COMPUTATIONAL THINKING IN FINANCE

An exchange-traded fund (ETF) is a fund that holds assets like stocks. ETFs are traded on the stock exchange just like stocks. According to Investopedia (2018), The most popular ETFs are FNCL, IYF, PGF, and KRE. When clients want to invest in ETFs, the bank can fulfill the client's demands by either creating the ETF or borrowing the ETF from an external source (the market). Creating an ETF is an expense on the bank's balance sheet and therefore depends highly on the availability of funds on the balance sheet to cover this expense. Borrowing an ETF depends on the available quantity in the market, therefore if demand exceeds the available quantity, a bank cannot fully satisfy the demand using the available amount.

The objectives of the bank are to meet the client's demands, to use the least amount from the balance sheet, and to make profit. Factors that the bank considers to meet these objectives include the raw market quantity, the break even, and the supply fee.

According to Horswill (2012), as long as the eventual result is achieved, it does not matter what method was taken. There are two solutions to meet the above objectives, one is for investment bankers to make the calls on their own based on judgement and experience and the other is to use a trained algorithm to predict the most suitable ETFs to invest in and what profits they would bring in.

Using investment bankers' judgement involves a banker either making calls based on prior experience or making calculations to predict eventual profit. Using prior experience is highly dependent on luck but making calculations takes a lot of time and manual effort.

Using Computer Science, the bank can develop models to either calculate which ETFs are most favorable on a specific day or use artificial intelligence to predict profitability based on past trends.

Using a linear programming model and modules like SciPy in Python, one can find the optimal allocation of the client's fund on various ETFs by comparing the minimal ETF creation cost with the supply fee and picking the least as long as the bank does not exceed the raw market quantity. In the case that the bank does not enough funds to create ETFs from its balance sheet, an option would be to let the client choose what to prioritize between his/her/their full demand being met versus profit. The bank can then incorporate this preference in its linear programming model.

Both of the described methods would meet the bank's and client's needs and a solution would be met. Both methods could be manually or computationally inefficient, but the programming model would spend less time making the decision and therefore move the energy requirement from the banker to a machine.

References

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