

# Package ‘spatialSPsurv’

August 26, 2020

**Type** Package

**Title** Bayesian Spatial Split Population Survival Model

**Version** 0.1.5

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

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**Depends** R (>= 3.6.0)

**RoxygenNote** 7.1.0

**LinkingTo** Rcpp,  
RcppArmadillo

**Imports** MCMCpack,  
FastGP,  
stats,  
Rcpp,  
RcppArmadillo,  
coda,  
dplyr,  
reshape2

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 capdist

*Gleditsch and Ward Distance data*


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### Description

Dyadic dataset extracted from [Gleditsch and Ward \(2001\)](#). The dataset contains information on the distance between capital cities among independent nation-states.

### Usage

```
data(capdist)
```

### Format

A data frame with 41006 rows and 6 variables

### Details

**numa** COW code – country A

**ida** Three letter ISO code – country A

**numb** COW code – country B

**idb** Three letter ISO code – country B

**kmdist** ...

**midist** ...

### Source

Gleditsch, Kristian S., and Michael D. Ward. (2001). "Measuring Space: A Minimum-Distance Database and Applications to International Studies." *Journal of Conflict Resolution* 38(6): 739-758.

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 exchangeSPsurv

*exchangeSPsurv*


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### Description

Markov Chain Monte Carlo (MCMC) to run Bayesian split population survival model with exchangeable frailties

Returns a summary of a exchangeSPsurv object via [summary.mcmc](#).

**Usage**

```
exchangeSPsurv(
  duration,
  immune,
  Y0,
  LY,
  S,
  data,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form = c("Weibull", "exponential", "loglog"),
  prop.var
)

## S3 method for class 'frailtySPsurv'
summary(object, parameter = c("betas", "gammas", "lambda"), ...)
```

**Arguments**

duration	survival stage equation written in a formula of the form $Y \sim X1 + X2 + \dots$ where Y is duration until failure or censoring
immune	split stage equation written in a formula of the form $C \sim Z1 + Z2 + \dots$ where C is a binary indicator of immunity
Y0	the elapsed time since inception until the beginning of time period (t-1)
LY	last observation year (coded as 1; 0 otherwise) due to censoring or failure
S	spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information
data	dataframe
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. <code>c(1,1,1)</code>
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Weibull, Exponential or Log-Logistic)
prop.var	Proposed variance for Metropolis-Hastings
object	an object of class <code>frailtySPsurv</code> , the output of <a href="#">exchangeSPsurv</a> .
parameter	one of three parameters of the pooledSPsurv output. Indicate either "betas", "gammas" or "lambda".
...	additional parameter

**Value**

chain of the variables of interest

list. Empirical mean, standard deviation and quantiles for each variable.

pooledSPsurv

*pooledSPsurv***Description**

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

Returns a summary of a SPsurv object via [summary.mcmc](#).

**Usage**

```
pooledSPsurv(
  duration,
  immune,
  Y0,
  LY,
  data,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form = c("Weibull", "exponential", "loglog")
)

## S3 method for class 'SPsurv'
summary(object, parameter = c("betas", "gammas", "lambda"), ...)
```

**Arguments**

duration	survival stage equation written in a formula of the form $Y \sim X1 + X2 + \dots$ where Y is duration until failure or censoring
immune	split stage equation written in a formula of the form $C \sim Z1 + Z2 + \dots$ where C is a binary indicator of immunity
Y0	the elapsed time since inception until the beginning of time period (t-1)
LY	last observation year (coded as 1; 0 otherwise) due to censoring or failure
data	dataframe
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. <code>c(1,1,1)</code>
m	limit on steps in the slice sampling. A vector of values for beta, gamma, rho.
form	type of parametric model (Exponential, Weibull or Log-Logistic)
object	an object of class SPsurv, the output of <a href="#">pooledSPsurv</a> .
parameter	one of three parameters of the pooledSPsurv output. Indicate either "betas", "gammas" or "lambda".
...	additional parameter

**Value**

chain of the variables of interest

list. Empirical mean, standard deviation and quantiles for each variable.

