Package ‘DPWeibull’

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Title Dirichlet Process Weibull Mixture Model for Survival Data
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Description Use Dirichlet process Weibull mixture model and dependent Dirichlet process Weibull mixture model for survival data with and without competing risks. Dirichlet process Weibull mixture model is used for data without covariates and dependent Dirichlet process model is used for regression data. The package is designed to handle exact/right-censored/interval-censored observations without competing risks and exact/right-censored observations for data with competing risks. Inside each cluster of Dirichlet process, we assume a multiplicative effect of covariates as in Cox model and Fine and Gray model. For wrapper of the DPdensity function from the R package DPpackage (already archived by CRAN) that uses the Low Information Omnibus prior, please check (<https://github.com/mjmartens/DPdensity-wrapper-with-LIO-prior>).
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R topics documented:

continue ................................................................. 2
continue.ddp ............................................................. 3
continue.ddpcomp ..................................................... 3
continue.dpm .......................................................... 4
Resume MCMC run

Description

Self-defined S3 method that resumes MCMC run from an object of class dpm, ddp, dpmcomp or ddpcomp.

Usage

continue(previous, iteration=1000, ...)

Arguments

- previous: An object of class dpm, ddp, dpmcomp or ddpcomp
- iteration: The number of iterations to continue sampling. The default is 1000.
- ...: Arguments to be passed to method

Value

An object of the class of previous.
**continue.ddp**

**Resume MCMC run**

**Description**

Resume MCMC run from an object of class ddp.

**Usage**

```r
## S3 method for class 'ddp'
continue(previous, ...)
```

**Arguments**

- `previous` An object of class ddp
- `...` Arguments to be passed to method

**Value**

An object of class ddp.

---

**continue.ddpcomp**

**Resume MCMC run**

**Description**

Resume MCMC run from an object of class ddpcomp.

**Usage**

```r
## S3 method for class 'ddpcomp'
continue(previous, ...)
```

**Arguments**

- `previous` An object of class ddpcomp
- `...` Arguments to be passed to method

**Value**

An object of class ddpcomp.
**Description**

Resume MCMC run from an object of class `dpm`.

**Usage**

```r
## S3 method for class 'dpm'
continue(previous,...)
```

**Arguments**

- `previous` An object of class `dpm`
- `...` Arguments to be passed to method

**Value**

An object of class `dpm`.

---

**Description**

Resume MCMC run from an object of class `dpmcomp`.

**Usage**

```r
## S3 method for class 'dpmcomp'
continue(previous,...)
```

**Arguments**

- `previous` An object of class `dpmcomp`
- `...` Arguments to be passed to method

**Value**

An object of class `dpmcomp`. 
Description

We reused the dataset "deterioration" of the time to cosmetic deterioration of the breast for breast cancer patients provided by the package DPpackage, which is orphaned in CRAN now. The two treatments are radiation alone and radiation coupled with chemotherapy. The event time is either right censored or interval censored.

Usage

data(deterioration)

Format

A data frame with 94 observations on the following 3 variables.

left  a numeric vector giving the left limit of the interval
right a numeric vector giving the right limit of the interval, -999 stands for right censoring
trt   a numeric vector giving the treatment (0 = radiation only, 1 = radiation plus chemotherapy)

Source


Examples

data(deterioration)

## maybe str(deterioration) ; plot(deterioration) ...
**dpweib**

*Dirichlet process mixture/Dependent Dirichlet process model for survival/competing risks data*

**Description**

Use Dirichlet process mixture/dependent Dirichlet process Weibull model for survival data with/without competing risks. When regression covariates are present, the model is a dependent Dirichlet process model. For competing risks data we only consider two potential causes of events and the user can combine events of secondary interests. In competing risks regression model, the estimates provided focus on the primary cause (cause 1), and the user can switch the event indicator to get the estimates for the secondary cause.

