Problem 8: Solving Problems Using Heap

Data Structures Lab (CS111)

Let there be a photo hosting website *photosdsliiitg.com*. They want to organize a photography contest where they want to consider only the last 10 photos submitted in the website. They have a jury of three members who assign rating which is an integer between 0 to 20 to each submitted photograph. Apart from this, they also allows the other users to provide rating which is an integer between 0 to 20 to each submitted photograph. At any point the organizer can request to get the winner photograph with maximum average rating. You need to design a data structure based solution for them where you need to implement following functionalities.

1. Initially at the time of submission each submitted photograph gets an identifier which is an integer and three ratings from jury members. You need to maintain avg_rating variable for each photo. This variable stores the average rating (it is going to be a floating point number, you need to consider the floor of the average value) received by the photo. You need to update this value whenever the photo receives a valid rating. **[3 marks]**

2. You need to maintain a max heap with 10 photograph entries where keys are value stored in the avg_rating for a photograph. Whenever a photograph is not among the last 10 entries you need to remove its key from the max heap and you also need to insert the new one. **[7 marks]**

3. To determine whether a rating is valid or not, you need to compare it with the median value of the last 9 valid ratings received by a particular photograph. Let median rating of a particular photograph is med_rat. A user provided rating is valid if the provided rating is between $met\_rat - 3$ and $met\_rat + 3$. To find this median ratings you need to do the following: For each photograph, you need to maintain a max heap and a min heap which contain the top half and the bottom half of the elements respectively to find the median of the rating received by a photo graph. You need to update these two heaps also whenever a particular photograph receives a valid rating. This means, at any point of time there will be 10 max heaps and 10 min heaps also for each photograph. Whenever you are deleting a photograph from last 10 submitted photos, you need to delete these heaps corresponding to that photo also. **[7 marks]**

4. **[3 marks]** for maintaining the whole solution properly.