 + \beta_4 age_i + e_{ij}$$

$$e_{ij} = \rho e_{ij-1} + u_{ij}$$

,$u_{ij} \sim N(0, 1/\tau)$; ρ is the correlation coefficient where i refers to ith individual and j is the timepoint. Missing values of covariate age is imputed assuming age follows normal distribution.

Value

posterior distribution result of the parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
##
data(agedata)
brgan(m=1,n=3,n.chains=1,data=agedata)
##
```

---

bygan *Bayesian analysis of mean response model with autoregressive covariance matrix*

Description

Bayesian analysis of mean response over time and age (quadratic trends) using MCMC for AR1 covariance structure,where age follows normal distribution

Usage

```
bygan(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with first column is age(there are missing values in age),and columns other than age are observation at four different timepoints, where timepoints are the respective column names.

Details

The model for the response is

$$Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_3 t_{ij}^2 + \beta_4 age_i + e_{ij}$$

$$e_{ij} = \rho e_{ij-1} + u_{ij}$$

,$u_{ij} \sim N(0, 1/\tau)$; ρ is the correlation coefficient where i refers to ith individual and j is the timepoint. Missing values of covariate age is imputed assuming age follows normal distribution.

Value

posterior distribution result of parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

See Also

Brgan

Examples

```
##
data(agedata)
bygan(m=1,n=3,n.chains=1,data=agedata)
##
```

---

byran — *Bayesian analysis of non linear mean response model with random effect compound covariance matrix*

Description

Provides bayesian analysis of random effect model for repeated measurement data with missing values using MCMC for compound symmetry covariance structure,where age follows normal distribution

Usage

```
byran(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with first row represents proportion,dimension have to be 9 by 11.

Details

The model for the response is

$$Y_{ij} = \beta_1 + b_i + \beta_2 exp(-\beta_3 x_{ij}) + e_{ij}$$

,where e_{ij} are independent $N(0, \sigma^2)$ and independent of n random effects $b_i \sim N(0, \sigma_b^2)$,where i refers to ith individual and j is the timepoint.

Value

posterior distribution result of parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(propdata)
byran(m=1,n=4,n.chains=1,data=propdata)
##
```

---

byrega *Bayesian analysis of mean response model with autoregressive covariance matrix*

Description

provides bayesian analysis of mean response over time and age (quadratic trends) using MCMC for AR1 covariance structure

Usage

```
byrega(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset with first column is age,and columns other than age are observation at four different timepoints, where timepoints are the respective column names

Details

The model for the response is

$$Y_{ij} = \beta_1 + \beta_2 t_{ij} + \beta_3 t_{ij}^2 + \beta_4 age_i + e_{ij}$$

$$e_{ij} = \rho e_{ij-1} + u_{ij}$$

,$u_{ij} \sim N(0, 1/\tau)$; ρ is the correlation coefficient where i refers to ith individual and j is the time-point.

Value

posterior distribution result of the parameters.

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

References

Broemeling, Lyle D. Bayesian methods for repeated measures. CRC Press, 2015.

Examples

```
##
data(agedata)
byrega(m=1,n=3,n.chains=1,data=agedata)
##
```

`byrga` *Bayesian analysis of mean response model with autoregressive covariance matrix*

Description

Bayesian analysis is performed using MCMC and uses a linear regression with an autoregressive covariance matrix for the response

Usage

```
byrga(m, n, n.chains, data)
```

Arguments

m	starting column number
n	ending column number
n.chains	number of MCMC chains
data	dataset whose first row is the respective time points at which observations are taken

Details

The model for the response is

$$Y_{ij} = X'_{ij}\beta + e_{ij}$$

and

$$e_{ij} = \rho e_{ij-1} + u_{ij}$$

,$u_{ij} \sim N(0, 1/\tau)$; ρ is the correlation coefficient where i refers to ith individual and j is the time-point.

Value

posterior distribution results of the parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
##
data(repeatdata)
byrga(m=1,n=3,n.chains=1,data=repeatdata)
##
```

`byrgu` *Bayesian analysis of repeated measurement data using linear regression with an unstructured covariance matrix*

Description

Bayesian analysis is performed using MCMC and uses a linear regression with an unstructured covariance matrix and the prior distributions are uninformative normal distributions for the regression coefficients and an uninformative Wishart for the 3 by 3 precision matrix of the outcome variable measured at 3 timepoints.

Usage

```
byrgu(m, n, n.chains, data)
```

Arguments

`m`	starting column number
`n`	ending column number
`n.chains`	number of MCMC chains
`data`	dataset whose first row is the respective time points at which observations are taken

Details

The mean reponse model is

$$E(Y_{ij}) = \beta_0 + \beta_1 t_j$$

with unstructured covariance Σ where i refers to ith individual and j is the timepoint.

Value

posterior distribution results of the parameters

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
##
data(repeatdata)
byrgu(m=1,n=3,n.chains=1,data=repeatdata)
##
```

`catadata` *Repeated measurement data with age,group,gender variable*

Description

dataset of observations made at various timepoints,no missing value in age,group,gender

Usage

```
data(catadata)
```

Format

A `tibble` with 8 columns which are :

age age of subject

grp group

gen gender

0 Observation on timepoint 0

1 Observation on timepoint 1

2 Observation on timepoint 2

3 Observation on timepoint 3

4 Observation on timepoint 4

`catdata` *Categorical repeated measurement data*

Description

dataset of observations made at various timepoints, with variable age,group ,gender. there are missing values in variables age,group also.

Usage

