Package 'spatialSPsurv'

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Type Package

Title Bayesian Spatial Split Population Survival Model

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Description Contains functions to fit Bayesian spatial survival model for split population.

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LinkingTo Rcpp,
RcppArmadillo

Imports MCMCpack,
FastGP,
stats,
Rcpp,
RcppArmadillo,
coda

R topics documented:

`betas.post` *betas.post*

Description

log-posterior distribution of betas with pth element fixed as betas.p

Usage

```
betas.post(betas.p, p, Sigma.b, Y, Y0, X, W, betas, delta, C, LY, rho, form)
```

Arguments

`betas.p`	current value of the pth element of betas
`p`	pth element
`Sigma.b`	variance estimate of betas
`Y`	the time (duration) dependent variable for the survival stage (t)
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`X`	covariates for betas
`W`	spatial random effects
`betas`	current value of betas
`delta`	probability of true censoring
`C`	censoring indicator
`LY`	last observation year
`rho`	current value of rho
`form`	type of parametric model (Exponential or Weibull)

Value

log- posterior density of betas

betas.slice.sampling *betas.slice.sampling*

Description

slice sampling for betas

Usage

```
betas.slice.sampling(
  Sigma.b,
  Y,
  Y0,
  X,
  W,
  betas,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  form
)
```

Arguments

Sigma.b	variance estimate of betas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho
w	size of the slice in the slice sampling. A vector of values for beta, gamma, rho.
m	limit on steps in the slice sampling
form	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

`frailtySPsurv` *frailtySPsurv*

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian non-spatial frailty split population survival model

Usage

```
frailtySPsurv(
  formula,
  duration,
  immune,
  Y0,
  LY,
  S,
  data = list(),
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

`formula`	...
`duration`	...
`immune`	...
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`LY`	last observation year
`S`	spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information
`data`	...
`N`	number of MCMC iterations
`burn`	burn-in to be discarded
`thin`	thinning to prevent from autocorrelation
`w`	size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1)
`m`	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
`form`	type of parametric model (Exponential or Weibull)
`prop.var`	...

Value

chain of the variables of interest

gammas.post *gammas.post*

Description

log-posterior distribution of gammas with pth element fixed as gammas.p

Usage

```
gammas.post(gammas.p, p, Sigma.g, Y, Y0, eXB, Z, gammas, C, LY, rho, form)
```

Arguments

gammas.p	current value of the pth element of gammas
p	pth element
Sigma.g	variance estimate of gammas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
form	type of parametric model (Exponential or Weibull)

Value

log- posterior density of betas

gammas.post2 *gammas.post2*

Description

log-posterior distribution of gammas with pth element fixed as gammas.p

Usage

```
gammas.post2(gammas.p, p, Sigma.g, Y, Y0, eXB, Z, V, gammas, C, LY, rho, form)
```

Arguments

gammas.p	current value of the pth element of gammas
p	pth element
Sigma.g	variance estimate of gammas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
form	type of parametric model (Exponential or Weibull)

Value

log- posterior density of betas

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gammas.slice.sampling *gammas.slice.sampling*

Description

slice sampling for gammas

Usage

```
gammas.slice.sampling(Sigma.g, Y, Y0, eXB, Z, gammas, C, LY, rho, w, m, form)
```

Arguments

Sigma.g	variance estimate of gammas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
w	size of the slice in the slice sampling
m	limit on steps in the slice sampling
form	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

gammas.slice.sampling2 *gammas.slice.sampling2*

Description

slice sampling for gammas

Usage

```
gammas.slice.sampling2(
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  V,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  form
)
```

Arguments

Sigma.g	variance estimate of gammas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
w	size of the slice in the slice sampling. A vector of values for beta, gamma, rho.
m	limit on steps in the slice sampling
form	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

`lambda.gibbs.sampling2` *lambda.gibbs.sampling2*

Description

log-posterior distribution of rho

Usage

```
lambda.gibbs.sampling2(S, A, W, V, a = 1, b = 1)
```

Arguments

S	spatial information (e.g. district)
A	adjacency information corresponding to spatial information
W	spatial random effects
V	spatial random effects
a	shape parameter of gammas prior
b	scale parameter of gammas prior

Value

log- posterior density of betas

`mcmcfrailtySP` *mcmcfrailtySP*

Description

Markov Chain Monte Carlo (MCMC) routine to run Bayesian non-spatial frailties split population survival model

Usage

```
mcmcfrailtySP(
  Y,
  Y0,
  C,
  LY,
  X,
  Z,
  S,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
C	censoring indicator
LY	last observation year
X	covariates for betas
Z	covariates for gammas
S	spatial information (e.g. district)
N	number of MCMC iterations
burn	burn-in to be discarded
thin	thinning to prevent from autocorrelation
w	size of the slice in the slice sampling for (betas, gammas, rho)
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Exponential or Weibull)
prop.var	proposal variance for Metropolis-Hastings
A	adjacency information corresponding to spatial information

