Stock Price Prediction Extended Abstract

Shailesh Mahto(50540379), Abhiroop Ghosh(), Shivam Bhalla, Kshitij Thakur()

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1 Abstract

We try to utilize popular models like ETS and ARIMA for stock price prediction of Apple stocks. Thorough residual diagnostics is performed to check the validity of the forecase. Finally, the performance of all the models are compared.

2 Overview

2.1 Data Preprocessing

Even though data was available for many years, We decided to use only the data from Jan 2020 to May 2024. This is because the data visually showed very different pattern before 2020 but looked to have similar pattern 2020 onwards. Next, the dates were converted to auto-increasing index since there were gaps in dates due to stock market being closed on weekends or holidays. Hence the data size was 1089 rows. Out of this 989 rows were used for training and last 100 for testing the model. Next, box-cox transformation was used to stabilize variance. 'fable' package in R was used for training.

2.2 Data Modeling

For ETS model, ETS(A,N,N) model was autoselected.

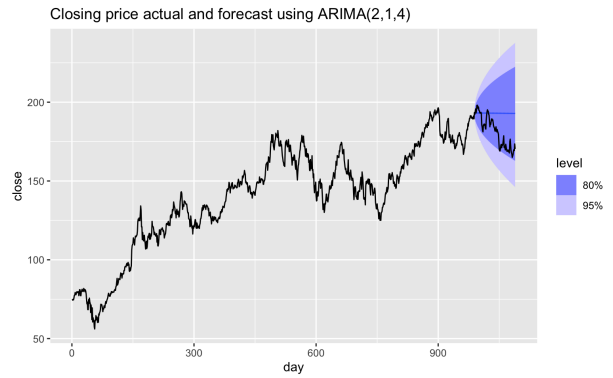| Model	RMSE	MAPE
ARIMA(2,1,4)	15.18	7.09%
ETS(A,N,N)	15.28	7.14%

Table 1: Results

Figure 1: Forecast using ARIMA(2,1,4) model

For ARIMA model, the data was made stationary before modeling by unit differencing. Stationarity was validated using KPSS test. ARIMA(2,1,4) model produced the best results. So it was carried forward for further analysis.

For both ETS and ARIMA models, Ljung-Box test was used to ensure the innovative residuals were indistinguishable from white noise. Finally their result(Table 1) was compared and ARIMA model was chosen as the best model.