Lab 13

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Abstract

This lab assignment applies the use of a partially loaded array and methods for solving simple calculations.

1 Instructions

1. Go online to D2L and download lab13.zip. Unzip the file to your USB drive. Use this as a starting point for your program. It includes the data file.
2. Compile and test your program. It has some default behavior. Look closely at the code before moving on. Some of the methods are not completely implemented. You will be asked to complete them in the next steps.
3. Modify `public static double average(int[] data, int cnt)` so that it calculates the average of the values of a partially loaded array. To do this simply use cnt rather than data.length in the loop as well as in the average calculation. That is all there is to it.
4. Modify `public static int max(int[] data, int cnt)` so that it returns the maximum value in the partially filled array.
5. Modify the the method `public static int min(int[] data, int cnt)` so that it returns the minimum value in the patiallally filled array.
6. Create the the method `public static double deviation(int[] data, double avg, int cnt)`. This method calulates the standard deviation of the elements in data. The variable cnt has the count of the number of elements in the partially filled array. The algorithm for deviation is provided.
7. Create the the method `public static int countAbove(int[] data, double avg, int cnt)`. This method should count the number of elements in data that are greater than avg. The variable cnt has the count of the number of elements in the partially filled array.
8. Modify `public static void main(String[] args)` so that it prints the sample output in **exactly the same format as the sample output**. Code the appropriate method calls as necessary. Upon completion of this step, show the instructor your results.

Sample Output

```
**************************************************
Lab 13   Fall 2015       <your name>
**************************************************
------------ Summary Statistics ---------------
Average data value is:       84.18
The standard deviation is:   12.35
Min data value is:              67
Max data value is:              99
Count above avg is:              6
Count below avg is:              5
```

Algorithm 1 main

$sum \leftarrow 0$
$k \leftarrow 0$
open input file "data.txt"
load data[] from input file maintaining k as number of elements loaded into data[]
close input file
print name-banner
$avg \leftarrow average(data, k)$
$dev \leftarrow deviation(data, k)$
$max \leftarrow max(data, k)$
$min \leftarrow min(data, k)$
$above = countAbove(data, avg, k)$
$below \leftarrow k - above$
print summary statistics

Algorithm 2 deviation

function DEVIATION($data : int[], avg : double, cnt : int$)
    $sum \leftarrow 0$
    $k \leftarrow 0$
    while $k < cnt$ **do**
        $sum \leftarrow sum + Math.pow(data[k] - avg, 2)$
        $k \leftarrow k + 1$
    end while
    return $Math.sqrt(sum/(cnt - 1))$
end function