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Ethereum Price Model Draft

Business Problem

Can I apply a time series forecast model to the price of Ethereum since its inception? Will this model be able to accurately predict market timing for buying and selling Ethereum to maximize profits, or will the mantra of "time in the market beats timing the market" hold true?

Background/History

Ethereum is the second largest cryptocurrency with a market cap of 216.3 billion dollars, or 15% of the entire cryptocurrency market. Ethereum is used primarily to facilitate smart contracts (automated processes for financial transactions on the block chain), to reduce the time needed for these transactions to occur. Ethereum first started in 2015, and through various upgrades has secured its position as a staple in the cryptocurrency market

Data Explanation

Using Yahoo Finance, I was able to pull the historical trading data of Ethereum under the ticker symbol "ETH-USD." Due to some changes on Yahoo's backend, a library called "yfinance" used a function to brute force a means to extract the data. The data is not robust; however, it is comprised of the relevant data Yahoo Finance has tracked for the requested ticker symbol.

Date – The data is split up by calendar day, and this header is the day in question.

Open – This column shows the price of the stock/asset when the markets open for trading.

High – This column shows the highest price of the stock/asset during that day of trading.

Low – This column shows the lowest price of the stock/asset during that day of trading.

Close – This column shows the price of the stock/asset when the markets close after a day of trading.

Adjusted Close – This column shows the stock/asset price when the markets close after a day of trading, after considering actions such as stock splits over years.

Volume – This column shows the number of trades made on a given day of trading.

After receiving the data from Yahoo Finance, the data was indexed based off of the day of trading. To rectify this and make the date its own column, I exported the data to a .csv file and reimported the data. I could have used the reset_index function, however exporting the data provided me a file to share as needed. Finally, I Pandas' to_datetime() function to convert the date column to a datetime group for easier model handling.

Methods

I created a histogram for each variable to see if there were any noticeable distributions. From there, I noticed that the Close and Adj Close graphs looked identical. Using NumPy's where() function, a new column was created to test if the value in Close and Adj Close were different on any given day. Since Ethereum does not function like normal stocks, stock splits have never occurred for Ethereum. This explains why Close and Adjusted Close values do not differ anywhere in the dataset.

After creating a correlation matrix to see how each variable correlates to each other, volume and date were the only variables to not have a new 100% correlation to Close price. Seeing these values so tightly grouped, I chose to build a model based on Date vs Closing Price. With these variables, I will pass them into Facebook Prophet to build a time series forecast.
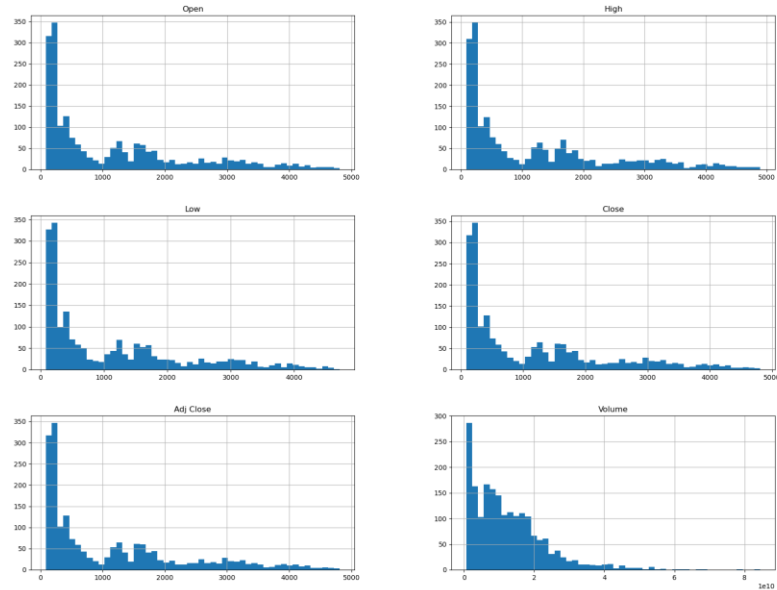
Analysis

After plotting the historical price of Ethereum, we can clearly see a massive spike in 2021-2022 during the period where the Federal Reserve loaned money at a 0% interest rate. This is followed by a downward trend in price as the Federal Reserve started raising rates again. It should be noted that the average price now is about 50% higher than the average price was before the massive spike in 2021.

Etherum Price History

Using fbProphet, I created a model and overlayed the forecast line over the historical data and proceeded to generate a single year outlook. The model did well on the training data up until year 3, correctly forecasting a few dips in price. In year 3 and onward, the model correctly predicted the peaks of 2021 and 2022. The model did not handle the rapid increase in price that the real world saw. At the end of 2022, the model was conservative with the price tapering down, when the real world saw a decline of 200-300 dollars. Finally, the prediction is that in February of 2024, Ethereum will be worth less than 0 dollars.

Conclusion

The model itself took a very conservative approach to the forecast data. Just doing a simple time series model on the historical data alone does not seem to provide enough information for the model to accurately predict the future, let alone the past. Most of the time though, the model did accurately predict the price was going to rise or fall. This model could be used as a first glance for deciding to buy or sell in the cryptocurrency market.

Assumptions

The biggest assumption of this model is that Ethereum follows the same seasonality as the rest of the stock market (September being the worst month for trading as everyone sells to lock in for tax season). This model assumes the price will continue to fall as it does not consider lowering interest rates from the Federal Reserve in the future.

Limitations

This model does not consider sentiment values for the market at large, or cryptocurrency in general. When Ethereum 2.0 is fully released, this model is operating under the assumption that there will be no more demand or increased "hype" around the upgrade as well.

Challenges

One challenge of this model is that it is basic. Cryptocurrency is very volatile due to being able to buy and sell at all hours of the day. It is also very susceptible to social media influence as we see an uptick in trade volume whenever there is panic or discourse in the crypto sphere online.

Future Uses

This model could be used as an addition to a more robust sentiment analysis model. Scraping blogs and Twitter to see how the world views the global market, as well as cryptocurrency, will be able to shed more light on outside factors that affect the pricing of Ethereum.

Recommendations

This is not financial advice. Making any investment decisions off one model is risky. I strongly recommend this model be used with advice from a financial planner and models that take more robust input.

Implementation Plan

This model will be embedded into a personal dashboard to help monitor the current price of Ethereum and the forecast. Embedding tweets through a widget will also improve my confidence in that day's forecast. Once implemented, this will be a useful tool to analyze

Ethical Assessment

There are ethical concerns around cryptocurrency being environmentally unsafe, and promoting trading could increase the demand of cryptocurrency. Subsequently doing more harm to the environment. Cryptocurrency developers are continuing to work on making their algorithms more energy efficient to reduce environmental impact, however that will take time. Providing a one-stop shop to someone for financial information could also give them an out to blaming you for poor trades that do not pan out in their favor.

<u>Appendix</u>

Installing fbprophet python on windows 10. Stack Overflow. Retrieved A5pril 9, 2023, from https://stackoverflow.com/questions/53178281/installing-fbprophet-python-on-windows-10/64878241#64878241

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