**Usage**

```r
dpweib(formula, data, high.pct = NULL, predtime = NULL, comp = FALSE,
alpha = 0.05, simultaneous = FALSE, burnin = 8000, iteration = 2000,
alpha00 = 1.354028, alpha0 = 0.03501257, lambda00 = 7.181247,
alphaalpha = 0.2, alphalambda = 0.1, a = 1, b = 1, gamma0 = 1,
gamma1 = 1, thin = 10, betasl = 2.5, addgroup = 2)
```

**Arguments**

- **formula**: A formula written in regular $y \sim x_1 + x_2 + \ldots + x_p$ regression format. $y$ is a Surv object for survival data (including interval censored data) and Hist object for competing risks data. The regression covaraites can be continuous or factors. Since the model is flexible enough, interaction terms are not necessary.

- **data**: an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model. If not found in data, the variables are taken from environment(formula), typically the environment from which dpweib is called.

- **high.pct**: The estimated high percentile (95th) percentile of the data-generating distribution of the average population given by the user. If the user does not provide this value, we will look into the data. If there is no censoring, we take the 95th percentile of the observed data. If censoring takes less than 15% of the total observations, we use the maximum of the observed time. If the censoring takes more than 15%, we suggest a scaling parameter by first finding the time $t$ corresponding to the observed survival rate at the end of study from the plot of the median of the components (survmedian) generated by our LIO prior on a 0 to 10 scale, then set the scaling parameter to be the largest observation time multiplied by 10/t.

- **predtime**: A vector given by the user to specify the time points where the inferences will be made. If the user does not provide it, we will take 40 time points located evenly from the beginning to the high.pct.

- **comp**: A logical value indicating whether this is competing risks data or not. The default is FALSE.
alpha $1 - \alpha$ is the probability for constructing credible intervals. The default $\alpha$ is 0.05.

simultaneous A logical value indicating whether to provide simultaneous credible intervals. The default is FALSE.

burnin Number of burnin iterations. The default is 5000.

iteration Number of iterations. The default is 5000.

alpha00 Parameter for the base distribution of $\lambda$ in non-competing risks data model and $\lambda_1, \lambda_2$ in competing risks data model. The default is 1.354028.

alpha0 Parameter for the base distribution of $\lambda$ in non-competing risks data model and $\lambda_1, \lambda_2$ in competing risks data model. The default is 0.03501257.

lambda00 Parameter for the base distribution of $\lambda$ in non-competing risks data model and $\lambda_1, \lambda_2$ in competing risks data model. The default is 7.181247.

alphaalpha Parameter for the base distribution of $\alpha$ in non-competing risks data model and $\alpha_1, \alpha_2$ in competing risks data model. The default is 0.2.

alphalambda Parameter for the base distribution of $\alpha$ in non-competing risks data model and $\alpha_1, \alpha_2$ in competing risks data model. The default value is 0.1.

a Parameter for the gamma prior of the concentration parameter of DP. The default is 1.

b Parameter for the gamma prior of the concentration parameter of DP. The default is 1.

gamma0 Parameter for the base distribution of $p$ in competing risks data model. The default value is 1.

gamma1 Parameter for the base distribution of $p$ in competing risks data model. The default value is 1.

thin Thinning. The default value is 10.

betasl Parameter for the base distribution of the regression coefficients $\beta$ in non-competing risks data model and $\beta_1$ and $\beta_2$ in competing risks data model. The default value is 2.5.

addgroup Number of new parameters proposed for each cluster assignment. The default is 2 (suggested by Neal).

Details

For no regression, no competing risks data, the function dpweib implements dirichlet process Weibull mixture model. The basic form of model is the following.

\[
\begin{align*}
  y_i | \alpha_i, \lambda_i & \sim \text{Weib}(t_i | \alpha_i, \lambda_i), \quad i = 1, \ldots, n \\
  (\alpha_i, \lambda_i) | G & \sim G, \quad i = 1, \ldots, n \\
  G & \sim \text{DP}(G_0, \nu) \\
  G_0 & = \text{Ga}(\lambda | \alpha_0, \lambda_0) I_{f(\lambda), \infty}(\alpha) \text{Ga}(\alpha_0, \lambda_0) \\
  \lambda_0 & \sim \text{Ga}(\alpha_00, \lambda_00) \\
  \nu & \sim \text{Ga}(a, b)
\end{align*}
\]

where $f(\lambda) = \max\{0, \log\{\log(20)/\lambda\}/\log(25))$.

