Problem Statement

Algorithmic trading is widely used by investment banks, pension funds, mutual funds, and other buy-side (investor-driven) institutional traders, to divide large trades into several smaller trades to manage market impact and risk. Sell side traders, such as market makers and some hedge funds, provide liquidity to the market, generating and executing orders automatically.

Algorithmic trading uses a computer program that follows a defined set of instructions (an algorithm) to place a trade. The trade, in theory, can generate profits at a speed and frequency that is impossible for a human trader.

Here we present to you one such problem where you need to complete a computer program that shall take long(buy) or short(sell) position on a set of assets covering different geographies and different markets based on the trade logic block (called strategy) which needs to be designed by you.

Your task is to complete the method strategy within the class Strategy in the python script Problem2.py. Based on your strategy, the code runs a backtest on the data provided to you and generates the Sharpe ratio. Your goal is to maximize this Sharpe ratio.

Below link gives some details on Sharpe Ratio. For this problem we consider risk free rate to be zero.

Link: https://www.investopedia.com/terms/s/sharperatio.asp

You are being provided with dataset containing asset prices from 5th Jan 2015 to 31st Dec 2020.

Data Format

The data format contains prices for each of the asset for each of the calendar days. In case a day is not a trading business day for a particular asset, the asset price for the previous trading business day is quoted as the price for that day. The column description is as follows:

Date	Trading date
Series1	Price of asset 1
Series2	Price of asset 2
Series3	Price of asset 3
Series4	Price of asset 4
Series5	Price of asset 5
Series6	Price of asset 6
Series7	Price of asset 7
Series8	Price of asset 8
Series9	Price of asset 9
Series10	Price of asset 10

Please ensure that the data file is in the same working directory for. In case want to keep the data file in a different location , please update the file path accordingly in the python code.

Submission Format

You shall submit the following files

- A word document describing your approach to the problem in a single page at the maximum.
- The python file Problem2.py with the completed class Strategy
- The csv file Result.py
- Optionally a pickled file containing all information you need from your trained model(If your strategy requires such a pickle file , it must be read within the module strategy itself)

Evaluation Criteria

The submission python file will be run for both provided dataset and an out of sample dataset.

We shall use the generated Sharpe ratio over the provided dataset and out of sample dataset as the evaluation metrics.

Sample function

A sample strategy has been provided within the python, you can use that for reference. Any submissions with the same sample strategy would not be considered for further evaluation.

```python
'''
Your strategy has to coded in this section
A sample strategy of moving average crossover has been provided to you for checking data output
You strategy module should return a signal dataframe
'''

def strategy(self):

    short_window = 15
    long_window = 30

    signal = self.data.rolling(short_window).mean() - self.data.rolling(long_window).mean()
    return signal
```