Long-memory Log-linear Zero-inflated Generalized Poisson Autoregression for COVID-19 Pandemic Modeling

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Abstract

This paper describes the dynamics of count time series of daily new cases arising from the COVID-19 pandemic using a long-range dependent model. A new long memory model, LFIG (Log-linear zero-inflated generalized Poisson integer-valued Fractionally Integrated GARCH process model), is proposed to account for time series data with long-run dependent effect. It provides a novel unified framework for integer-valued processes with serial dependence (positive or negative), over-dispersion, zero-inflation and nonlinearity. We adopt an adaptive Bayesian Markov Chain Monte Carlo (MCMC) sampling scheme for parameter estimation. This new modeling is applied to the daily new confirmed cases of COVID-19 pandemic in six countries including Japan, Vietnam, Italy, the United Kingdom, Brazil, and the United States. The numerical study demonstrates good interpretation and forecasting performance of long-memory modeling to COVID-19 pandemic.