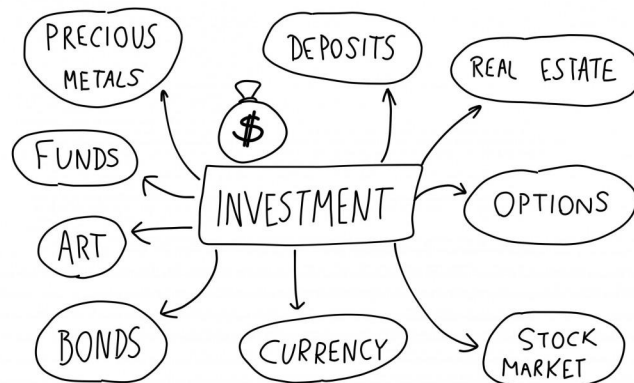


The project aims to implement sequential decision-making. Assume you're working in the Finance Department of a company. Your current task is to find the best investment opportunities. There are three different ways to invest your currency, Gold, Stock, and Bond. Each of these opportunities has its constraints outlined in the following.



The decision for investments took "every week". At the beginning of each week, you will decide to buy a portion of each investment. At the end of the week, your currency will be changing due to the overall percentage of revenue. You don't have freedom of action to do what you want but you are free to set objectives, constraints, and other variables only to maximize the overall income for your company. As mentioned each investment has its restrictions. these boundaries will prevent you and you "have to" consider them.

Stock:

- The revenue fluctuates due to the market situation.
- You can buy and sell them every week.
- You can invest every fraction of your money.

Gold:

- The revenue fluctuates due to the global situation.
- You can buy and sell them every week.
- Your total investment must be an integer multiplier of the current gold price.

Bond:

- The revenue is fixed to 0.54% per month.
- You can only sell them if there is a month passed from buying time.
- You can invest every fraction of your money.

Your investment will start at “**1 May 2023**”. The price of stock and gold varies over time. You can't use the future data (after the current date) in your model and decision-making process. Just consider you only have access to historical data. There is a chance for you to predict the future occurrence based on your historical data. You can download the historical data from [here](#). The “close” price is all you need.

Several models can be used to learn how to predict the future from historical data. You can just use “linear models” for forecasting tasks. The linear model also has to be modeled in linear manners and solved. For a brief introduction to working with time series data please check this [tutorial](#). Please be informed that this tutorial is useful for you to deal with data preprocessing. As mentioned the linear model must be implemented on your own. Many other libraries exist that you can use to process and handle your dataset. Check for [Numpy](#), [Pandas](#), [matplotlib](#), and etc.

For your linear regression and decision-making model you should use [MiniZinc](#) and its capabilities. You also might need to use the [Minizinc Python library](#) to connect your Python scripts to MiniZinc. The modeling can be done by defining a model file (.mzn) and a data file (.dzn).

Your decision-making software must incorporate with:

- Keep your structure of code and implementation as clean as possible.
- Data preprocessing, feature extraction related to time series, and some visualization.
- Linear models to predict future occurrence optimized by solver.
- Decision-making with a linear programming model. Interpretable objective functions and constraints.
- Merging your linear prediction model and linear programming.
- Making decisions for each stage (week) in the row. Going through each week to the next one. Precise and accurate illustration of what was your decision and what was happening in real. The start date for your program is determined but the end date can be varied.
- The ability to change the initial amount of money. But for testing assume you have 50000\$ at first.
- The ability to show the overall property at each stage.
- The ultimate outcome you got after all stages passed.

While and after your implementation please write a full academic report containing documentation for your strategies and your code correspondingly. Your report would contain the steps you have passed and an analysis of your results. You can use any statistical measurements for your runtime and performance. It is also recommended to add a Gantt chart to illustrate your decision throughout the time.

Good Luck