For regression data without competing risks, the method is a mixture of Cox model.

In competing risks data, the likelihood for each individual can be written as
\[ L = \{f_1(t_i)\}^{I(c_i=1)} \{f_2(t_i)\}^{I(c_i=2)} \{1 - F_1(t_i) - F_2(t_i)\}^{I(c_i=0)}, \]
where \( f_1(\cdot) \) and \( f_2(\cdot) \) are the cause-specific density functions for cause 1 and 2 and survival function for the \( i \)th observation can be expressed as \( 1 - F_1(t_i) - F_2(t_i) \). In order to model it, we introduce a parameter \( p \), which is the cumulative incidence function of primary cause at \( \infty \), \( p = F_1(\infty) \). The likelihood can be written as
\[ L = \{pd_1(t_i)\}^{I(c_i=1)} \{(1-p)d_2(t_i)\}^{I(c_i=2)} \{(1-p)D_1(t_i) - (1-p)D_2(t_i)\}^{I(c_i=0)}. \]

Here the \( D_1, D_2, d_1, d_2 \) are the normalized baseline cumulative incidence functions and cause-specific density functions and are modeled with Weibull mixtures as above, while \( p \) is the normalizing parameter for the baseline distribution. When regression covariates are present in a competing risks data, we modify the above likelihood with respect to the value of covaraites, such that
\[ F_1(t|Z, \beta_1, p) = 1 - (1 - pD_{01}(t))^{\exp(Z^T\beta_1)}. \]
The cause-specific density function for cause 1 is
\[ f_1(t|Z, \beta_1, p) = \exp(Z^T\beta_1)[1 - pD_{01}(t)]^{\exp(Z^T\beta_1)-1}pd_{01}(t). \]
The model for the secondary cause is defined as
\[ F_2(t|Z, \beta_1, \beta_2, p) = (1-p)^{\exp(Z^T\beta_1)}(1 - (1 - D_{02}(t))^{\exp(Z^T\beta_2)}), \]
which leads to the cause-specific subdensity function for cause 2 as
\[ f_2(t|Z, \beta_2, p) = (1-p)^{\exp(Z^T\beta_1)}(1 - D_{02}(t))^{\exp(Z^T\beta_2)-1}exp(Z^T\beta_2)d_{02}(t). \]

**Value**

This function can generate 4 different kinds of output based on the data set given. They all share,
\[ c \]
a vector, the cluster assignment in the last iteration, useful for the resumption of MCMC iteration
a vector, the number of observations in each cluster from the last iteration, useful for the resumption of MCMC iteration
emptybasket only useful for the resumption of MCMC iteration
allbaskets only useful for the resumption of MCMC iteration
ngrp a vector, the number of clusters in each iteration, useful for the resumption of MCMC iteration
predtime the time points where the inferences are made
high.pct the scaling parameter of observations used in the model
usertime a logic value, whether user provides time for estimation or not

\( 1 - \alpha \) is the probability for constructing credible intervals.

Whether give simultaneous credible intervals.

For non-competing risks data, dpweib can generate two classes of output, dpm and ddp, for data with and without covariates separately. They both have

a matrix, saved samples of \( \alpha \)'s, the rows correspond to the iterations saved, the columns correspond to the observations

a matrix, saved samples of \( \lambda \)'s, the rows correspond to the iterations saved, the columns correspond to the observations

a matrix, saved samples of \( \lambda_0 \)'s, the rows correspond to the iterations saved, the columns correspond to the observations

a matrix, saved samples of \( \lambda \)'s under 0 to 10 scale, the rows correspond to the iterations saved, the columns correspond to the observations, only useful for the resumption of MCMC iteration

the left end point

the right end point

right censoring indicator

exact observation indicator

For dpm output, it has

a matrix, the estimated survival function for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

a vector, the estimated survival function at specified time points

a vector, the estimated pointwise upper credible interval for survival function at specified time points

a vector, the estimated pointwise lower credible interval for survival function at specified time points

a matrix, the estimated density function for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

a vector, the estimated density function at specified time points

a vector, the estimated pointwise upper credible interval for density function at specified time points
dpredl a vector, the estimated pointwise lower credible interval for density function at specified time points

h a matrix, the estimated hazard function for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

hpred a vector, the estimated hazard function at specified time points

hpredu a vector, the estimated pointwise upper credible interval for hazard function at specified time points

hpredl a vector, the estimated pointwise lower credible interval for hazard function at specified time points

