MONASH University

MONASH BUSINESS SCHOOL

GRATIS: GeneRAting TIme Series with diverse and controllable characteristics

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Time series features

- seasonal period(s)
- length
- ACF and PACF based features - calculated on raw, differenced, and remainder series.
- strength of seasonality
- strength of trend
- peaks, troughs
- spectral entropy
- linearity
- curvature
- spikiness
- stability
- lumpiness
- Hurst exponent
- nonlinearity
- unit root test statistics
- crossing points, flat spots
- ARCH/GARCH statistics and ACF of squared series and residuals.

Mixture autoregressive (MAR) models

AR(p) model

$$x_t = \phi_0 + \phi_1 x_{t-1} + \cdots + \phi_p x_{t-p} + \varepsilon_t, \qquad \varepsilon_t \sim N(0, \sigma^2)$$

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MAR($K; p_1, p_2, \ldots, p_K$) model

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MAR models

- can contain multiple stationary or non-stationary autoregressive components.
- can handle nonlinearity, non-Gaussianity, cycles and heteroskedasticity

GRATIS package

Gene**RA**ting **TI**me **S**eries with diverse and controllable characteristics

- https://github.com/ykang/gratis
- https://cran.r-project.org/package=gratis