Spark Web App Calculator

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1 Abstract

This article shows the implementation and architecture of a web calculator developed with the spark micro framework. This calculator has the operations of the mean and standard deviation of a set of real numbers.

2 Introduction

The objective of this laboratory is to create a program to calculate the mean and standard deviation of a set of n real numbers. This application is implemented using Spark a micro framework to create web applications in Java 8 with minimal efforts. Also, This application is implemented using our own implementation of a linked list. The program reads the n real numbers from a file and returns the mean and standard deviation. Finally, for easy access to the calculator, this application is deployed in heroku.

3 Contenido

In order to develop this application it was necessary to implement the following elements

3.1 Linked Lists

A linked list is a linear data structure where each element is a separate object. The elements of the list are stored in Nodes. The linked list elements are not stored at contiguous location; the elements are linked using pointers.

Every node can point to the next node, prior node, or both. In this implementation the nodes point to both. The linked list references the first node of the list (head) and the last node of the list (tail). Using this references is possible to reach every node of the list.

These are some of the operations that can perform a linked list:

- Appends an element to the end of this list.

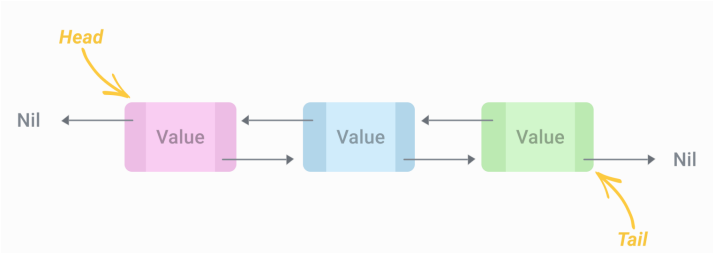

Figure 1: linked List

- Appends an element at a position in the list.
- Removes all of the elements from this list.
- Removes an element at a position in the list.
- Consult the number of elements in the list.
- Replaces an element at position in the list with other element.

3.2 Mean and standard Deviation

- The mean is the average of a set of data. The average is the most common measure of location for a set of numbers.
- Standard deviation is a measure of the spread or dispersion of a set of data.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - x_{avg})^2}{n-1}} \qquad x_{avg} = \frac{\sum_{i=1}^{n} x_i}{n}$$

where

- Σ is the symbol for summation
- i is an index to the n numbers
- x is the data in the set
- n is the number of items in the set

Figure 2: Mean and standard Deviation Formula

With the functionality of the mean and standard deviation operations using the LinkedList class, then the web application was implemented. Using Spark, [2] the micro framework to support the creation of the web application with

java. It was created a web-App that receiving numbers will show the mean and standard deviation, combining the functionalities. In order to have an available service of the application continually. It was deployed on a heroku webapp to use the calculator from the source code of the repository.

4 Test Cases

Two test cases were performed. These consisted of reading two text files with a set of n numbers shown in Figure 3. When calculating the mean and standard deviation the result should be the values shown in Figure 4. After executing the program, the values chosen are shown in Figure 5 The result values match with the correct values. [1]

Column 1	Column 2
Estimate Proxy Size	Development Hours
160	15.0
591	69.9
114	6.5
229	22.4
230	28.4
270	65.9
128	19.4
1657	198.7
624	38.8
1503	138.2

Table 1

Figure 3: table 1

Test	**Expected Value**		**Actual Value**	
	Mean	*Std. Dev*	*Mean*	*Std. Dev*
Table 1: Column 1	550.6	572.03		
Table 1: Column 2	60.32	62.26		

Table 2

Figure 4: Mean and standard deviation

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Mean Case 1: 550.6
Standard Deviation Case 1: 572.03

Mean Case 2: 60.32
Standard Deviation Case 2: 62.26
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Figure 5: Mean and standard deviation result

References

[1] Escuela Colomibiana de Ingenieria. Introduction to complex systems, java, mvn, and git.

[2] Spark. Spark quick start.