CS562 Programming Assignment 1 Report

Skyline Branch and Bound Algorithm in R-Tree

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Instructions and Implementations

The demo of the program running dynamically is named BBSDynamic.java located under the src/test/java/ folder within the rtree package. After running the demo program, an R-Tree is constructed and a dataset file including in line 39 gets inserted into the R-Tree:

```
38                  return new GZIPInputStream(BBSDynamic.class
39                                  .getResourceAsStream("/greek-earthquakes-1964-2000.txt.gz"));
```

After data points are inserted, the program would then find out the Skyline points of this R-Tree using Branch and Bound Algorithm(BBS Algorithm) and output the points. After these basic operations, the program would then ask the user to choose whether he/she wants to insert/delete a point to the R-Tree and the program will update skyline points respectively regarding the new R-Tree dynamically as points get inserted or deleted from the R-Tree.

The codes for the main algorithm running is located under the src/main/java folder within the algs.bbs package where BBS.java file contains the main algorithm and BBSHeapElement.java file contains the heap structure of the BBS Algorithm.

Demo Screenshots

Initially, the Skyline points are:

```
Point [x=33.92, y=20.08]
Point [x=34.78, y=19.24]
Point [x=34.36, y=19.77]
Point [x=35.32, y=19.2]
Point [x=36.13, y=19.05]
Point [x=36.6, y=19.0]
Point [x=33.82, y=25.82]
Point [x=41.47, y=18.52]
```

Inserting Points: the Skyline points would dynamically change based on the new R-Tree:

```
Please choose below entering the number before the specific option (1/2)
1.Insert a point
2.Delete a point
1
Please input x value of the point:
40
Please input y value of the point:
10
The new skyline points are:
Point [x=40.0, y=10.0]
Point [x=33.92, y=20.08]
Point [x=34.78, y=19.24]
Point [x=34.36, y=19.77]
Point [x=35.32, y=19.2]
Point [x=36.13, y=19.05]
Point [x=36.6, y=19.0]
Point [x=33.82, y=25.82]
```

Deleting Points: the Skyline points would dynamically change based on the new R-Tree:

```
Please make a change to the R-tree:
Please choose below entering the number before the specific option (1/2)
1.Insert a point
2.Delete a point
2
Please input x value of the point:
33.92
Please input y value of the point:
20.08
The new skyline points are:
Point [x=40.0, y=10.0]
Point [x=34.78, y=19.24]
Point [x=34.36, y=19.77]
Point [x=35.32, y=19.2]
Point [x=36.13, y=19.05]
Point [x=36.6, y=19.0]
Point [x=34.29, y=21.48]
Point [x=34.16, y=21.62]
Point [x=34.08, y=21.86]
Point [x=34.0, y=22.9]
Point [x=33.82, y=25.82]
```