

Artificial Intelligence-Based Time Series Forecasting for Operational Risk Management in Healthcare: A Comparative Study of ARIMA, SARIMA, and Prophet on the EPA Platform

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Abstract

This study presents the development and evaluation of time series forecasting models for operational risk management in healthcare institutions, using real data from the EPA Platform. The objective was to predict the number of risk-related occurrences based on historical records, comparing the performance of ARIMA, SARIMA, and Prophet. The models were applied to both daily and monthly granularities, which enabled the identification of the most effective forecasting strategies for each temporal context. The approach included seasonal pattern analysis and hyperparameter optimization through Grid Search. Experimental results highlighted each model's ability to capture complex temporal dynamics while maintaining low computational cost. The findings supported strategic decision-making aimed at risk mitigation and patient safety, and demonstrated the practical applicability of AI-based forecasting in institutional healthcare environments.

Keywords

Artificial Intelligence, Time Series Forecasting, ARIMA, SARIMA, Prophet, Healthcare Risk Management.