Project Proposal Part 1

Working Title:
InvestEd: Investment Education

Dataset:

Summary:
We are using the NASDAQ and S&P 500 stock data that are publicly available through Yahoo Finance. This data set is available on Kaggle through a user who used the Yahoo Finance API to put together this data.

Metadata:

1. Brief Description: General US stock market data
2. URL: https://www.kaggle.com/datasets/paultimothymooney/stock-market-data
   - nasdaq folder
   - sp500 folder
3. Date Downloaded: April 11, 2022
4. Authorship: Paul Mooney
5. Exact name and version: Stock Market Data (NASDAQ, NYSE, S&P500). Version 57.
6. Terms of Use: "All the data provided by Yahoo Finance is free. Yahoo Finance API is the API that Yahoo provides to fetch financial information."
7. Citation: Mooney, Paul. 2022, April, 11th. *Stock Market Data (NASDAQ, NYSE, S&P500)*. Ver 57. *Accessed* April 11th, 2022. *https://www.kaggle.com/competitions/jpx-tokyo-stock-exchange-prediction/data*.
8. Usability: To make this data usable and under the size limit, we are subsetting only the prices of stock from the last 1-2 years back. We are also subsetting into a number of the companies instead of all of them.

Potential User Interactions with Data:

1. Inspect pricing metrics (Low, High, Open, Close, and Volume) of individual stocks in the data
2. Pick individual stocks for a virtual portfolio and view their ROI in a particular time period
3. Choose one from the pre-coded investment strategies and compare ROI across strategies
4. Customize an investment strategy and compare ROI with pre-coded strategies

5. An automated graphical engine that conveys the portfolio's ROI through time. This engine should work with a standardized input from other functions

Pre-coded Investment Strategies to Be Implemented

1. Buy Low, Sell High, Perfect Timing
   - Divide a year into four quarters
   - Buy stocks at their lowest prices of each quarter, and sell them at their highest prices the following quarter

2. I Work Here
   - Annual installments of stocks from a single company
   - The monetary value of annual installments increases by 3% each year?

3. S&P 500
   - Routine investments into the 500 most valuable stocks
   - Frequency can be specified by the user

4. Whole Market Index Fund
   - Routine investments into an index fund that covers the entire market
   - Frequency can be specified by the user

5. Monkey Trading
   - Randomize 10 companies from the S&P 500 annually
   - Invest in those 10 companies for a year, then sell out to invest in a new set of 10 randomly selected stocks

6. Believer
   - One time investment in a single company
   - Hold forever

TEAM CONTRACT

Team Goals:

- Practice working as a team using the Agile framework
- Write modular software that matches together into a bigger framework
- Develop software that all members of the team care about, some sort of practical usefulness
- Develop experience seeing a large-scale project from start to finish

Goals Statement:
Together, we employ Agile and professional frameworks to develop software that our members are passionate about through modular software development.

Team Strengths:

Jack:
- Building an overarching plan for development
- Error checking code
- Collaborating with team members

Miles:
- Code organization
- Debugging
- Reevaluating code to increase efficiency

Geoffrey:
- Writing organized code
- Debugging code
- Quick learner of new technologies

Nguyen:
- Passionate about pseudo-code. I believe in thorough planning before coding.
- Experienced with Pandas and data cleaning.
- Efficient in long-coding sessions.
- Thorough communication. Every voice should be heard.

Team Roles:

A. Predicting ROIs for Specific Investment Strategies

1. Geoffrey: Functions for *S&P 500* and *Market Index Fund* prediction strategies
2. Jack: Functions for *I Work Here* and *Believer* prediction strategies
3. Miles: Function for *Buy Low, Sell High, Perfect Timing* prediction strategy
4. Nguyen: Function for *Monkey Trading* prediction strategy

B. Common Helper Functions

1. Random Stock Generator (Jack)
   - Take in *nasdaq* or *SP500* and the desired amount of random stocks
   - Randomly pick that many stocks from either the *nasdaq* or *SP500* listing and return those
2. Stock Inspector (Jack and Geoffrey)
   - Take in a ticker symbol, date, and the desired query (“Low”, “High”, “Open”, etc.)
   - Return the value of the query
3. Cash to Stock/Stock to Cash converter (Miles)
   - Takes in Stock Name (ticker symbol), Date, toCash or toStock (binary option indicating whether to convert from stock to cash or cash to stock) and amount of stock/cash
   - Returns the conversion from either stock to cash or cash to stock
4. ROI Graphical Engine (Nguyen)
   - Make a line chart representing the fluctuating ROI of a certain portfolio
   - The data for the ROI is calculated by other functions
5. ROI Calculator (Nguyen and Miles)
   - Calculates the ROI for specified investment strategy

