**GROUP NUMBER:** fill in your group number

Recall that groups with odd (resp. even) number can use the cluster only in odd (resp. even), days.

**GROUP MEMBERS:** fill in your group members

**AVAILABLE INPUTS:** All input files are stored in the hdfs directory /data/BDC2324/ of the cluster. In particular, file artificialXM\_9\_100.csv contains a dataset of (approximately) X million points, for X=1, 10, 20, 50, 100. The points have been chosen in a random fashion, but they are roughly partitioned into 9 clusters and 100 outliers.

**TEST 1:** The goal of this test is to assess the scalability of the proposed strategy for outlier detection with respect to the number of executors. **You must fill in the following table**. *In case one run with 2 executors takes more than 10 minutes first try to optimize your code, and if it remains slow use the next smaller dataset until the run falls within the 10 minutes bound*.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SCALABILITY WITH RESPECT TO NUMBER OF EXECUTORS**  **Dataset: Artificial100M\_9\_100.csv,** **M: 10, K: 110, L: 16** | | | | |
| **Number of executors** | **Running time of R1 of MRFFT in ms**  **(average of 3 runs)** | **Running time of R2 of MRFFT in ms**  **(average of 3 runs)** | **Running time of R3 of MRFFT in ms**  **(average of 3 runs)** | **Running time of MRApproxOutliers in ms**  **(average of 3 runs)** |
| **2** | 354579 | 145 | 158177 | 10250 |
| **4** | 461962 | 144 | 190649 | 12179 |
| **8** | 506718 | 138 | 192167 | 11808 |
| **16** | 493221 | 139 | 106943 | 6424 |

*The run with 2 executors is done with the 20M dataset. The run with 4 executors is done with the 50M dataset. The run with 8 and 16 executors is done with the 100M dataset. All runs are done with equal parameters.*

**TEST 2:** The goal of this test is to assess how effective is the approximate strategy to detect the outliers when the values M and K are suitably set and the true outliers are well separated from the other points. **You must fill in the following table**.

|  |  |  |  |
| --- | --- | --- | --- |
| **EFFECTIVENESS OF THE STRATEGY**  **Dataset: Artificial10M\_9\_100.csv,** **M: 3, L: 16, Executors: 16** | | | |
| **K** | **Radius** | **Number of sure outliers** | **Number of uncertain points** |
| **50** | 8.620378181959303 | 21 | 73 |
| **70** | 6.501931097758571 | 40 | 52 |
| **90** | 3.434511027788379 | 91 | 9 |
| **110** |  |  |  |
| **130** |  |  |  |

**GENERAL HINTS:**

* Do not include the reading of the input in your running times
* In your program, after defining the Spark Configuration variable “conf”, add the line

conf.set("spark.locality.wait", "0s");

which should force Spark to use all required executors even for small datasets.