

Predicting Medical Drug Sales in a Specific Area for Categorical Drugs using Time Series Forecasting

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Accurately forecasting pharmaceutical drug sales is a significant challenge faced by many firms, particularly in Sri Lanka, where factors such as seasonality, weather, local health crises, importation issues, currency fluctuations, and economic instability affect inventory management. These challenges often lead to frequent conditions of either shortages or overstocking of drugs, which adversely affect healthcare delivery and business profitability. This study addresses this issue through the development of a data-driven system using machine learning to predict drug sales efficiently and accurately. This work involved gathering sales data from local pharmacies, performing some pre-processing steps, and implementing a time-series forecast using the SARIMA model, which works efficiently with seasonal variations in sales data. A locally hosted, user-friendly web application was developed using the Flask framework to present these predictions in a readable format for pharmacists and drug sellers. The system was also validated on an external dataset, demonstrating high accuracy in the forecasted sales, which helped improve inventory management practices. The proposed system reduces drug shortages, minimizes wastage due to expiration, and enhances supply chain efficiency, thereby improving healthcare delivery and business outcomes. This research provides evidence of the opportunity to leverage pharmaceutical sales data to identify disease trends and inform public health strategies. The model can be further improved and applied in various aspects by including additional variables. This research bridges gaps in supply chain management, improving the availability of medications and making inventory management more predictable, benefiting both public health and industry stakeholders.

Keywords: *drug sales, pharma sales prediction, public health, SARIMA, time series forecasting*

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