Stock Price Forecasting

By Nelson Genao

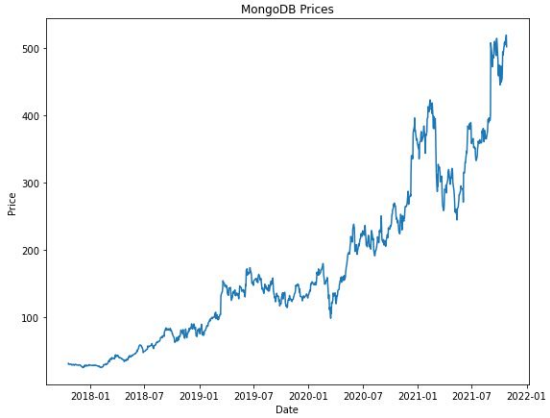
Overview

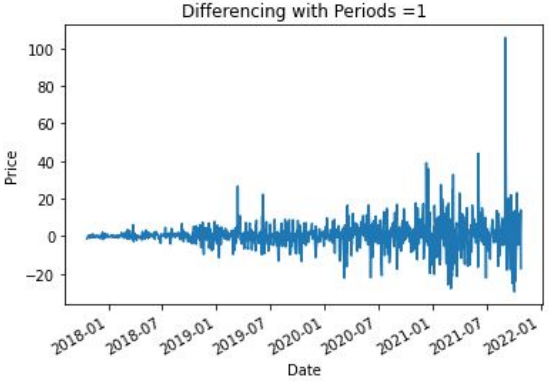
- Use time series forecasting to predict stock price growth rate after 60 days.
- Performing in-depth analysis on MongoDB using custom built preprocessing and modeling functions.
- The overall process is semi automated to find best model by lowest RMSE for stock price data provided.
- The purpose is to streamline the functionality across a larger spread of stock data and building a portfolio of the highest forecasted growing stocks.

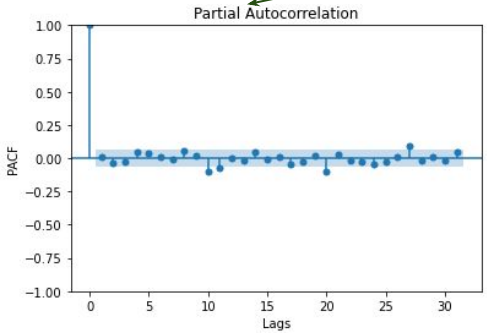
Data

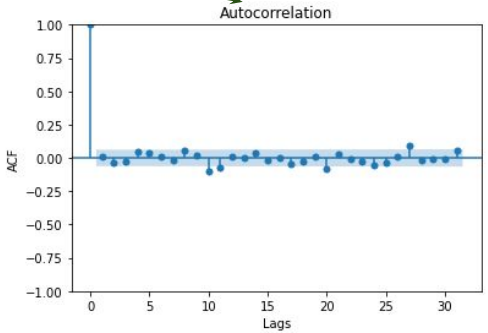
- Stock prices downloaded from Yahoo! Finance
- Obtained the past 5 years of prices for the following stock examples:
    - MongoDB
        i. MongoDB experienced significant growth over the last 3 years with the continued rise in the value of data. Could the models catch large spikes in growth?
    - American Airlines
        i. The airline industry has suffered due to recent events. Want to analyze what the next few months may look like for one major airline.
    - Amazon
        i. One of the most popular big tech companies which should be a safe bet to invest in.
    - General Electric
        i. GE has been on a steady decline over the years. Using this stock as an example of potentially negative or no growth.
    - Intel
        i. Intel has seen a lot of competition in the tech market as well. Looking at how it may continue to be affected.
    - Tesla
        i. A very popular stock experiencing significant growth.