When simultaneous is specified TRUE, the function also provides

Sbandu a vector, the estimated simultaneous upper credible interval for survival function at specified time points

Sbandl a vector, the estimated simultaneous lower credible interval for survival function at specified time points

dbandu a vector, the estimated simultaneous upper credible interval for density function at specified time points

dbandl a vector, the estimated simultaneous lower credible interval for density function at specified time points

hbandu a vector, the estimated simultaneous upper credible interval for hazard function at specified time points

hbandl a vector, the estimated simultaneous lower credible interval for hazard function at specified time points

For ddp output, it also has

betarec a matrix, saved samples of $\beta$s, which is consist of horizontal-merged blocks. One block corresponds to one observation. Inside each block, the rows correspond to the iterations saved, the columns correspond to the covariates.

x the covariate matrix

xmean a vector, the mean for each covariate (including created binary dummy covariates)

xsd a vector, the standized deviation for each covariate, if the covariate is binary, then it is set to be 0.5. (including created binary dummy covariates)

xscale The matrix used to scale log hazard ratio

loghr a matrix, the estimated log hazard ratio for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

loghr.est a vector, the estimated log hazard ratio at specified time points

loghru a vector, the estimated pointwise upper credible interval for log hazard ratio at specified time points

loghr1 a vector, the estimated pointwise lower credible interval for log hazard ratio at specified time points

indicator a vector, whether a covariate is binary
covnames 

When simultaneous is specified TRUE, the function also provides

loghrbandu 

a vector, the estimated simultaneous upper credible interval for log hazard ratio at specified time points

loghrbandl 

a vector, the estimated simultaneous lower credible interval for log hazard ratio at specified time points

For competing risks data, dpweib can generate two classes of output, dpmcomp and ddpcomp, for data with and without covariate separately. They both have

alpharec1 

a matrix, saved samples of $\alpha_1$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambdarec1 

a matrix, saved samples of $\lambda_1$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambda0rec1 

a matrix, saved samples of $\lambda_{01}$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambdascaled1 

a matrix, saved samples of $\lambda_1$s under 0 to 10 scale, the rows correspond to the iterations saved, the columns correspond to the observations, only useful for the resumption of MCMC iteration

alpharec2 

a matrix, saved samples of $\alpha_2$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambdarec2 

a matrix, saved samples of $\lambda_2$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambda0rec2 

a matrix, saved samples of $\lambda_{02}$s, the rows correspond to the iterations saved, the columns correspond to the observations

lambdascaled2 

a matrix, saved samples of $\lambda_2$s under 0 to 10 scale, the rows correspond to the iterations saved, the columns correspond to the observations, only useful for the resumption of MCMC iteration

prec 

a matrix, saved samples of $p$, the rows correspond to the iterations saved, the columns correspond to the observations

t 

the observed time

event 

the event indicator

For dpmcomp output, it has

CIF1 

a matrix, the estimated cumulative incidence function for cause 1 for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

CIF1.est 

a vector, the estimated cumulative incidence function of cause 1 at specified time points

CIF1u 

a vector, the estimated pointwise upper credible interval for cumulative incidence function of cause 1 at specified time points

CIF1l 

a vector, the estimated pointwise lower credible interval for cumulative incidence function of cause 1 at specified time points
d1 a matrix, the estimated cause-specific density function for cause 1 for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

d1.est a vector, the estimated cause-specific density function of cause 1 at specified time points

d1u a vector, the estimated pointwise upper credible interval for cause-specific density function of cause 1 at specified time points

d1l a vector, the estimated pointwise lower credible interval for cause-specific density function of cause 1 at specified time points

h1 a matrix, the estimated subdistribution hazard function for cause 1 at specified time points, the columns correspond to time points, the rows correspond to saved iterations

h1.est a vector, the estimated subdistribution hazard function of cause 1 at specified time points

h1u a vector, the estimated pointwise upper credible interval for subdistribution hazard function of cause 1 at specified time points

h1l a vector, the estimated pointwise lower credible interval for subdistribution hazard function of cause 1 at specified time points

