

AP Computer Science Homework 9

Due date: Friday, November 11, 2016

Instructor: Mr. Alwin Tareen

Part A: Calculating the Average Acidity Level of Coffee Samples

- You have been assigned a task to compute the average acidity level of several samples of coffee, which have been taken from various coffee shops around the neighbourhood.
- Your method of data collection is to visit a coffee shop, and order a plain cup of coffee. Then, you perform a *litmus test* by dipping your pH meter into the sample of coffee. You record each reading in an array data structure.
- After visiting 13 different coffee shops, you have 13 unique data points that represent the acidity levels of 13 samples of coffee. You calculate the average of these data points, which is 5.9308.
- Figure 1 shows a plot of the various acidity levels. The red horizontal line indicates the average acidity level of the 13 data points.

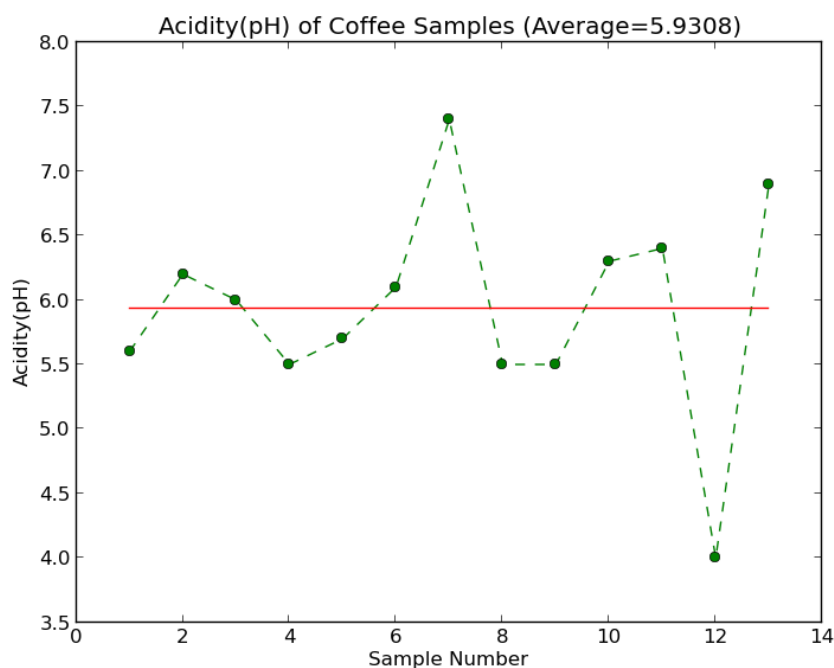


Figure 1: Acidity of 13 Coffee Samples

- Throughout the course of your field work, you discover that your pH meter sometimes produces false readings. To correct for this discrepancy, you decide to disregard the reading that is most distant from the average value.
- Figure 2 shows the same plot of acidity levels, but in this case, the *maximum outlier*(data point 4.0) has been removed. The red horizontal line indicates the new average acidity level that has been calculated from the 12 data points.

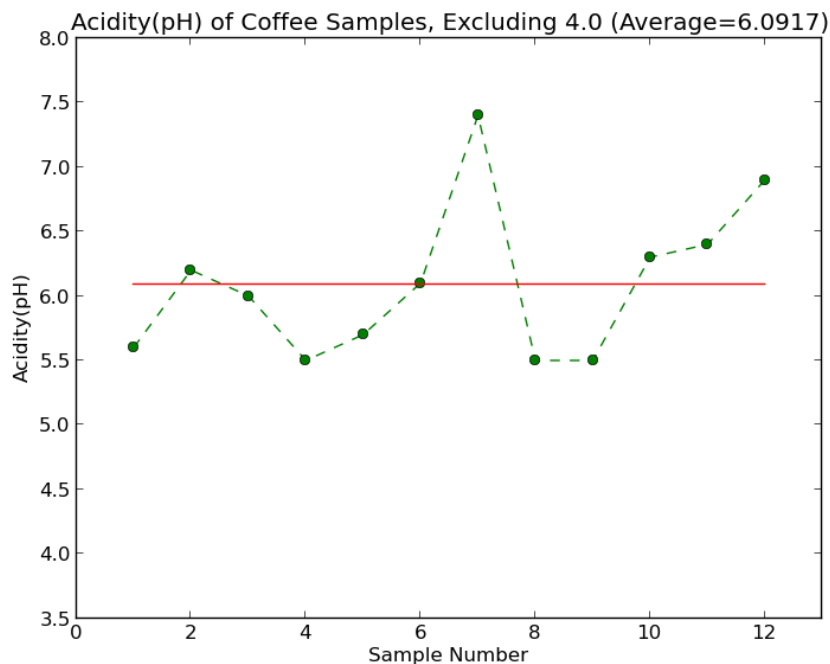


Figure 2: Acidity of 12 Coffee Samples, Excluding 4.0

Write a Java program that does the following:

- You must write an `accurateAverage` method for the `AcidLevels` class. This method accepts an array parameter of type `double`, which represents the acidity levels of the coffee. It returns a `double` value, which represents the average acidity, excluding the *maximum outlier*.
- Calculate the average of all the data in the array `samples`.
- Scan through the array `samples` to find the *maximum outlier*, that is, the value that is farthest away from the average, *in either direction*. You will need to use the absolute value function for this.
- Keep track of the array index of the *maximum outlier*. Then, scan through the array `samples` again, compute a new average that does not include the *maximum outlier*, and return it.
- *Hint:* When computing your new average, remember that the number of data points has been reduced by 1!

- Your output should look like the following:

Average, excluding maximum outlier: 6.091666666666668

- You are provided with the files `AcidLevels.java` and `AcidLevelsJUnitTest.java` to develop this program.
- Write your code in the area indicated by `// YOUR CODE HERE`.
- On your BlueJ project window, you should see a button labelled `Run Tests`. Press this button to run the `JUnit` tests.
- You should see a `BlueJ: Test Results` window pop up. If everything is correct, you should see a green bar that indicates that your code has passed the `JUnit` tests. If your program is

incorrect, you will see a red bar. You can click on the method name to get more information about the problem. Otherwise, just click on the `Close` button, and you can go ahead and upload this program to Web-CAT.

Part B: Submission

- Submit your Java program `AcidLevels.java` by uploading it to the Web-CAT automated grading platform.