CSE 102 Spring 2024 – Computer Programming Assignment 6

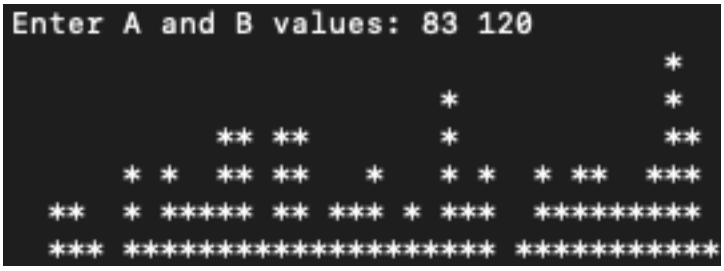
Due on April 10, 2024 at 23:59

For this assignment, you will begin by creating a histogram that illustrates the frequency of each number within a specified interval. Following this, you will utilize the same histogram by adding new numbers to it.

Part 1. [50pts] Determination of Interval and Drawing Histogram

Your first task is to write a C program that takes an input, which is two integer value (A and B), from the user to determine the interval of x values for the histogram. Please note that the A value must be at least 50, and the B value must not exceed 200. The x-axis will represent each number in this interval [A, B] (including A and B) and y-axis will represent occurrences.

Create an array `number_array[]` to hold the numbers, you don't need to ask the user to enter numbers for the array. The contents of the array will be copied and pasted to inside your code. However, you need to ignore the numbers out of the interval which is determined by the user and you need to create a function `find_size_of_array(int A[])` to find the size of the array. **(Hint:** The end of the array is represented with '-1'.) Your task is to count occurrences of each number within the given array and then display the histogram in the terminal. An example histogram is shown below. In this given example, it can be seen that 118 appears 6 times and there is no 83.



Part 2. [30pts] Updating Histogram By Adding New Numbers

After displaying the histogram to the user, the system must prompt whether they wish to add additional numbers to the histogram.

- If the received user input is "1", the system will proceed to prompt the user to enter up to five additional numbers. However, the user can also input fewer than five numbers. The system must determine the total number of inputs provided. For example, you can use some sort of marker (**-1**) for such situations. In the end, it updates the array and the displayed histogram accordingly.
- If the user inputs "0", the system proceeds to Part 3.

Part 3. [20pts] Doing Mathematical Operations

In this part, you need to calculate the average, mode, and median of the numbers. If the array is updated in Part 2, you need to consider updated version of it and recall that the numbers must be in determined interval by the user.

3.1. Calculation of Average: Create a function to calculate the mean of the numbers within the interval.

3.2. Calculation of Mode: Create a function to calculate the mode, which is the number that appears most frequently within the interval. If there are multiple modes, display all of them.

3.3. Calculation of Median: Create a function to calculate the median of the numbers within the interval. Make sure to handle cases where the number of elements in the array is even for calculating the median.

OUTPUT FORMAT:

- **Array:**

```
int number_array[] = {3, 8, 9, 9, 5, 2, 4, 7, 4, 8, 9, 10, 2, 4, 5, -1};
```

- **Example 1:**

```
Enter A and B values: 2 9
  *    *
* **  **
**** ***
Would you like to add new numbers? (Press 1 for yes, Press 0 for no): 0
Average: 5.64
Median: 5.50
Mode: 9 4
```

- **Example 2:**

```
Enter A and B values: 2 9
  *    *
* **  **
**** ***
Would you like to add new numbers? (Press 1 for yes, Press 0 for no): 1
Enter the numbers:
5
6
-1
  **   *
* **  **
********
Average: 5.62
Median: 5.50
Mode: 9 5 4
```

IMPORTANT NOTES:

- Submit your homework as a zip file named as your student id (StudentID.zip) and this file should include:
  - YourStudentID.c file
  - A pdf file named "YourStudentID.pdf" including a screenshots of your program outputs.
- Do not use any library other than stdio.h.
- The output format must be as given, do not change it.
- Compile your work with given command “gcc --ansi your_program.c -o your_program”.
- Your work will be evaluated using gcc version 11.4.0.
- For any questions and problems, you can always contact me **via email** (incikaramahmutoglu@gtu.edu.tr), or you can find me in Human Computer Interaction Lab. during scheduled office hours on April 2, 2024, between 13:30 and 14:30.