

Prophet Diagnostics and Cross Validation: Evaluating Forecasting Accuracy and Reliability in Stock Market Analysis

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Abstract: According to the research, there was a consistent increase in app and tool users on the stock market since 2014, as well as a drop in market entry restrictions. Tesla's stock performance between 2019 and 2020 shows a significant increase in app and tool-based trading which also lowering capital investment levels. This research helps to to have a better understanding of the consequences of regular people's increasing dependence on trading apps.

Keywords: Prophet Diagnostics/Cross Validation Function.

1. Introduction

The problem that I will be tackling in this research paper is the increased number of ordinary people who are increasingly using apps to trade stocks. In this case, I will be looking at the two companies in question; (1) Apple and (2) Tesla. The trading Apps that I may be interested in through this report include Robinhood, Acorns, Stash, Weibull, and TD Ameritrade. I will be expounding on how these trading apps sometimes lure new users with free shares and then on the flip side, the apps offer the users minimal and close to zero trading or financial advice. This is increased risks on the part of the users. These apps mainly target younger users by lowering the entry threshold (Liu, Chen, and Wang, 2019).

The other issues that I will discuss in this report are the challenges and opportunities that are presented by the trading tools/apps. Under this category, the discussions will focus on the various challenges that these trading tools may encounter such as delay in response time with the actual market, and impulsive trading; either buying or selling on the part of the armature users who may not know how to properly read and gauge the stock market before buying or selling shares. On the other hand, there are increased benefits and opportunities that these trading tools have made easily accessible to the users in real-time whenever the market changes are happening, and this helps the users trade directly on the spot thus avoiding the lagging time of having to deal through their agents or brokers (Amirinia, 2020).

2. Methods

The methods that I used in order to evaluate the problem of increased use of trading apps in stock trading was by accessing one year of stock data from the two companies in question; Tesla and Apple, which I obtained from Yahoo Finance website. After this, I used the open price modeling strategy to help with the stock forecasting and modeling of stock prices of Apple and Tesla in order to help with the financial analysis and study of the characteristics of the stock prices of these two companies.

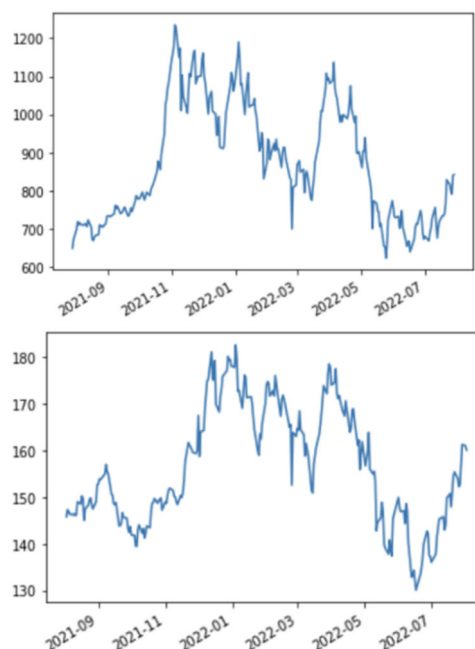


Figure 1. Opening stock price of Tesla (left) and Apple (right) over the last 12 months

After the forecasting, we used the prophet package analysis strategy and cross-validation methods to help with measuring the forecast data error by studying the pattern of historical data of Tesla and Apple. By applying forecasting tools such as the prophet package I could then tell the customary cutoff stock tradeoff points which range mostly between the cutoff points and the horizon points. This system helped me evaluate just how much the new users of the various mentioned trading apps and tools risk losing by deciding to not go via the brokers and agents, and instead take the option of trading the Tesla and Apple stocks directly. The last part of this method was to ensure that I note the number of new users who were one-time traders or rather not frequent traders. This helps note users of the trading apps and tools and what profits, losses, and risks they proffer (Liu, Chen, and Wang, 2019).

3. Results

With the Apple stock vs timetable representation, I used the parameters of time in years from 2014 to 2022. The graph

representation shows that users of trading apps and tools have been on the rise and the market entry threshold has been consistently lowered through the years; 2014.

