COP290 Part C - 4.1

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1 Our Understanding of the problem statement

We assume that on all trading days between start_date and end_date we will first calculate z_score of current day analyzing last n days from current day and then will decide whether to generate buy or sell signal (the definition of buy and sell signal is same as in the problem statement) after making this decision (note that this decision has only been made and not mentioned in cash_flow or any other file) now from here two cases arise (note that in the below cases something (i.e. a transaction) would only occur only if our final holdings after the transactions are within [-x,+x])

CASE 1: When we should generate sell signal

In this case we will first check all of our current positions, now here there can be two scenarios first one is when all our current positions are of type buy in this case we will sell the earliest bought position (i.e. in effect removing the earliest owned position(of type buy)), in scenario 2 all our current positions are of type sell in that case i will sell a new position and add it to the end of list of current positions.

CASE 2: When we should generate buy signal

In this case we will first check all of our current positions, now here there can be two scenarios first one is when all our current positions are of type sell in this case we will buy the earliest position of type sell (i.e. in effect removing the earliest owned position(of type sell)), in scenario 2 all our current positions are of type buy in that case i will buy a new position and add it to the end of list of current positions.

In both of the above cases i have assumed that at each instance all of our positions will either be of type sell or buy only, it can be proved easily by induction on the number of trades, like if we have positions of only sell type then we can can only add a new positon of type sell to it or remove one position from it.

After adjusting our current positions we will iterate over all of our current positions (note that the positions are stored along with the mean and standard deviation of the day at which we bought that position) if for a position its new z_score (calculated from its stored mean, standard deviation, and spread of current date) > stop_loss_threshold and only if the position is of type sell then we will buy it and if z_score < -stop_loss_threshold then only if the position is of type buy then we will sell it (note that we are removing that position from our dataset after this process)

After this we will have a net positions to be bought or to be sold we are then writing that to this concerned files.

2 Reason for the above understanding

We generate a sell signal only when z_score ¿ threshold as we hope that its spread would return to the mean its now if we found that its z_score ¿ stop_loss_threshold then we are forced to close the position (i.e. sell it) as it has turned in a unexpected direction. Similar analogy can be used for buy signals.

3 Our Implementation

We have a function fill_data which populates date, price1, price2 and spread array with the appropriate data now in it if we have passed stop_loss_threshold to it then it will call function solve2 which will first do analysis of each day as per strategy discussed in part 4 of the assignment statement and then at the end of each day we iterate over all the positions and delete the appropriate ones and after this we will write the data in appropriate files. So we basically have implement what we understood , for detailed implementation **refer section 1**