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15-112 Term Project

Project Description:

My term project is called Investment Robo Advisor. This program allows users to "paper trade" or trade stocks through a live market simulation. Users are also introduced to different strategies that typical retail investors do not have access to, such as pair trading and sentiment analysis. The users can monitor their portfolio of stocks and how it performs against certain indexes.

Competitive Analysis:

I have seen a few similar term projects from previous semesters as well as online projects from Reddit and GitHub.

One previous project was iStockUp. Both of our projects use a visualization tool to display a stock chart. We both have some kind of prediction strategy of where the stock will go. However, my pair trading strategy is independent of the market trend and will not be affected by systematic risk as a linear regression + machine learning model would. We both have a portfolio and trading platform for a user to interact with; I would expect that mine would be similar.

Another previous project was Stock Market Simulator. Both of our projects use a visualization tool. However, this visualization is unique because it simulates a trading day, but much faster paced. Though my project does not intend on doing this as mine would be simulate a regular paced trading day, I find this interesting. There is also a wealth of financial information, but no strategy for the user to utilize except possible daily moving averages.

Lastly, a previous project was PyStocks. This one also displays a stock chart as the previous two have had. However, there is a lot less financial information or strategies recommended.

My project will need a significant overhaul in user interface, as it is basic black and white tkinter. However, I do see that previous projects have not done advanced trading strategies such as pair trading and sentiment analysis. I hope that these features will work and can be tested upon live data.

Structural Plan:

- UI will be driven by Tkinter processes and functions
- Matplotlib functions will be one file
    - Kind of like the canvas of tkinter, except for drawing graphs
- Web-scraping functions will be another file

    - API from Alpha Advantage and NYT
- Pair trading and linear regression will be one file
    - Data analysis
- Sentiment Analysis and NLTK will be another file

Algorithmic (Two-Part) Plan:

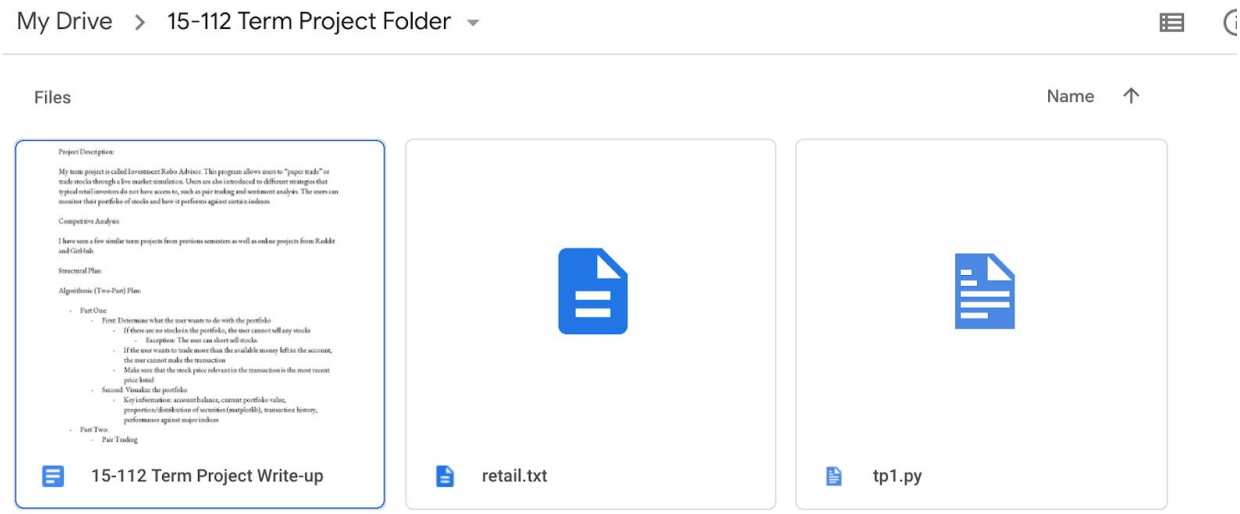
- Part One:
    - First: Determine what the user wants to do with the portfolio
        - If there are no stocks in the portfolio, the user cannot sell any stocks
            - Exception: The user can short sell stocks
        - If the user wants to trade more than the available money left in the account, the user cannot make the transaction
        - Make sure that the stock price relevant in the transaction is the most recent price listed
    - Second: Visualize the portfolio
        - Key information: account balance, current portfolio value, proportion/distribution of securities (matplotlib), transaction history, performance against major indices
- Part Two:
    - Pair Trading
        - Web-scrape the data of the user's stock pair
        - Run a regression analysis
        - Determine if the pair trade has a high correlation
            - If so, is the current standard deviation higher than usual and is there an opportunity for statistical arbitrage?
                - Make a buy rating for the underperforming stock and a sell rating for the overperforming stock
        - Determine if the user wants to utilize the opportunity
            - Refer to part one, where the user makes the trade and the trade shows up in the portfolio
    - Sentiment Analysis
        - If the user's stock has a positive "sentiment" in the market, demonstrate a buy rating for the stock
            - If the stock has negative "sentiment", demonstrate a sell rating for the stock

Timeline Plan:

I plan on finishing all major features of the project by TP2. Essentially, having all the modules integrated where I can web-scrape online financial data, visualize it, and perform analysis on it through my pair trading and sentiment analysis platforms. Furthermore, the portfolio platform should be functional as well. What I plan on doing between TP2 and TP3 is working on the user interface to help the overall user experience. I will also be doing lots of use case testing to figure out and debug any issues.

Version Control Plan:

I plan on using Google Drive to backup any work related to this term project, including any code.



Module List:

Web Scraping, Natural Language Processing, Matplotlib, Tkinter