DSA Assignment 4

(Heap Sort) 17th Aug 2023

Note: For all the below given problems, write the space and time complexity.
Note: Do not use inbuilt functions.

Problem 1: **(10M)**

You are given an array. Now you have to convert it into a min heap and max heap. write the logic behind the given functions.

1. CreateMinHeap(array) -> returns MinHeap
2. CreateMaxHeap(array) -> returns MaxHeap
3. AddElementInMinHeap(MinHeap) -> returns modified MinHeap
4. PopSamllestElementFromMinHeap(MinHeap) -> returns element, MinHeap
5. PopLargestElementFromMaxHeap(MaxHeap) -> returns element, MaxHeap

Problem 2: **(10M)**

You have two order books (ask order book and bid order book), where you will have to store all your orders.

There can be two types of orders, ask order (sell) and bid orders (buy orders).

Write a function to accomplish below functions.

you have given a list of orders which will have both bid and ask orders. You have to add those orders in the order book.

AddToOrderBook (orders_list, AskOrderBook, BidOrderBook) -> returns both modified order books.

you have given market ask and bid prices, by the help of which you have to execute the orders. executing the bid order that are higher than the given market ask value and the ask order that are lesser than the given market bid value.

ExecuteOrders(marketAskPrice, marketBidPrice, AskOrderBook, BidOrderBook) -> list of ordered executed and modified order books.

Assume every order amount should be 1 i.e. you can only buy one stock or sell one stock per order. Write a logic behind every function using the function that you have created in the above function, i.e. try to find a solution of the problem using heap concepts.

Problem 3: **(10M)**

Consider the following set of integers: [50, 30, 70, 20, 60, 45, 55]. You are required to construct a max-heap using the bottom-up approach. Present the step-by-step process of transforming the given set into a max-heap. Clearly show the heap's progression after each insertion. Finally, provide the resulting max-heap representation.

(Note: You can represent the max-heap either visually or as an array, indicating the arrangement of elements at each stage of the process.)