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spatialSPsurv

*spatialSPsurv*


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**Description**

Markov Chain Monte Carlo (MCMC) to run time-varying Bayesian split population survival model with spatial frailties

Returns a summary of a exchangeSPsurv object via [summary.mcmc](#).

**Usage**

```
spatialSPsurv(
  duration,
  immune,
  Y0,
  LY,
  S,
  A,
  data,
  N,
  burn,
  thin,
  w = c(1, 1, 1),
  m = 10,
  form = c("Weibull", "exponential", "loglog"),
  prop.var
)

## S3 method for class 'spatialSPsurv'
summary(object, parameter = c("betas", "gammas", "lambda"), ...)
```

**Arguments**

duration	survival stage equation written in a formula of the form $Y \sim X1 + X2 + \dots$ where Y is duration until failure or censoring
immune	split stage equation written in a formula of the form $C \sim Z1 + Z2 + \dots$ where C is a binary indicator of immunity
Y0	the elapsed time since inception until the beginning of time period (t-1)
LY	last observation year (coded as 1; 0 otherwise) due to censoring or failure
S	spatial information (e.g. district ID) for each observation that matches the spatial matrix row/column information
A	an a times a spatial weights matrix where a is the number of unique spatial units (S) load as a separate file
data	dataframe

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, Weibull or Log-Logistic)
prop.var	proposal variance for Metropolis-Hastings
object	an object of class spatialSPsurv, the output of <a href="#">exchangeSPsurv</a> .
parameter	one of three parameters of the pooledSPsurv output. Indicate either "betas", "gammas" or "lambda".
...	additional parameter

**Value**

chain of the variables of interest

list. Empirical mean, standard deviation and quantiles for each variable.

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spatial_SA	<i>spatial_SA</i>
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**Description**

matrix A and sp\_id (S)

**Usage**

```
spatial_SA(data, var_ccode, threshold = 800L)
```

**Arguments**

data	data.frame.
var_ccode	name of the variable that contains the country codes.
threshold	...

**Value**

list. Contains database with variable sp\_id (S) and matrix A

SPstats

*SPstats***Description**

A function to calculate the deviance information criterion (DIC) and Log-likelihood for fitted model outputs of pooled, exchangeable, and spatial Split Population survival models for which a log-likelihood can be obtained, according to the formula  $DIC = -2 * (L - P)$ , where  $L$  is the log likelihood of the data given the posterior means of the parameter and  $P$  is the estimate of the effective number of parameters in the model.

**Usage**

```
SPstats(object)
```

**Arguments**

**object** An object of the output of pooled, exchangeable, or spatial Split Population survival model .

**Value**

List.

Walter\_2015\_JCR

*Walter\_2015\_JCR***Description**

Time-series-cross-sectional (TSCS) dataset extracted from [Walter \(2015\)](#). It has data on duration of civil war as well as information on other relevant economic and political data. The variables duration, cured, t.0 and lastyear added by the authors of this package.

**Usage**

```
data(Walter_2015_JCR)
```

**Format**

A data frame with 1562 rows and 13 variables

**Details**

**duration** duration until failure or censoring.

**immune** binary indicator of immunity.

**fhcompor1** Freedom House civil liberties index.

**lgdpl** log of per capita GDP in 2005 dollars.

**comprehensive** combatants signed comprehensive peace agreement.

**victory** end of previous war with outright victory.

**instabl** dummy that indicates whether there was a positive or negative change in the Polity 2 score in the previous country-year.

**intensityln** deaths per year – logged.

**ethfrac** index of ethnic fractionalization.

**unpko** number of UN peacekeepers on the ground.

**t.0** duration of peace spell.

**lastyear** year of last country observation in dataset.

**sp\_id** country unique id.

**A** time-invariant binary adjacency matrix

### Source

Walter, Barbara F. (2015), Why Bad Governance Leads to Repeat Civil War, Journal of Conflict Resolution 59(7), 1242 - 1272.



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