CIF2 a matrix, the estimated cumulative incidence function for cause 2 for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

CIF2.est a vector, the estimated cumulative incidence function of cause 2 at specified time points

CIF2u a vector, the estimated pointwise upper credible interval for cumulative incidence function of cause 2 at specified time points

CIF2l a vector, the estimated pointwise lower credible interval for cumulative incidence function of cause 2 at specified time points

d2 a matrix, the estimated cause-specific density function for cause 2 for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

d2.est a vector, the estimated cause-specific density function of cause 2 at specified time points

d2u a vector, the estimated pointwise upper credible interval for cause-specific density function of cause 2 at specified time points

d2l a vector, the estimated pointwise lower credible interval for cause-specific density function of cause 2 at specified time points

h2 a matrix, the estimated subdistribution hazard function for cause 2 for each saved iteration, the columns correspond to time points, the rows correspond to saved iterations

h2.est a vector, the estimated subdistribution hazard function of cause 2 at specified time points

h2u a vector, the estimated pointwise upper credible interval for subdistribution hazard function of cause 2 at specified time points
a vector, the estimated pointwise lower credible interval for subdistribution hazard function of cause 2 at specified time points

When simultaneous is specified TRUE, the function also provides

CIF1bandu a vector, the estimated simultaneous upper credible interval for cumulative incidence function of cause 1 at specified time points
CIF1bandl a vector, the estimated simultaneous lower credible interval for cumulative incidence function of cause 1 at specified time points
d1bandu a vector, the estimated simultaneous upper credible interval for cause-specific density function of cause 1 at specified time points
d1bandl a vector, the estimated simultaneous lower credible interval for cause-specific density function of cause 1 at specified time points
h1bandu a vector, the estimated simultaneous upper credible interval for subdistribution hazard function of cause 1 at specified time points
h1bandl a vector, the estimated simultaneous lower credible interval for subdistribution hazard function of cause 1 at specified time points
CIF2bandu a vector, the estimated simultaneous upper credible interval for cumulative incidence function of cause 2 at specified time points
CIF2bandl a vector, the estimated simultaneous lower credible interval for cumulative incidence function of cause 2 at specified time points
d2bandu a vector, the estimated simultaneous upper credible interval for cause-specific density function of cause 2 at specified time points
d2bandl a vector, the estimated simultaneous lower credible interval for cause-specific density function of cause 2 at specified time points
h2bandu a vector, the estimated simultaneous upper credible interval for subdistribution hazard function of cause 2 at specified time points
h2bandl a vector, the estimated simultaneous lower credible interval for subdistribution hazard function of cause 2 at specified time points

For ddpcomp output, it also has

betarec1 a matrix, saved samples of $\beta_1$s, which is consist of horizontal-merged blocks. One block corresponds to one observation. Inside each block, the rows correspond to the iterations saved, the columns correspond to the covariates.
betarec2 a matrix, saved samples of $\beta_2$s, which is consist of horizontal-merged blocks. One block corresponds to one observation. Inside each block, the rows correspond to the iterations saved, the columns correspond to the covariates.
xmean a vector, the mean for each covariate(including created dummy covariates)
xsd a vector, the standized deviation for each covariate, if the covariate is binary, then it is set to be 0.5(including created dummy covariates).
x the covariate matrix
xscale The matrix used to scale log hazard ratio
covnames a vector, the names of covariates
loghr.est the estimated log subdistribution hazard ratio at specified time points for cause 1
loghru the estimated pointwise upper credible interval for log subdistribution hazard ratio at specified time points for cause 1
loghrl the estimated pointwise lower credible interval for log subdistribution hazard ratio at specified time points for cause 1
indicator a vector, whether a covariate is binary

