

# Package ‘spatialSPsurv’

August 21, 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

*SPsurv***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. 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)
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	<i>spatialSPsurv</i>
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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, lastyear, S and A were later 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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