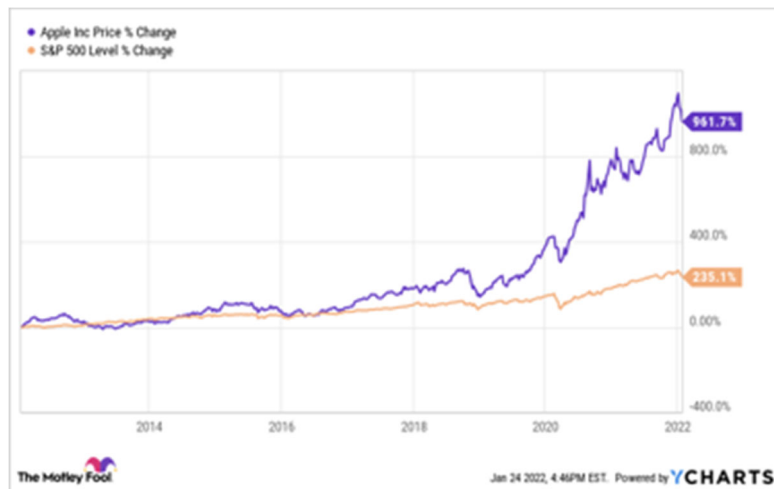


Figure 2. Plot of graph for Apple stock vs time



Figure 3. Plot of graph for Tesla stock vs time

On the flip side, the stock vs time graphical representation of Tesla was made by the parameters of time mainly in months. I timed the months starting from March 2021 to March 2022. Through this period, the results showed that Tesla stocks that had been traded through apps and trading tools that had been registered not later than 2019 and 2020 were continuously on the rise, and brokers and agents were no longer the main

traders as most of the new users did not employ the advice or guidance of any professionals and financial experts in stocks trading. The results however show that through this period as well, Tesla stock peaked around November 2021 and was at an all-time low in early 2022. This indicates that the new users trading via trading apps and tools had reduced the amounts of capital that they traded with (Amirinia, 2020).

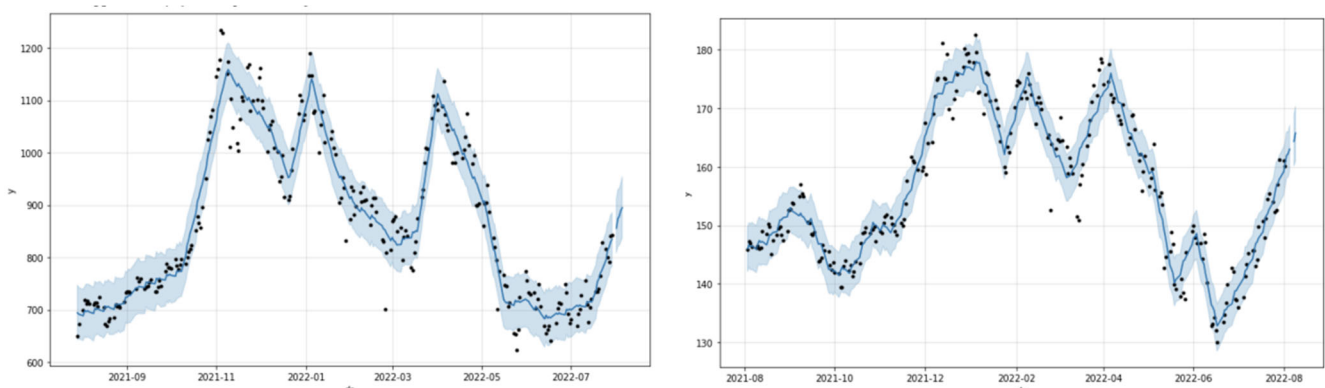


Figure 4. Prophet model fit to Tesla stock prices (left) and Apple (right). The solid line is the model prediction and the shaded region shows the confidence interval. The plots also show a forecast ahead for several days in the future.

Table 1. Model forecast (yhat) of the stock price for Tesla (left) and Apple (right) for future days. The confidence interval is between yhat_lower and yhat_upper. For the Apple forecast, August 6/7 are on a weekend when trading is halted.

	ds	yhat	yhat_lower	yhat_upper	ds	yhat	yhat_lower	yhat_upper	
255	2022-08-01	855.527423	808.397681	911.355572	252	2022-08-03	161.928805	158.091383	166.034955
256	2022-08-02	873.587222	820.900998	928.708530	253	2022-08-04	162.261457	158.227514	165.858810
257	2022-08-03	879.044984	823.204411	932.042546	254	2022-08-05	163.021936	159.238803	167.082688
258	2022-08-04	889.153366	830.104026	940.499152	255	NaT	NaN	NaN	NaN
259	2022-08-05	894.604471	836.997846	953.589914	256	NaT	NaN	NaN	NaN
					257	2022-08-08	164.343306	160.167998	168.782852
					258	2022-08-09	165.779105	161.029685	170.338440

4. Discussion

How well did the models do compared to the actual opening stock prices? Prediction for 8/02 where the actual opening was 882 for Tesla; prediction for 8/04 where the actual opening was 166 for Apple.

Tesla 8/02 open, high, low:

882.01 923.50 878.00

Apple 8/04 open, high, low

166.01 167.19 164.43

What were your expert guesses a couple of days ahead? Tesla, guessed 970 +/- 30, too high for open (but it did go up in later days - you might be right in the future). Apple, you guessed 159-165, very similar to the model, you were both basically correct if a tiny bit low.

The model only uses stock open price. A more complicated model that also used close price, high/low, volume, trend over the last few days, etc would be expected to be more accurate.

Your expert guesses also took into account factors such as financial events, plans, company strength, etc

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