When simultaneous is specified TRUE, the function also provides

loghrbandu a vector, the estimated simultaneous upper credible interval for log subdistribution hazard ratio at specified time points
loghrbandl a vector, the estimated simultaneous lower credible interval for log subdistribution hazard ratio at specified time points

Source

Examples
## Not run:
library(survival)
library(DPWeibull)
data(veteran)

DPresult1<-dpweib(Surv(time,status)-1,data=veteran)
summary(DPresult1)
opar<-par(mfrow=c(1,3),
mar=c(3.1, 3.1, 3.1, 5.1),
mgp=c(2, 0.5, 0),
oma=c(0, 0, 0, 4))
plot(DPresult1)
par(opar)

DPresult2<-dpweib(Surv(time,status)-factor(trt)+age,data=veteran)
summary(DPresult2)
opar<-par(mfrow=c(1,2),
library(survival)
library(prodlim)
library(riskRegression)
library(DPWeibull)

data(Paquid)

Paquid<-Paquid[1:500,]
DPresult1<-dpweib(Hist(time, status)~1,data=Paquid,  
                  predtime = seq(from=min(Paquid$time),to=max(Paquid$time),length=200))

DPresult2<-continue(DPresult1,simultaneous=TRUE)

DPresult3<-dpweib(Hist(time, status)~DSST+MMSE,data=Paquid,  
                  predtime = seq(from=min(Paquid$time),to=max(Paquid$time),length=200))

newdata<-NULL
newdata$DSST<-Paquid$DSST[c(1,70)]
newdata$MMSE<-Paquid$MMSE[c(2,87)]
newdata<-data.frame(newdata)
DPpredict<-predict(DPresult3,newdata)
summary(DPpredict)
opar<-par(mfrow=c(2,3),
      mar=c(3.1, 3.1, 3.1, 5.1),
      mgp=c(2, 0.5, 0),
      oma=c(0, 0, 0, 4))
plot(DPpredict)
par(opar)

# An example of interval censored data
library(KMsurv)
library(survival)
library(DPWeibull)
data("bcdeter")
DPresult<-dpweib(Surv(lower, upper, type="interval2") ~ treat, data = bcdeter)
summary(DPresult)
plot(DPresult)
## End(Not run)

plot.ddp  plot estimated log hazard ratio functions from an object of class ddp.

Description
plot estimated log hazard ratio functions with credible intervals from an object of class ddp.

Usage
## S3 method for class 'ddp'
plot(x,simultaneous=FALSE, exp=FALSE, ...)

Arguments
x          Output an object of class ddp
simultaneous Plot simultaneous credible intervals or not. The default is FALSE.
exp         Plot hazard ratio (TRUE) or log hazard ratio (FALSE). The default is FALSE.
...         Arguments to be passed to method

Value
plot estimated log hazard ratio functions from an object of class ddp.
### plot.ddpcomp

*plot estimated log subdistribution hazard ratio functions for cause 1 from an object of class ddpcomp.*

**Description**

plot estimated log subdistribution hazard ratio functions with credible intervals for cause 1 from an object of class ddpcomp.

**Usage**

```r
## S3 method for class 'ddpcomp'
plot(x, simultaneous = FALSE, exp = FALSE, ...)
```

**Arguments**

- `x`: Output an object of class ddpcomp
- `simultaneous`: Plot simultaneous credible intervals or not. The default is FALSE.
- `exp`: Plot hazard ratio (TRUE) or log hazard ratio (FALSE). The default is FALSE.
- `...`: Arguments to be passed to method

**Value**

plot estimated log subdistribution hazard ratio functions for cause 1 from an object of class ddpcomp.

### plot.dpm

*plot estimated survival/density/hazard functions from an object of class dpm.*

**Description**

plot estimated survival/density/hazard functions with credible intervals from an object of class dpm.

**Usage**

```r
## S3 method for class 'dpm'
plot(x, simultaneous = FALSE, ...)
```

**Arguments**

- `x`: Output an object of class dpm
- `simultaneous`: Plot simultaneous credible intervals or not. The default is FALSE.
- `...`: Arguments to be passed to method
plot.predddp

Value
plot estimated survival/density/hazard functions from an object of class dpm.

plot.dpmcomp

plot estimated cumulative incidence/subdistribution density/subdistribution hazard functions from an object of class dpmcomp.

