Epidemiological Parameter Estimation of SIRD Model for COVID-19 Outbreak

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Abstract
COVID-19 is a highly transmissible epidemic that has impacted worldwide. It became important to study the transmission pattern and forecast the changes in the pandemic curve with the implementation of non-pharmaceutical interventions (NPIs). Epidemiological parameters of the Susceptible-Infected-Removed (SIR) model are widely used in explaining the characteristics and behavior of the disease spreading. The epidemiological parameter of the model changes throughout the epidemic due to external factors such as NPIs enforcement, public reactions to the control measures, and improvements in healthcare facilities. This paper is devoted to the parameter estimation of the SIRD model using the Markov Chain Monte Carlo (MCMC) method of the Metropolis Hasting algorithm. The data from Malaysia, Thailand, and Indonesia are used and the dynamic behavior of the COVID-19 outbreak in these three countries is simulated. The results show the parameter changing due to the NPI enforced influencing the trend of the pandemic curve.

Keywords: COVID-19; MCMC; Deterministic SIRD; SRK4; Parameter estimation.