Stock Price Prediction with Hybrid of ARIMA Models

Forecasting stock market requires investors to have extensive knowledge and background information. The stock market for the most part is the appearance of the anticipated financial situation of a company and industry. Stock market data are time-variant, which is challenging to forecast. Today, analysists build traditional statical models or use machine-learning algorithms to study the trend of the stock and forecast the price of a stock. Typically, the Autoregressive integrated moving average, ARIMA, is widely used in time series forecasting due to its ability to capture the mean appropriately. The simple ARIMA model takes in three integer inputs. During the toning process, analysts have to identify the combination of three inputs that best fit the trend of data. The tunning process of ARIMA model could tedious and time-consuming. Moreover, it is less effective in determining datasets with nonlinear-relation. On another hand, machine learning algorithms can better predict datasets that contain nonlinear-relation but are less effective in seasonal variance, data has different trends in different periods of time, which Seasonal ARIMA (SARIMA) is capable of. Lately, many large tech companies like Facebook and Amazon have both built their time series prediction model, Facebook Prophet, and Amazon SageMaker DeepAR. This paper is going to explore if a hybrid model between SARIMA and these two machine learning algorithms would be more effective in modeling the trend and accurately predict the price of the NASDAQ Index. The dataset would be fitted using the SARIMA model that would capture the seasonal variance of the data, then the residual of the SARIMA model would be passed into Facebook Prophet and Amazon SageMaker DeepAR to perform training to determine the nonlinear-relation of the data. This paper is going to discuss whether hybrid ARIMA models would be more efficient and accurate them a single algorithm alone.