

Understanding the ARIMA model for analyzing time series medical data

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Abstract: This study explores the application of the ARIMA (Autoregressive Integrated Moving Average) model for analyzing time-series medical data. Given the critical importance of accurate forecasting in healthcare—such as predicting patient admissions, disease incidence, or resource demand—this research evaluates the effectiveness of ARIMA in capturing temporal dependencies within structured health datasets. The methodology involves data preprocessing to ensure stationarity, model identification using autocorrelation and partial autocorrelation functions, parameter estimation, and diagnostic checking. The model's performance is assessed through metrics including AIC, BIC, and out-of-sample forecast errors. Results demonstrate that ARIMA effectively models linear trends and seasonal patterns in medical time series, providing reliable short-term predictions. However, limitations are noted in handling non-linear fluctuations and external shocks. The findings underscore ARIMA's practical utility as a baseline forecasting tool in health informatics, while also highlighting the need for hybrid approaches to enhance predictive accuracy in complex clinical environments.

Keywords: ARIMA, time series, medical data, forecasting analysis