

Package ‘MisRepARMA’

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Type Package

Title Misreported Time Series Analysis

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Description Provides a simple and trustworthy methodology for the analysis of misreported continuous time series. See Moriña, D, Fernández-Fontelo, A, Cabaña, A, Puig P. (2021) <[arXiv:2003.09202v2](https://arxiv.org/abs/2003.09202v2)>.

Depends R (>= 3.5.0), mixtools, boot, tseries

License GPL (>= 2)

NeedsCompilation no

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MisRepARMA-package *Misreported time series analysis*

Description

Provides a simple and trustworthy methodology for the analysis of misreported continuous time series. See Moriña, D, Fernández-Fontelo, A, Cabaña, A, Puig P. (2021) <<https://arxiv.org/abs/2003.09202v2>>.

Details

Package: MisRepARMA
Type: Package
Version: 0.0.2
Date: 2021-07-14
License: GPL version 2 or newer
LazyLoad: yes

The package implements function `fitMisRepARMA`, which is able to fit an ARMA time series model to misreported data, and the function `reconstruct` which is able to reconstruct the most likely real series.

Author(s)

David Moriña, Amanda Fernández-Fontelo, Alejandra Cabaña, Pedro Puig
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References

- Davison, A.C. and Hinkley, D.V. (1997) Bootstrap Methods and Their Application. Cambridge University Press.
- Kunsch, H.R. (1989) The jackknife and the bootstrap for general stationary observations. *Annals of Statistics*, **17**, 1217–1241.
- Moriña, D., Fernández-Fontelo, A., Cabaña, A., Puig, P. (2021): New statistical model for misreported data with application to current public health challenges. arXiv preprint (<https://arxiv.org/pdf/2003.09202.pdf>)
- Politis, D.N. and Romano, J.P. (1994) The stationary bootstrap. *Journal of the American Statistical Association*, **89**, 1303–1313.

See Also

[MisRepARMA-package](#), [fitMisRepARMA](#), [reconstruct](#)

`fitMisRepARMA`*Fit ARMA model to misreported time series data*

Description

Fits an ARMA model to misreported time series data.

Usage

```
fitMisRepARMA(y, tol, B, p_AR, q_MA, covars=NULL, misReport="U", ...)
```

Arguments

<code>y</code>	a numeric vector or time series giving the original data.
<code>tol</code>	tolerance limit to stop the iterative algorithm.
<code>B</code>	the number of bootstrap series to compute.
<code>p_AR</code>	order of the AR part.
<code>q_MA</code>	order of the MA part.
<code>covars</code>	matrix of explanatory variables. Its default value is <code>NULL</code> .
<code>misReport</code>	direction of misreporting issue. Its default value is <code>U</code> for underreported data, can also take the value <code>O</code> for overreported data.
<code>...</code>	additional arguments to pass to <code>tsboot</code> , for instance those regarding parallelization.

Details

The model based resampling scheme with `B` bootstrap resamples is computed. This

Value

An object of class `fitMisRepARMA` with the following elements is returned:

- `data`: The original time series.
- `t0`: The results of applying statistic to the original series.
- `t`: Estimates on each replicated time series.
- `call`: The original call to `tsboot`.

Author(s)

David Morriña, Amanda Fernández-Fontelo, Alejandra Cabaña, Pedro Puig

References

- Davison, A.C. and Hinkley, D.V. (1997) *Bootstrap Methods and Their Application*. Cambridge University Press.
- Kunsch, H.R. (1989) The jackknife and the bootstrap for general stationary observations. *Annals of Statistics*, **17**, 1217–1241.
- Moriña, D., Fernández-Fontelo, A., Cabaña, A., Puig, P. (2021): New statistical model for misreported data with application to current public health challenges. arXiv preprint (<https://arxiv.org/pdf/2003.09202.pdf>)
- Politis, D.N. and Romano, J.P. (1994) The stationary bootstrap. *Journal of the American Statistical Association*, **89**, 1303–1313.

See Also

[MisRepARMA-package](#), [reconstruct](#)

Examples

```
### Simulate underreported time series data
set.seed(12345)
x <- arima.sim(model=list(ar=0.4), n=50)
ind <- rbinom(50, 1, 0.6)
y <- ifelse(ind==0, x, x*0.3)
mod <- fitMisRepARMA(y, 1e-6, 3, 0.05, 1, 0, covars=NULL, misReport="U")
```

reconstruct

Reconstruct the most likely series

Description

Reconstructs the most likely series.

Usage

```
reconstruct(object)
```

Arguments

object object of class `fitMisRepARMA`.

Value

the function returns a vector of the same length of data containing the reconstruction of the most likely series.

Author(s)

David Moriña, Amanda Fernández-Fontelo, Alejandra Cabaña, Pedro Puig

References

- D. Moriña, A. Fernández-Fontelo, A. Cabaña, P. Puig (2021): New statistical model for misreported data with application to current public health challenges. arXiv preprint (<https://arxiv.org/pdf/2003.09202.pdf>)
- Davison, A. C. and Hinkley, D. V. (1997) Bootstrap Methods and Their Applications. Cambridge University Press, Cambridge. ISBN 0-521-57391-2

See Also

[MisRepARMA-package](#), [fitMisRepARMA](#)

Examples

```
### Simulate underreported time series data
x <- arima.sim(model=list(ar=0.4), n=50)
ind <- rbinom(50, 1, 0.6)
y <- ifelse(ind==0, x, x*0.3)
pr <- fitMisRepARMA(y, 1e-8, 5, 0.05, 1, 0, covars=NULL, misReport="U")
x <- reconstruct(pr)
```

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