Comparing Statistical and Transformer-Based Models for Stock Price Forecasting: ARIMA vs. TimesFM and Chronos-T5

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Abstract

Stock price forecasting remains a challenging task due to the volatility of financial markets and the complex, nonlinear patterns in historical data. This study investigates whether cutting-edge AI models can outperform traditional statistical methods in predicting stock prices, with a focus on closing price prediction, a key market indicator. Using real-world stock data collected from Yahoo Finance for major companies like Tesla and Nvidia, we compare three models: the traditional ARIMA model and two Transformer-based models—Google's TimesFM and Amazon's Chronos-T5. The models are evaluated using Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Mean Squared Error (MSE). Results show that deep learning models, particularly Chronos-T5, significantly outperform ARIMA by capturing long-term dependencies and complex market behaviors. The study also discusses model limitations and suggests future improvements, such as incorporating sentiment analysis and using ensemble approaches to better handle market volatility.