Package 'geomask'

January 29, 2018

Type Package

Title Geostatistical modeling of geomasked data

Version 0.1.0

Description This package contains several functions to fit geostatical models to geomasked data (i.e. spatial data with positioanl error induced by geomasking). It contains all the functions necessary to reproduce my PhD thesis.

License GPL (>= 3)

Encoding UTF-8

LazyData true

Imports geoR,
gstat,
VGAM,
randtoolbox,
sp,
raster,
flexclust

RoxygenNote 6.0.1

Suggests knitr,
rmarkdown

VignetteBuilder knitr

R topics documented:

fcut *Function needed for internal usage*

Description

Function needed for internal usage

Usage

```
fcut(range, phi, kappa, r)
```

fit_geoadj *Fit a geostatistical model to geomasked data*

Description

This function fit a geostatistical model using composite likelihood to spatial data that have positional error due to geoamsking.

Usage

```
fit_geoadj(data, locations, displacement = "gaussian", delta, kappa,
  n_sequence = 10, approx = F, thresh = 5e-06, ini, method = "BFGS")
```

Arguments

data	A numeric vector of spatial data.
locations	A two column matrix containing the locations (coordinates x and y).
displacement	The type of geomasking to be applied: either "gaussian" or "uniform".
delta	A number that specify the standard deviation of the positional error in the case of Gaussian geomasking or the maximum displacement distance in the case of Uniform geomasking.
kappa	Numerical value for the additional smoothness parameter of the matern correlation function.
n_sequence	A numeric value. It will define the lenght of the halton sequence for the quasi monte carlo integration. A longer sequence requires more computational time but provides more accurate results. Defaul to 10.
approx	If TRUE (defautl is FALSE) it will use an approximation to calculate the composite likelihood. If set to TRUE a threshold value in the argument thresh needs to be provided.
thresh	If approx is TRUE this defines the level of the approximation. By default is 0.000005 and garuantess a good comprise between speed and accuracy. Bigger values will make the computation faster but less accurate.
ini	Initial values for the parameters to be passed to the optimisation algorithm.
method	The optimisation method to be used. Default is "BFGS".

Value

A list containing the set of estimated parameters. The likelihood evaluated at the estimated parameters and a code to asses convergence of the algorithm.

`geomask` *geomask: A package for Geostatistical modeling of geomasked data.*

Description

The geomask package provides three categories of important functions: foo, bar and baz.

Geomaks functions

The geomask functions ...

`geomasking` *Apply Gaussian or Uniform geomasking to a set of spatial coordinates.*

Description

Apply Gaussian or Uniform geomasking to a set of spatial coordinates.

Usage

```
geomasking(locations, displacement, delta)
```

Arguments

`locations`	A two column matrix containing the locations (coordinates x and y) to which apply geomasking.
`displacement`	The type of geomasking to be applied: either "gaussian" or "uniform".
`delta`	A number that specify the standard deviation of the positional error in the case of Gaussian geomasking or the maximum displacement distance in the case of Uniform geomasking.

Value

A matrix with the displaced locations.

qmci *Likelihood calculation with Quasi Monter Carlo Integration*

Description

This function calculates the liklelihood of the geostatistical model in presence of positional error using Quasi Monte Carlo Integration. It is used internally in the optimisation routine.

Usage

```
qmci(data, sequence, sigma2, phi, nugget, mu, delta, kappa)
```

sim_spdata *Simulation of gaussian spatial data using Cholesky decomposition*

Description

Given a set of spatial coordinates this function generates gaussian distributed data whose spatial structure is defined by the user through the specification of a spatial correlation function.

Usage

```
sim_spdata(locations, cov_model = "matern", cov_pars = c(1, 0.16),
  nugget = 0.5, kappa = 0.5)
```

Arguments

locations	A two column matrix containing the locations (coordinates x and y).
cov_model	A string indicating the type of the correlation function. For the available choices see cov.spatial.
cov_pars	A numeric vector with 2 elements with the covariance parameters. The first element corresponds to the variance parameter σ^2. The second element or corresponds to the range parameter ϕ of the correlation function.
nugget	Value of the nugget parameter τ^2.
kappa	Numerical value for the additional smoothness parameter of the correlation function. Only required by the following correlation functions: "matern", "powered.exponential", "cauchy", "gencauchy" and "gneiting.matern".

Value

A numeric vector containing the simualted spatial data.

splm_sim_aggr *Spatial model for spatially aggregated data*

Description

This function provide model based parameters estiamtion for a geostatical model when spatial data are avialable at a corarser scale than their natural resolution. It is mainly for simulation purposing and testing.

Usage

```
splm_sim_aggr(data, mc_points = 100, tau.sq = 0, ncovariates = 2,
  beta = c(3.5, -1.2), aggr.cell = 9, fix.nugget = F, fix.nug = 0.5,
  ini = c(0.5, 0.5), message = F)
```

Arguments

data	A numeric vector of spatial data.
mc_points	Number of Monte Carlo points to calculate the correlation matrix.
tau.sq	Numeric value for the nugger parameter τ^2.
ncovariates	Number of covariates to simulate.
beta	Values for the beta parameters.
aggr.cell	To how many cells the points should be aggregated.
fix.nugget	A logical value. Should the nugget be fixed?
fix.nug	If fix.nugget = TRUE then a numeric value should be provided.
ini	Initial parameters values for the optimisation algorithm.
message	If FALSE suppress all the messages from the fitting algorithm.

varioadj *Variogram fit adjusting for positional error*

Description

This function fit the parameters of a variogram through N-weighetd least squares taking also into account the presence of positional error.

Usage

```
varioadj(data, locations, displacement = "gaussian", delta, kappa, ini, ...)
```

Arguments

data	A numeric vector of spatial data.
locations	A two column matrix containing the locations (coordinates x and y).
displacement	The type of geomasking to be applied: either "gaussian" or "uniform".
delta	A number that specify the standard deviation of the positional error in the case of Gaussian geomasking or the maximum displacement distance in the case of Uniform geomasking.
kappa	Numerical value for the additional smoothness parameter of the matern correlation function.
ini	Initial values for the parameters to be passed to the optimisation algorithm.
...	Control argumenets for the optimiser.

Value

A numeric vector containg the estimated parameters.

Index