Package 'ZINARp'

May 7, 2026

Type Package

Title Simulate INAR/ZINAR(p) Models and Estimate Its Parameters

Version 0.1.0

Maintainer Tharso Augustus Rossiter Araújo Monteiro <tharso.augustus@ufpe.br>

Description Simulation, exploratory data analysis and Bayesian analysis of the p-order Integer-valued Autoregressive (INAR(p)) and Zero-inflated p-order Integer-valued Autoregressive (ZINAR(p)) processes, as described in Garay et al. (2020) <doi:10.1080/00949655.2020.1754819>.

License GPL (>= 3.0)

Encoding UTF-8

LazyData true

Imports progress, stats, utils, graphics

RoxygenNote 7.1.1

Depends R (>= 2.10)

NeedsCompilation no

Author Aldo William Medina Garay [aut],
Francyelle de Lima Medina [aut],
Tharso Augustus Rossiter Araújo Monteiro [aut, cre]

Repository CRAN

Date/Publication 2022-05-09 11:30:02 UTC

Contents

`estimate_zinarp` *Parameter estimation for ZINARp models*

Description

This function uses MCMC algorithms (Metropolis-Hastings and Gibbs Sampler) to generate a chain of INAR/ZINAR(p) parameter estimators.

Usage

```
estimate_zinarp(
  x,
  p,
  iter = 5000,
  thin = 2,
  burn = 0.1,
  innovation = "Poisson"
)
```

Arguments

`x`	A vector containing a discrete non-negative time series dataset.
`p`	The order of the INAR/ZINAR process.
`iter`	The number of iterations to be considered. Defaults to 5000.
`thin`	Lag for posterior sample. Defaults to 2.
`burn`	Burn-in for posterior sample. Defaults to 0.1. Must be in (0,1).
`innovation`	Distribution to be used for the innovation : "Poisson" or "ZIP". Defaults to Poisson.

Value

Returns a list containing a posteriori samples for the specified model parameters.

References

Garay, Aldo M., Francyelle L. Medina, Celso RB Cabral, and Tsung-I. Lin. "Bayesian analysis of the p-order integer-valued AR process with zero-inflated Poisson innovations." Journal of Statistical Computation and Simulation 90, no. 11 (2020): 1943-1964.

Garay, Aldo M., Francyelle L. Medina, Isaac Jales CS, and Patrice Bertail. "First-Order Integer Valued AR Processes with Zero-Inflated Innovations." In Workshop on Nonstationary Systems and Their Applications, pp. 19-40. Springer, Cham, 2021.

Examples

```
test <- simul_zinarp(alpha = 0.1, lambda = 1, n = 100)
e.test <- estimate_zinarp(x = test, p = 1, iter = 800, innovation= "Poisson")
alpha_hat <- mean(e.test$alpha)
lambda_hat <- mean(e.test$lambda)

data(slesions)
e.slesions <- estimate_zinarp(slesions$y, p = 1, iter = 800, innovation = 'ZIP')
alpha_hat_slesions <- mean(e.slesions$alpha)
lambda_hat_slesions <- mean(e.slesions$lambda)
rho_hat_slesions <- mean(e.slesions$rho)
```

---

explore_zinarp *EXPLORATORY DATA ANALYSIS FOR ZINAR(p) PROCESSES*

Description

This function generates a graph for exploring ZINAR(p) processes.

Usage

```
explore_zinarp(x)
```

Arguments

x	A vector containing a discrete non-negative time series data set.

Value

Plot time series graph, relative frequency bar plot, autocorrelation function graph and partial autocorrelation function graph on a common plot.

---

simul_zinarp *Sample Generator for ZINAR(p)*

Description

This function generates a realization of a ZINAR(p) process.

Usage

```
simul_zinarp(n, alpha, lambda, pii = 0)
```

Arguments

n	The length of the simulated chain.
alpha	The p-dimensional vector (in which p is the process order) of alpha values, the probabilities of an element remaining in the process.All alpha elements must be in [0,1] and their sum must be smaller than 1.
lambda	The Poisson rate parameter. Must be greater than zero.
pii	The probability of a structural zero (i.e., ignoring the Poisson distribution) under ZIP innovation sequences. Defaults to 0, following a standard Poisson.

Value

Returns a numeric vector representing a realization of an INAR/ZINAR(p) process.

References

Garay, Aldo M., Francyelle L. Medina, Celso RB Cabral, and Tsung-I. Lin. "Bayesian analysis of the p-order integer-valued AR process with zero-inflated Poisson innovations." Journal of Statistical Computation and Simulation 90, no. 11 (2020): 1943-1964.

Garay, Aldo M. ; Medina, Francyelle L. ; Jales, Isaac C. ; Bertail, Patrice. First-order integer valued AR processes with zero-inflated innovations. Cyclostationarity: Theory and Methods, Springer Verlag - 2021, v. 1, p. 19-40.

---

slesions *Skin lesions dataset*

Description

Monthly number of skin lesions-related submissions to animal health laboratories from a region in New Zealand, obtained from 2003 to 2009.

Usage

```
slesions
```

Format

An object of class `data.frame` with 84 rows and 1 columns.

References

Jazi, Mansour Aghababaei, Geoff Jones, and Chin-Diew Lai. "First-order integer valued AR processes with zero inflated Poisson innovations." Journal of Time Series Analysis 33.6 (2012): 954-963.

Index