CME 2204 Assignment 3

Greedy Programming Project

15.05.2024 22:00 (Sharp deadline – No extension)

Rules:

- You will work as a ***group of two students*** on this homework.
- The submissions will be checked for code similarity. Plagiarism will be graded as zero.
- You are required to upload single Java code file. It is suggested to upload the code file as the IntelliJ IDEA project folder.
- You are required to upload the code file with the below naming:
  (STUDENT1_ID)_(STUDENT2_ID)_hw3
  Example = 2043901815_2043901915 _hw3.java

Problem Definition:

In this assignment, you are expected to design a greedy approach that assigns problems to judges for evaluation.

You are organizing a programming competition with multiple problem types to be solved. Each problem type has a different level of difficulty. You have a fixed number of judges available to evaluate the solutions to problems. Each judge can evaluate the solution of one problem at a time, and it takes a constant time to change between problem types. The problems are presented in a particular order; the original ordering should be maintained; you cannot sort problems to generate problem clusters based on their types.

You will write a Java program that assigns problems to judges in such a way that the total time of changing between problem types should be minimized.

Operations:

The program should take the following inputs:

- Total number of judges
- Constant cost of problem type changing
- Problem types (which are provided in the input.txt file)

The program should output ***the minimum total cost*** of changing between problem sets.

You are expected to implement a greedy approach to minimize the cost. Your algorithm should work in polynomial time in the order of the total number of problems.

You should include the running time of each function (method) you implemented. These analyses can be provided as comments at the beginning of each function.

Example 1:

Please enter the number of judges: 3
Please enter the cost of problem type changing: 3

The input file is read.

The problem types are listed:
Type 2, Type 1, Type 3, Type 2, Type 1

Total cost : 9

(Solution – no need to print)
Judge 1: Type 2, Type 2
Judge 2: Type 1, Type 1
Judge 3: Type 3

Example 2:

Please enter the number of judges: 2
Please enter the cost of problem type changing: 1

The input file is read.

The problem types are listed:
Type 1, Type 3, Type 4, Type 2, Type 1, Type 2, Type 3, Type 4, Type 1

Total cost : 6

(Solution – no need to print)
Judge 1: Type 1, Type 1, Type 1
Judge 2: Type 3, Type 4, Type 2, Type 2, Type 3, Type 4

Example 3:

Please enter the number of judges: 3
Please enter the cost of problem type changing: 1

The input file is read.

The problem types are listed:
Type 7, Type 1, Type 7, Type 6, Type 3, Type 2, Type 1, Type 3, Type 6, Type 5, Type 7, Type 6

Total cost : 8

(Solution – no need to print)
Judge 1: Type 7, Type 7, Type 3, Type 2, Type 7
Judge 2: Type 1, Type 1, Type 3, Type 5
Judge 3: Type 6, Type 6, Type 6

Grading Policy

Task	**Percentage**
Single java code file	5
Input processing	5
Running time analysis	10
Greedy programming approach	40
Finding exact solutions	40