



Forecasting COVID-19 Daily Infected Cases in Sri Lanka by Holt-Winters Model

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ABSTRACT

Since December 2019, the novel coronavirus disease (COVID-19) has spread from China and around the world. In Sri Lanka, as of December 29, there had been 586,183 confirmed cases and 14,944 deaths due to this viral infection. This study was performed to forecast the daily infected cases of COVID-19 in Sri Lanka by using Holt-Winters three parameter with additive or multiplicative models. Forecasting may help relevant authorities for better preparedness against the pandemic. The daily infected cases in Sri Lanka for the period of 22nd January 2020 to 22nd December 2021 were obtained from the publicly available databases of Epidemiology Unit of Sri Lanka and World Health Organization. Analysis was performed using Minitab statistical software (18th version). The pattern recognition of the daily infected cases was examined by time series plot and Auto Correlation Function (ACF). The model validation was performed by the Anderson Darling test which confirmed the normality of residuals ($p > 0.05$) and ACF that confirmed the independence of residuals of the model. The forecasting ability of the model was assessed by the three measurements of errors; Mean Absolute Percentage Error (MAPE), Mean Absolute Deviation (MAD) and Mean Square Error (MSE). Holt-Winters additive and multiplicative model with α (level) 0.61, β (trend) 0.4 and γ (seasonal) 0.3 at a length of repeating behaviour of 3 days, had the least relative and absolute measurement of errors during the model fitting and verification. In the multiplicative model, MAPE, MAD and MSE were 0.2847, 0.0187 and 0.0005 respectively. Similarly in the additive model, corresponding values of MAPE, MAD and MSE were 0.0207, 0.0187 and 0.0005. The fits and the forecast of these models followed a similar pattern of the actual daily infected cases concluding that this model can be used to forecast the COVID-19 outbreak in Sri Lanka.

Keywords: *Holt-Winters, COVID-19, infected cases, forecasting*