Description
plot estimated cumulative incidence/subdistribution density/subdistribution hazard functions with credible intervals from an object of class dpmcomp.

Usage
## S3 method for class 'dpmcomp'
plot(x, simultaneous=FALSE,...)

Arguments
x output an object of class dpmcomp
simultaneous Plot simultaneous credible intervals or not. The default is FALSE.
... Arguments to be passed to method

Value
plot estimated cumulative incidence/subdistribution density/subdistribution hazard functions from an object of class dpmcomp.

plot.predddp

plot estimated survival/density/hazard functions from an object of class predddp.

Description
plot estimated survival/density/hazard functions with credible intervals from an object of class predddp.

Usage
## S3 method for class 'predddp'
plot(x,...)

Arguments
x output an object of class predddp
... Arguments to be passed to method
**plot.predddpcomp**

Value

plot estimated survival/density/hazard functions from an object of class predddp.

---

**Description**

plot estimated cumulative incidence function/ subdistribution density/ subdistribution hazard functions with credible intervals of cause 1 from an object of class predddpcomp.

**Usage**

```
## S3 method for class 'predddpcomp'
plot(x,...)
```

**Arguments**

- `x` Output an object of class predddpcomp
- `...` Arguments to be passed to method

**Value**

plot estimated cumulative incidence function/ subdistribution density/ subdistribution hazard functions of cause 1 from an object of class predddpcomp.

---

**predict.ddp**

generate predictions for dependent Dirichlet process Weibull model data without competing risks.

---

**Description**

generate predictions for dependent Dirichlet process Weibull model data without competing risks.

**Usage**

```
## S3 method for class 'ddp'
predict(object,newdata,alpha=0.05,tpred=NULL,...)
```
Arguments

- **object**: Output from dpweib, must be ddpcomp class
- **newdata**: The new dataset for predictions
- **tpred**: The time points where the predictions are made. If is not given by the user, it will use the time points where the log hazard ratios are calculated in dpweib function.
- **alpha**: $1 - \alpha$ is the probability for constructing credible intervals. The default $\alpha$ is 0.05.
- **...**: Arguments to be passed to method

Value

- **tpred**: The time points where the predictions are made.
- **alpha**: $1 - \alpha$ is the probability for constructing credible intervals.
- **Spred**: A matrix, the estimated survival for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **Spredu**: A matrix, the estimated upper pointwise credible interval of the survival functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **Spredl**: A matrix, the estimated lower pointwise credible interval of the survival functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **dpred**: A matrix, the estimated density for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **dpredu**: A matrix, the estimated upper pointwise credible interval of the density functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **dpredl**: A matrix, the estimated lower pointwise credible interval of the density functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **hpred**: A matrix, the estimated hazard for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **hpredu**: A matrix, the estimated upper pointwise credible interval of the hazard functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- **hpredl**: A matrix, the estimated lower pointwise credible interval of the hazard functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
**predict.ddpcomp**

generate predictions for dependent Dirichlet process Weibull model data with competing risks.

**Description**

generate predictions for dependent Dirichlet process Weibull model data with competing risks.

**Usage**

```r
## S3 method for class 'ddpcomp'
predict(object, newdata, alpha = 0.05, tpred = NULL, ...)
```

**Arguments**

- `object` Output from `dpweib`, must be `ddpcomp` class
- `newdata` The new dataset for predictions
- `alpha` \(1 - \alpha\) is the probability for constructing credible intervals. The default \(\alpha\) is 0.05.
- `tpred` The time points where the predictions are made. If is not given by the user, it will use the time points where the log hazard ratios are calculated in `dpweib` function.
- `...` Arguments to be passed to method

**Value**

- `tpred` The time points where the predictions are made.
- `alpha` \(1 - \alpha\) is the probability for constructing credible intervals.
- `Fpred` A matrix, the estimated cumulative incidence functions of cause 1 for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- `Fpredu` A matrix, the estimated upper pointwise credible interval of the cumulative incidence functions of cause 1 for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- `Fpredl` A matrix, the estimated lower pointwise credible interval of the cumulative incidence functions of cause 1 for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- `dpred` A matrix, the estimated subdistribution density functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
- `dpredu` A matrix, the estimated upper pointwise credible interval of the subdistribution density functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.
A matrix, the estimated lower pointwise credible interval of the subdistribution density functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.

