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Forecasting Stock Prices with SARIMAX and Prophet Time Series Analyses

Problem Statement:

The US stock market offers many lucrative investment opportunities for both institutional and individual investors, barring any disastrous or unforeseeable changes with the economy or any specific publicly traded company/companies. The stocks offering the most returns to investors usually are from companies who have and continue to trend positively, both in financial performance and future outlook. Being able to forecast a stock's future trend and quantify its future value empowers investors to make more informed decisions whether to sell a stock now to maximize returns or buy more of it for even greater returns.

The goal of my project will be to use stock market data to determine the future trend and price of any given stock.

Dataset Description:

I will be using and retrieving data from Yahoo! Finance for this project. Using the yfinance python package, I will be able to download stock market data from Yahoo! for any given stock that is publicly traded. To be more specific, I will be downloading ten years worth of US stock trading data (from 2008-10-31 to 2019-09-27), as there are only 250 trading days in a year as the market is not open on weekends (i.e., Saturday and Sunday).

After downloading the dataset, I will be able to convert the output into a dataframe, and clean and prepare it for time series analysis and ARIMA & Prophet models.

I will mainly be focusing on analyzing and forecasting the closing price of a stock but may add other metrics such as the volume traded into my analysis.

Purpose and Outcome:

Such analysis of forecasting stock prices to ensure greater returns are invaluable to the investment companies, such as asset management firms where it is their fiduciary responsibility to invest a client's money into financial instruments (such as stocks) for future growth and target financial goals.

The robustness of this time series modeling will provide the most critical information to investing or divesting from a certain stock, as it provides tangible and quantifiable results that empower asset/money managers to make informed decisions on behalf of their clients. Moreover, it allows such decision makers to avoid relying on price speculation, investor sentiment and market volatility--all of which are intangible factors that cannot not be confidently quantified or used to make a responsible investment.