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Project Proposal - CSCE 686

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I have two different ideas for the project, one of which is a multi-objective model while the other is a dynamic NPC problem that has a lot of constraints. I will be proposing both of them here and would like some feedback on which you think I should move forward with. Both of the problems involve finding the best subset of stocks to purchase from a given set of stocks.

**Note**: I am only going to show the progression from English -> symbols -> math/logic for one of the first idea, but if together we thing the second idea will be better for the project, then I will include these steps for that idea on the next part of the project to be turned in. Thank you

Idea 1: From a given set of potential stocks, pick the subset of stocks that should be purchased. There is a set amount of money and the plan is to buy 100 shares of each stock that is picked. The cost for each stock will be evaluated by multiplying the end of market price for that stock on Monday, June 8th, 2020 by 100. The value for each stock is a weight that is decided based on its potential risk/reward. This values that go into this weight will be given based on variables such as volatility, the given price vs 52 week high/lows, and large support or resistance prices for the stock. The portfolio of stocks will need to be diversified so each stock will also be given a list of sectors which it can be classified as, for instance Tesla could be considered for both technology and automotive. The plan is to use the knapsack problem and the set covering problem where the knapsack problem will be used to find the greatest value in the potential stocks and the set covering problem will be used to ensure the portfolio is diversified.

Input: Dictionary of stocks d where each stock in d is the stock ticker s paired with a list of stock attributes to include price P, value V, and a list of sectors the stock can be applied to T. Amount of money M which can be used to purchase stock. A list of sectors, SECs, which need to be covered by the portfolio.

Output: List of stocks to buy

max

Idea 2: This idea is very similar to idea 1. The difference here is instead of using the set covering problem to ensure a portfolio is diverse, I will go much more in depth about the constraints used in deciding upon the weight of each stock and have the weights change over time rather than using a single data point to create them. Additionally, with this I could make the set of stocks chosen dynamic where stocks from the current portfolio could be sold in order to buy other stocks. Lastly, I could also not limit the shares of a single stock to be purchased to 100 but instead say that they have to be purchased in increments of 100 and limit the max percentage of the portfolio used for a single stock.