Value

chain of the variables of interest

`mcmcSP` *mcmcSP*

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian split population survival model with no frailties

Usage

```
mcmcSP(Y, Y0, C, LY, X, Z, N, burn, thin, w = c(1, 1, 1), m = 10, form)
```

Arguments

Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
C	censoring indicator
X	covariates for betas
Z	covariates for gammas
N	number of MCMC iterations
burn	burn-in to be discarded
thin	thinning to prevent from autocorrelation
w	size of the slice in the slice sampling for (betas, gammas, rho)
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Exponential or Weibull)

Value

chain of the variables of interest

`mcmcspatialSP` *mcmcspatialSP*

Description

Markov Chain Monte Carlo (MCMC) routine for Bayesian spatial split population survival model

Usage

```
mcmcspatialSP(
  Y,
  Y0,
  C,
  LY,
  X,
  Z,
  S,
  A,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

`Y`	the time (duration) dependent variable for the survival stage (t)
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`C`	censoring indicator
`LY`	last observation year
`X`	covariates for betas
`Z`	covariates for gammas
`S`	spatial information (e.g. district)
`A`	adjacency information corresponding to spatial information
`N`	number of MCMC iterations
`burn`	burn-in to be discarded
`thin`	thinning to prevent from autocorrelation
`w`	size of the slice in the slice sampling for (betas, gammas, rho)
`m`	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
`form`	type of parametric model (Exponential or Weibull)
`prop.var`	proposal variance for Metropolis-Hastings

Value

chain of the variables of interest

`rho.post` *rho.post*

Description

log-posterior distribution of rho

Usage

```
rho.post(Y, Y0, eXB, delta, C, LY, rho, a = 1, b = 1)
```

Arguments

`Y`	the time (duration) dependent variable for the survival stage (t)
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`eXB`	exponentiated vector of covariates times betas
`delta`	probability of true censoring
`C`	censoring indicator
`LY`	last observation year
`rho`	current value of rho
`a`	shape parameter of gammas prior
`b`	scale parameter of gammas prior

Value

log- posterior density of betas

`rho.slice.sampling` *rho.slice.sampling*

Description

univariate slice sampling for rho

Usage

```
rho.slice.sampling(
  Y,
  Y0,
  eXB,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  lower = 0.01,
  upper = +Inf
)
```

Arguments

Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho
w	size of the slice in the slice sampling. A vector of values for beta, gamma, rho.
m	limit on steps in the slice sampling
lower	lower bound on support of the distribution
upper	upper bound on support of the distribution

Value

One sample update using slice sampling

`spatialSPsurv` *spatialSPsurv*

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian spatial split population survival model

Usage

```
spatialSPsurv(
  duration,
  immune,
  Y0,
  LY,
  S,
```

```
  data = list(),
  A,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form,
  prop.var
)
```

Arguments

duration	...
immune	...
Y0	the elapsed time since inception until the beginning of time period (t-1)
LY	last observation year
S	spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information
data	...
A	Spatial Matrix (load separate spatial weights matrix file)
N	number of MCMC iterations
burn	burn-in to be discarded
thin	thinning to prevent from autocorrelation
w	size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1)
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Exponential or Weibull)
prop.var	proposal variance for Metropolis-Hastings

Value

chain of the variables of interest

SPsurv *SPsurv*

Description

Markov Chain Monte Carlo (MCMC) to run Bayesian split population survival model with no frailties

Usage

```
SPsurv(
  duration,
  immune,
  Y0,
  LY,
  data = list(),
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form
)
```

Arguments

duration	...
immune	...
Y0	the elapsed time since inception until the beginning of time period (t-1)
LY	last observation year
data	...
N	number of MCMC iterations
burn	burn-in to be discarded
thin	thinning to prevent from autocorrelation
w	size of the slice in the slice sampling for (betas, gammas, rho). Write it as a vector. E.g. c(1,1,1)
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Exponential or Weibull)

Value

chain of the variables of interest

`univ.betas.slice.sampling` *univ.betas.slice.sampling*

Description

univariate slice sampling for betas.p

Usage

```
univ.betas.slice.sampling(
  betas.p,
  p,
  Sigma.b,
  Y,
  Y0,
  X,
  W,
  betas,
  delta,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)
```

Arguments

betas.p	current value of the pth element of betas
p	pth element
Sigma.b	variance estimate of betas
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho
w	size of the slice in the slice sampling
m	limit on steps in the slice sampling
lower	lower bound on support of the distribution
upper	upper bound on support of the distribution
form	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

`univ.gammas.slice.sampling` *univ.gammas.slice.sampling*

Description

univariate slice sampling for gammas.p

Usage

