Exploratory Dynamic Asset Allocation Leveraging Using Reinforced learning

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Most asset optimization models in finance output the best asset allocation to hold at a certain point in time (mean-variance portfolio theory). Follow the discovery of MVP, other strategies gained popularities such as factor investing and risk parity portfolios. Many of them have proven to be effective in-sample testing and out of sample testing. In practice, strategies are highly effective only in certain periods of time. My goal is to deploy a reinforced learning model in the US stock market to explore the different types of strategies that the agent can create. Inputs will be an investable universe of investors (ETFs, stocks, mutual funds, etc.). Outputs will be the weighting in each of the assets. The model will be optimized based on several factors. I have in mind to test for minimization of variance, maximization of returns, maximization of Sharpe ratio, minimization of VaR, minimization of Expected Shortfall, etc. In exploring how a reinforced learning agent allocates its assets, we can have insights if the methodology used today is the best. Using a reinforced learning model allows us to have an unbiased agent with a super brain. Since finance is more of an art than a science, there is truly no one right answer to each problem. Therefore, having supervised models is difficult because the end goal is often unknown.

The final conceptualization will be a web app with different inputs that a user can put. For example, one can put their human capital, house wealth, risk aversion, etc. It will create boundaries for the AI to optimize its model, allowing it to take on more risk or less.

Datasets:

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#Research

Kenneth R. French offers returns data on several factors investing strategies in multiple geographies.

https://www.aqr.com/Insights/Datasets

AQR's data will be used to assess some of their strategies.

https://www.refinitiv.com/content/dam/marketing/en_us/documents/fact-sheets/datastream-economic-data-macro-research-fact-sheet.pdf

Prices of stocks and other financial information from funds and ETFs will be taken from Datastream. For custom data types such as real estate indices and aggregate market bond data, Bloomberg data will be used.

https://research.stlouisfed.org/econ/mccracken/fred-databases/

Chen and al. (2019) have shown hidden macroeconomic trends that have a strong explanatory effect on asset pricing. Their model can be feed into other models. I will attempt to integrate it into my model.