EDA (Order)

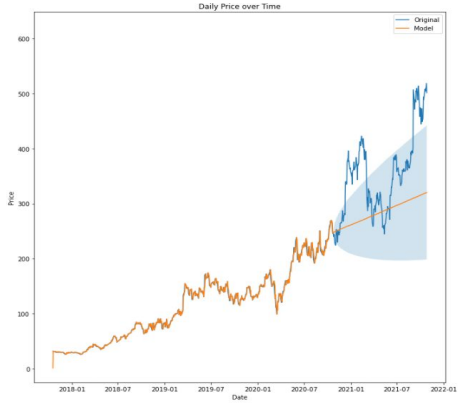

MongoDB Prices
Price
Date
2018-01
2018-07
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01


Differencing with Periods =1
Price
Date


Partial Autocorrelation
PACF
Lags


Autocorrelation
ACF
Lags

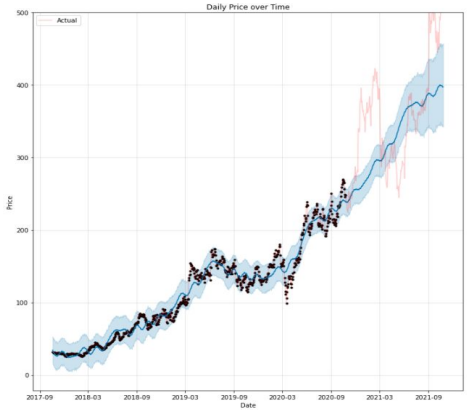
Modeling



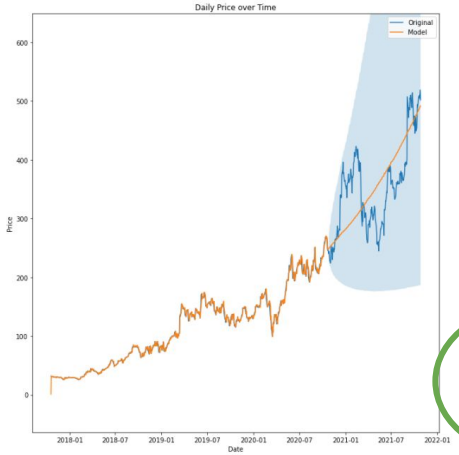
ARIMA

RMSE:
$92.11

Facebook
Prophet



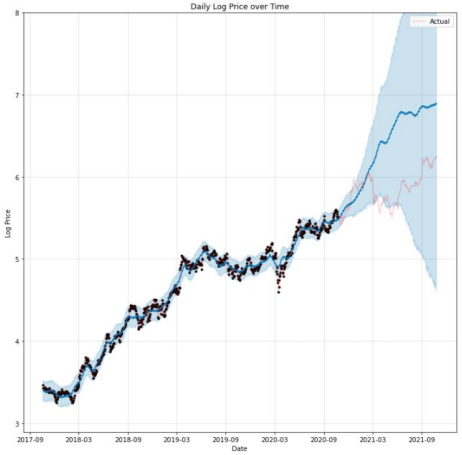
RMSE:
$65.79



ARIMA with
Log Transformed
Data

RMSE:
$58.08

Facebook Prophet
with Log
Transformed Data



RMSE:
$369.84

Results

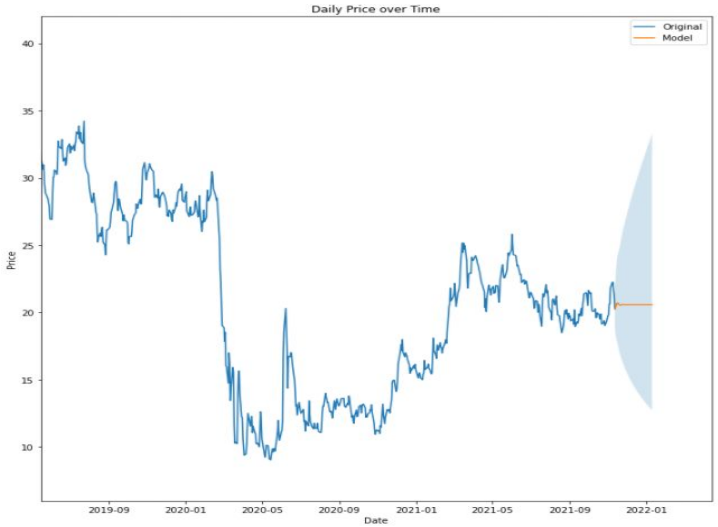
17.41%

Forecasted growth after 60 days

Additional Results

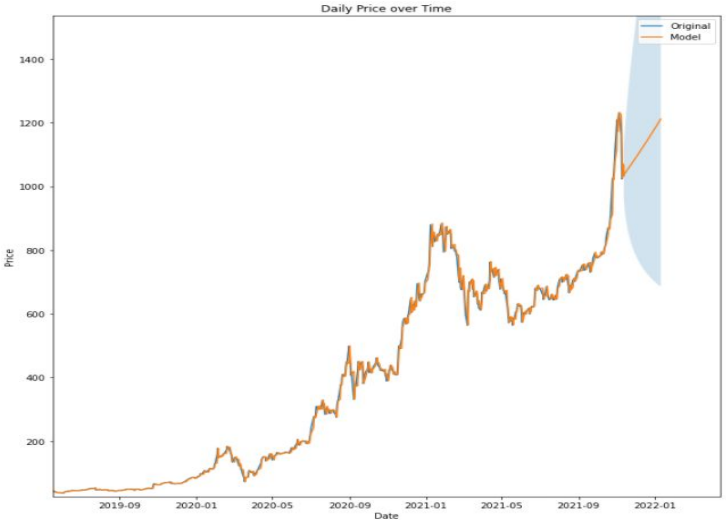
1.68% Growth

American Airlines



17.01% Growth

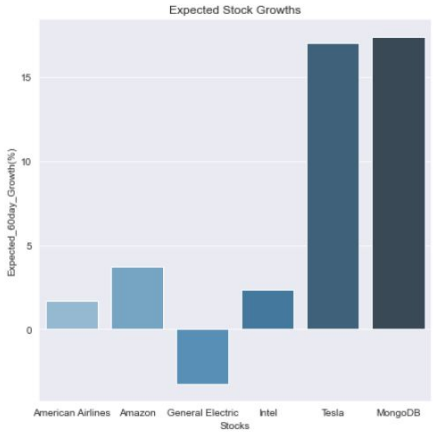
Tesla



Additional Results P2

Table of RMSE's By Model and Transformation

Stocks	ARIMA	Logged_ARIMA	Auto_ARIMA	Logged_Auto_ARIMA	Prophet	Logged_Prophet	Best_Model	Best_RMSE	Expected_60day_Growth(%)
American Airlines	11.37	8.92	6.49	6.09	28.2	14.75	Logged_Auto_ARIMA	6.09	1.68
Amazon	335.37	936.79	333.23	933.73	746.38	1918.65	Auto_ARIMA	333.23	3.73
General Electric	74.05	55.02	74.04	55.07	97.25	59.03	Logged_ARIMA	55.02	-3.23
Intel	6.49	5.79	7.98	7.99	6.44	6.26	Logged_ARIMA	5.79	2.33
Tesla	319.78	210.92	138.17	225.76	254.49	1098.83	Auto_ARIMA	138.17	17.01
MongoDB	92.11	58.08	92.4	58.02	65.79	369.84	Logged_Auto_ARIMA	58.02	17.41



Conclusions

17.41%

MongoDB

17.01%

Tesla

- Out of all the stocks, MongoDB and Tesla have the highest growth rates over 60 days.
- Caution is advised since the price of stocks can be shocked by financials, news/current events or even social media posts.

Next Steps

- Train neural network models to improve forecast accuracy
- Introduce other variables and data to the models
  - Stock sentiment analysis
  - Company financials
- Automate

THANK YOU

github.com/NelGen/NG-Stock-Forecasting-Project

finance.yahoo.com