

# Package ‘ZINARp’

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**Type** Package

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

**Version** 0.1.0

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**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](https://doi.org/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

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**Repository** CRAN

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`estimate_zinarp`*Parameter estimation for ZINARp models*

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### 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

<code>x</code>	A vector containing a discrete non-negative time series dataset.
<code>p</code>	The order of the INAR/ZINAR process.
<code>iter</code>	The number of iterations to be considered. Defaults to 5000.
<code>thin</code>	Lag for posterior sample. Defaults to 2.
<code>burn</code>	Burn-in for posterior sample. Defaults to 0.1. Must be in (0,1).
<code>innovation</code>	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., Francielle 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., Francielle 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)

```

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explore\_zinarp

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*EXPLORATORY DATA ANALYSIS FOR ZINAR(p) PROCESSES*


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**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.

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simul\_zinarp

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*Sample Generator for ZINAR(p)*


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**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., Francielle 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, Francielle 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.

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slesions

*Skin lesions dataset*


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**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.

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