```
data(catdata)
```

Format

A `tibble` with 18 columns which are :

age age of subject

grp group

gen gender

0 Observation on timepoint 0

1 Observation on timepoint 1

2 Observation on timepoint 2

3 Observation on timepoint 3

4 Observation on timepoint 4

2 Observation on timepoint 2

7 Observation on timepoint 7

14 Observation on timepoint 14

agefull age of subject,no missing value

grpfull group,no missing value

genfull gender, no missing value

X1 takes value 0,1

X2 takes value 0,1

X3 takes value 0,1

X4 takes value 0,1

`countdata` *Repeated measurement data*

Description

dataset of observations made at various timepoints, variables take integer value. first row refers timepoint

Usage

```
data(countdata)
```

Format

A `tibble` with 7 columns which are :

X1 Observation on timepoint 1

X2 Observation on timepoint 2

X3 Observation on timepoint 3

X4 Observation on timepoint 4

X1 Observation on timepoint 2

X2 Observation on timepoint 7

X4 Observation on timepoint 14

`mskall` *Mean score method for missing covariate value in linear regression model for repeated measurement data*

Description

provides estimates of parameter from linear regression model using meanscore method for repeated measurement data.

Usage

```
mskall(cvstr = "unstructured", Dep, Id, Time, m, n, data)
```

Arguments

`cvstr`	"unstuctured","compound","ToE","AR1","markov","independence"
`Dep`	column name of dependent variable in the dataset
`Id`	column name of id of subjects in the dataset
`Time`	column name of timepoints in the dataset
`m`	starting column number of covariates
`n`	ending column number of covariates
`data`	balanced longitudinal data set where each subject's outcome has been measured at same time points and number of visits for each patient is samiliar covariance structure

Details

Mean score method is used for getting the missing score function value in the estimating equation.

Value

estimated parameter value for multiple linear regression model

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
data(srdata)
mskall(cvstr="ToE",Dep="C6kine",Id="ID",Time="Visit",m=5,n=10,data=srdata)
```

`mskopt` *Estimates of parameter corresponding to minimum AIC*

Description

provides estimates of parameter of linear regression model of the response variable corresponding to the minimum AIC value using mean score method with different covariance structure

Usage

```
mskopt(Dep, Id, Time, m, n, data)
```

Arguments

`Dep`	column name of dependent variable in the dataset
`Id`	column name of id of subjects in the dataset
`Time`	column name of timepoints in the dataset
`m`	starting column number of covariates
`n`	ending column number of covariates
`data`	balanced longitudinal data set where each subject's outcome has been measured at same time points and number of visits for each patient is same, covariance structure of the outcome variable like "unstuctured","compound","ToE", "AR1","markov","independence"

Details

It calculates the AIC value for the linear regression model

$$Y_{ij} = \beta_0 + \beta_1 x_{1ij} + \beta_2 x_{2ij} + ... + \beta_p x_{pij} + e_{ij}$$

using mean score method with different covariance structures and gives the estimates of parameter for minimum AIC value

Value

estimated parameter value for multiple linear regression model for that covariance structure with minimum AIC value.

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
data(srdata)
mskopt(Dep="C6kine",Id="ID",Time="Visit",m=5,n=10,data=srdata)
```

`propdata` *Categorical,Continuous repeated measurement data*

Description

dataset of observations made at various timepoints,first row refers probability

Usage

```
data(propdata)
```

Format

A `tibble` with 17 columns which are :

X1...X6 categorical data with values 0,1

X1..X11 continuous data

`repeatdata` *Continuous repeated measurement data*

Description

dataset whose first row is the respective time points at which observations are taken.First row refers to time points.

Usage

```
data(repeatdata)
```

Format

A `tibble` with 3 columns which are :

2 Observation on timepoint 2

4 Observation on timepoint 4

14 Observation on timepoint 14

`sipw` *Estimate of linear regression parameter using SIPW*

Description

provides simple inverse probability weighted estimates of parameters for linear regression model of response variable using different covariance structure

Usage

```
sipw(cvstr = "unstructured", Dep, Id, Time, m, n, data)
```

Arguments

`cvstr`	"unstuctured","compound","ToE","AR1","markov","independence"
`Dep`	column name of dependent variable in the dataset
`Id`	column name of id of subjects in the dataset
`Time`	column name of timepoints in the dataset
`m`	starting column number of covariates
`n`	ending column number of covariates
`data`	balanced longitudinal data set where each subject's outcome has been measured at same time points and number of visits for each patient is same, covariance structure of the outcome variable.

Details

It uses the inverse probability weighted method to reduce the bias due to missing covariate in linear regression model. The estimating equation is

$$\sum_{i=1}^{k}\sum_{j=1}^{n}\frac{\delta_{ij}}{\pi_{ij}}S(Y_{ij},\mathbf{X}_{ij},\mathbf{X}'_{ij})$$

=0 where $\delta_{ij} = 1$ if there is missing no value in covariates and 0 otherwise. $\mathbf{X}$ is fully observed all subjects and $\mathbf{X}'$ is partially missing.

Value

estimated parameter value for multiple linear regression model

Author(s)

Atanu Bhattacharjee,Bhrigu Kumar Rajbongshi and Gajendra K Vishwakarma

Examples

```
data(srdata)
sipw(cvstr="ToE",Dep="C6kine",Id="ID",Time="Visit",m=5,n=10,data=srdata)
```

---

srdata *protein data*

Description

Repeated measurement dataset, for each id we have four visit observations

Usage

```
data(srdata)
```

Format

A dataframe with 164 rows and 30 columns

ID ID of subjects

Visit Number of times observations recorded

event death as event 1 if died or 0 if alive

OS Duration of overall survival

leftcensored Left censoring information

lc Left censoring information

C6kine,.....,GFRalpha4 These are covariates

Examples

```
data(srdata)
```

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