MSc Project Report

DISTRICT LEVEL OPD PATIENT VISITS FORECASTING OF CRITICAL DISTRICTS IN SRI LANKA - CASE STUDY

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Abstract

Outpatient Department (OPD) open doors for both inpatients and outpatients to the health care delivery system. Patients are being screened and directed to respective treatment units or inpatient admission units. Outpatient department immensely contributes to reduce the morbidity and mortality by promoting health. Significant portion of health services of the health care system are done by the outpatient unit of a hospital. Thus, substantial volume of resources of the health system are utilized by the outpatient department.

Forecasting the outpatient visits would support efficient planning, allocation and requesting of resources, district wise depiction of health status of people and identifying core trends in OPD patient visits by the health care administration. Moreover, health care administration could request donations from other countries, prepare ahead for emergency situations like Covid-19 and create development proposals with reliable numbers of patients demand in future with forecasted figures.

Considering the immeasurable benefits provided by forecasted outpatient visits, forecasting of district wise OPD patient visits were performed. From 2006 to 2019, quarterly patient count ranged from 1,150,000 to 1,670,000 for Colombo district. Annual patient count by population percentage was highest for Mannar(402.65%) and lowest for Ampara(130.06%). Colombo, Anuradhapura, Rathnapura, Kurunegala and Kandy were identified as critical districts.

Univariate forecasting was performed on the identified critical districts. ARIMA, SAIRMA, Holt-Winters Exponential Smoothing (HWES) and LSTM were performed on each model. The model that gave the lowest RMSE% was used as the best model. The model adequacy test was performed by undertaking residual analysis. The next best model was chosen when the model adequacy tests failed. HWES was the best model for Rathnapura and Kurunegala. ARIMA for Colombo and Kandy while SARIMA for Anuradhapura. Web user interface was developed for users to perform district wise OPD patient forecasting and visualize OPD visits.

Keywords: outpatient department, outpatient department visits forecasting, arima, sarima, holt-winters exponential smoothing, lstm, univariate forecasting