A matrix, the estimated subdistribution hazard functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.

A matrix, the estimated upper pointwise credible interval of the subdistribution hazard functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.

A matrix, the estimated lower pointwise credible interval of the subdistribution hazard functions for new covariates. Each row corresponds to a covariate configuration. Each column corresponds to a time point.

**summary.ddp**

`generate summary of the dpweib output with ddp class.`

**Description**

generate estimated log hazard ratio and corresponding credible intervals of the dpweib output with ddp class at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct).

**Usage**

```r
## S3 method for class 'ddp'
summary(object,...)
```

**Arguments**

- `object` Output from dpweib of ddp class
- `...` Arguments to be passed to method

**Value**

an object of class summary.ddp
summary.ddpcomp  generate summary of the dpweib output with ddpcomp class.

Description

generate estimated log subdistribution hazard ratio and the corresponding credible intervals of the dpweib output with ddpcomp class at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct).

Usage

```r
## S3 method for class 'ddpcomp'
summary(object,...)
```

Arguments

- `object` Output from dpweib of ddpcomp class
- `...` Arguments to be passed to method

Value

an object of class summary.ddpcomp

summary.dpm  generate summary of the dpweib output with dpm class.

Description

generate estimated survival and corresponding credible intervals of the dpweib output with dpm class at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct).

Usage

```r
## S3 method for class 'dpm'
summary(object,...)
```

Arguments

- `object` Output from dpweib of class dpm
- `...` Arguments to be passed to method

Value

an object of class summary.dpm
**summary.dpmcomp**

*generate summary of the dpweib output with dpmcomp class.*

**Description**

generate estimated cumulative incidence functions and corresponding credible intervals of the dpweib output with dpmcomp class at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct).

**Usage**

```r
## S3 method for class 'dpmcomp'
summary(object,...)
```

**Arguments**

- `object` Output from dpweib of class dpmcomp
- `...` Arguments to be passed to method

**Value**

an object of class summary.dpmcomp

---

**summary.predddp**

*generate summary of the predict output with predddp class.*

**Description**

generate estimated survival and corresponding credible intervals at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct) for each covariate configuration.

**Usage**

```r
## S3 method for class 'predddp'
summary(object,...)
```

**Arguments**

- `object` Output from dpweib of predddp class
- `...` Arguments to be passed to method

**Value**

an object of class summary.predddp
**summary.preddpcomp**

generate summary of the predict output with preddpcomp class.

**Description**

generate estimated cumulative incidence functions and corresponding credible intervals at 4 time points (1/4, 1/2, 3/4 and 1 of high.pct) for each covariate configuration.

**Usage**

```r
## S3 method for class 'preddpcomp'
summary(object,...)
```

**Arguments**

- `object` Output from dpweib of preddpcomp class
- `...` Arguments to be passed to method

**Value**

an object of class summary.preddpcomp

---

**survmedian**

*The median of the survival functions generated by LIO prior*

**Description**

This data set gives the median of 20000 random survival functions generated by our LIO prior on a 0 to 10 scale. This data set is primarily used for determining scale parameter when heavy end-of-study censoring is present.

**Source**

Index

* datasets
  deterioration, 5

continue, 2
continue.ddp, 3
continue.ddpcomp, 3
continue.dpm, 4
continue.dpmcomp, 4
deterioration, 5
dpweib, 6

Median of Survivals (survmedian), 25

plot.ddp, 16
plot.ddpcomp, 17
plot.dpm, 17
plot.dpmcomp, 18
plot.predddp, 18
plot.predddpcomp, 19
predict.ddp, 19
predict.ddpcomp, 21

summary.ddp, 22
summary.ddpcomp, 23
summary.dpm, 23
summary.dpmcomp, 24
summary.predddp, 24
summary.predddpcomp, 25
survmedian, 25