

Computational aspects of continuous-time-arma (CARMA) models: The `ctarma` package

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Some computational aspects of the continuous-time ARMA, CARMA are reviewed. Methods of simulation and estimation have been implemented in an *R*-package, `ctarma`. The simulations can be either frequency-domain based or time-domain based. Several approaches of simulating CARMA processes with time- and frequency-domain methods are implemented in the package. The estimation is based on numerically maximizing the normal likelihood. The likelihood is computed via the Kalman-filter algorithm. The process is constrained to be stationary by transforming the parameter space. Two alternative transformations enforcing the stationary conditions on the parameter space are given. The package can model irregularly spaced time series. Starting values of the parameters can be generated by using the Whittle-estimator when a usable empirical spectrum is available. A scheme of increasing the size of the model, i.e., generating a CARMA($p+1, q+1$) model from a CARMA(p, q) is built into the package. The functionality of the package is illustrated with simulations and some real-data series.