<u>How We Plan to Capitalize on Our Strengths:</u>

Our team members share significant resemblances with each other. This gives us a rotational advantage, meaning any member can cover for another in times of conflict. Though not set in stone, we agreed on a modular work environment to keep our team pushing forward on all fronts simultaneously. We will have weekly meetings to plan our development process when we agree on the general structure of the software in production, then divide the work into modules that each team member will work on separately.

CONTRACT AGREEMENT (Rules-ish)

1. We recognize the importance of outlining the development process together as a team before working on individual functions separately. Out of the 9 hours expected of students on group work per week, we commit to 2-3 hours of planning together. However, we will be flexible as our responsibilities change throughout the term. We plan on using Hulings 102 or Olin 04 as our two primary meeting locations.
2. For meetings, Nguyen will always be the scheduler. Geoffrey and Jack will be the coder/note-taker on a rotational basis. Everyone should facilitate discussion, but in case of inactivity, Nguyen will be the one responsible for reactivating the discussion. Miles is the member with the most attention to detail in our team, so he will be the one making sure that we are on track to meet the expectations and that nothing is missing.
3. We utilize 2 chat platforms, Slack and iMessage for communicating with each other. iMessage will be mainly used to remind each other of meeting times and informal check-ins, while Slack will be used for announcements and status updates.
4. Our team defines "respectful" as identifying each individual in the group as of equal importance and being mindful and understanding of each other's ideas and contributions. We will ensure communication stays respectful by involving every member consistently during group meetings and checking in with each other often to be aware of the team dynamic and maintain a positive inclusive work environment. We also will aim for compromises when disagreements arise and value each group member's opinions equally.
5. For non-communicative members, we will reach out during class time during the week. If the team member continues to be non-communicative, we will attempt to clear things up by scheduling a meeting with Anya and discussing possible solutions. Every team member will check in once every two days, and everyone will check in on Friday through a group meeting.
6. We have a designated Slack channel and text group chat for communication and a google drive folder for sharing files. We will also resort to using Zoom if meeting in person is inconvenient.
7. We plan on using majority rules as a last resort if we still can't reach a consensus. We will also keep an open mind when making decisions and consider every idea instead of shooting down any of them right away. We follow the 10-minutes rules. Each idea proposed will have at least 10 minutes of our discussion before any verdict can be made.
8. We will divide up work evenly based on individual strengths and interests, and also will be mindful of the amount of work that each group member will have. If one of us is struggling, then we will be sure to reach out and provide assistance to that group member if needed.
9. Everyone should be able to pick a task of interest when we divide the work. This does not necessarily require the member to be the best person in the chosen task, but we

believe that is the best way to stay motivated and ensure that each member thinks they are doing something meaningful. We acknowledge and appreciate that people naturally want to step outside of their comfort zone for the sake of learning, so allowing members to choose tasks they are interested in is the best way for them to make contributions that are valued.

10. Satisfactory performance at the minimum will be classified as finishing the agreed-upon task. We acknowledge that there will be unforeseeable problems that lead to the incompleteness of certain tasks. In that case, all other team members vouch to be respectful and empathetic, however, we will still classify the result as “unsatisfactory.” In addition, we expect our team members to spend a minimum of 9 hours per week on the team’s project.
11. The first step we will take when a member isn’t living up to expectations is reaching out and offering help. We are all motivated members, and we recognize that problems like this are bound to happen in every team. If it is determined that the member cannot finish the agreed-upon task within a reasonable extension, an additional member will be assigned to the task as well.
12. We strive to deal with conflicts on the basis of mutual respect as we know and value the importance of different perspectives. Therefore, we will discuss and reason together for the best option, and see if we can go from there. For specifically technical conflicts, if it is impossible or unlikely for us to reach an agreement, we will reach out to Anya to be our mediator. For more “petty” conflicts, the majority rules or even rock, paper, and scissors can work :)