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Statistical Time-Series and Neural Architecture of Malaria Patients Records in Lagos, Nigeria

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Abstract : Time series data are sequences of observations collected over a period of time. Such data can be used to predict health outcomes, such as disease progression, mortality, hospitalization, etc. The Statistical approach is based on mathematical models that capture the patterns and trends of the data, such as autocorrelation, seasonality, and noise, while Neural methods are based on artificial neural networks, which are computational models that mimic the structure and function of biological neurons. This paper compared both parametric and non-parametric time series models of patients treated for malaria in Maternal and Child Health Centres in Lagos State, Nigeria. The forecast methods considered linear regression, Integrated Moving Average, ARIMA and SARIMA Modeling for the parametric approach, while Multilayer Perceptron (MLP) and Long Short-Term Memory (LSTM) Network were used for the non-parametric model. The performance of each method is evaluated using the Mean Absolute Error (MAE), R-squared (R2) and Root Mean Square Error (RMSE) as criteria to determine the accuracy of each model. The study revealed that the best performance in terms of error was found in MLP, followed by the LSTM and ARIMA models. In addition, the Bootstrap Aggregating technique was used to make robust forecasts when there are uncertainties in the data.

Keywords : ARIMA, bootstrap aggregation, MLP, LSTM, SARIMA, time-series analysis
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