```
univ.gammas.slice.sampling(
  gammas.p,
  p,
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)
```

Arguments

`gammas.p`	current value of the pth element of gammas
`p`	pth element
`Sigma.g`	variance estimate of gammas
`Y`	the time (duration) dependent variable for the survival stage (t)
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`eXB`	exponentiated vector of covariates times betas
`Z`	covariates for gammas
`gammas`	current value of gammas
`C`	censoring indicator
`LY`	last observation year
`rho`	current value of rho
`w`	size of the slice in the slice sampling
`m`	limit on steps in the slice sampling
`lower`	lower bound on support of the distribution
`upper`	upper bound on support of the distribution
`form`	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

`univ.gammas.slice.sampling2` *univ.gammas.slice.sampling2*

Description

univariate slice sampling for gammas.p

Usage

```
univ.gammas.slice.sampling2(
  gammas.p,
  p,
  Sigma.g,
  Y,
  Y0,
  eXB,
  Z,
  V,
  gammas,
  C,
  LY,
  rho,
  w,
  m,
  lower = -Inf,
  upper = +Inf,
  form
)
```

Arguments

`gammas.p`	current value of the pth element of gammas
`p`	pth element
`Sigma.g`	variance estimate of gammas
`Y`	the time (duration) dependent variable for the survival stage (t)
`Y0`	the elapsed time since inception until the beginning of time period (t-1)
`eXB`	exponentiated vector of covariates times betas
`Z`	covariates for gammas
`V`	spatial random effects
`gammas`	current value of gammas
`C`	censoring indicator
`LY`	last observation year
`rho`	current value of rho

w	size of the slice in the slice sampling. A vector of values for beta, gamma, rho.
m	limit on steps in the slice sampling
lower	lower bound on support of the distribution
upper	upper bound on support of the distribution
form	type of parametric model (Exponential or Weibull)

Value

One sample update using slice sampling

`V.F.MH.sampling` *V.F.MH.sampling (Cure Model with non-spatial Frailties)*

Description

MH sampling for rcpp_log_dmvnorm

Usage

```
V.F.MH.sampling(Sigma.v, S, Y, Y0, eXB, Z, V, gammas, C, LY, rho, prop.var)
```

Arguments

S	spatial information (e.g. district)
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
prop.var	proposal variance for Metropolis-Hastings

Value

One sample update using slice sampling

V.F.post *V.F.post*

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
V.F.post(Sigma.v, S, Y, Y0, eXB, Z, V, gammas, C, LY, rho)
```

Arguments

S	spatial information (e.g. district)
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho

Value

log- posterior density of betas

V.MH.sampling *V.MH.sampling*

Description

MH sampling for rcpp_log_dmvnorm

Usage

```
V.MH.sampling(S, A, lambda, Y, Y0, eXB, Z, V, gammas, C, LY, rho, prop.var)
```

Arguments

S	spatial information (e.g. district)
A	adjacency information corresponding to spatial information
lambda	CAR parameter
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho
prop.var	proposal variance for Metropolis-Hastings

Value

One sample update using slice sampling

V.post *V.post*

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
V.post(S, A, lambda, Y, Y0, eXB, Z, V, gammas, C, LY, rho)
```

Arguments

S	spatial information (e.g. district)
A	adjacency information corresponding to spatial information
lambda	CAR parameter
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
eXB	exponentiated vector of covariates times betas
Z	covariates for gammas
V	spatial random effects
gammas	current value of gammas
C	censoring indicator
LY	last observation year
rho	current value of rho

Value

log- posterior density of betas

W.F.MH.sampling *W.F.MH.sampling (Cure Model with Frailties)*

Description

MH sampling for W

Usage

```
W.F.MH.sampling(Sigma.w, S, Y, Y0, X, W, betas, delta, C, LY, rho, prop.var)
```

Arguments

S	spatial information (e.g. district)
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho
prop.var	proposal variance for Metropolis-Hastings

Value

One sample update using slice sampling

W.F.post *W.F.post*

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
W.F.post(Sigma.w, S, Y, Y0, X, W, betas, delta, C, LY, rho)
```

Arguments

S	spatial information (e.g. district)
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho

Value

log- posterior density of W

`W.MH.sampling` *W.MH.sampling*

Description

MH Sampling for W

Usage

```
W.MH.sampling(S, A, lambda, Y, Y0, X, W, betas, delta, C, LY, rho, prop.var)
```

Arguments

S	spatial information (e.g. district)
A	adjacency information corresponding to spatial information
lambda	CAR parameter
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho
prop.var	proposal variance for Metropolis-Hastings

Value

One sample update using slice sampling

W.post *W.post*

Description

log-posterior distribution of W with sth element fixed as W.s

Usage

```
W.post(S, A, lambda, Y, Y0, X, W, betas, delta, C, LY, rho)
```

Arguments

S	spatial information (e.g. district)
A	adjacency information corresponding to spatial information
lambda	CAR parameter
Y	the time (duration) dependent variable for the survival stage (t)
Y0	the elapsed time since inception until the beginning of time period (t-1)
X	covariates for betas
W	spatial random effects
betas	current value of betas
delta	probability of true censoring
C	censoring indicator
LY	last observation year
rho	current value of rho

Value

log- posterior density of W

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