CS618: Assignment 2

Total Marks: 100

Due on: 23rd January, 2015, 04:00am

This assignment is to help understand the basics of 2-dimensional space-partitioning indexing using *quadtrees* and *k-d-trees*.

Implement a *region quadtree* in 2 dimensions. Assume that the space is constrained to $[0, 1]^2$.
Enable it to handle point queries, range queries, kNN queries and window queries. Ensure that it can support insertions as well. (Deletions may be ignored.)

Repeat the exercise for a *region k-d-tree*.

Implement both the index structures in the *same* framework so that they can be compared directly.

Use the file `assgn2data.txt` to inject the points. It contains 10^6 2-dimensional points.

Use the file `assgn2querysample.txt` to read the queries. The queries have the following formats:

Operation	Code	Details	
Insertion	0	Point	
Point query	1	Query point	
Range query	2	Query center	Range
kNN query	3	Query center	Number of nearest neighbors
Window query	4	Bottom-left point of query box	Top-right point of query box

Enable the program to output timing results string from the reading of a query to solving it. Do *not* include the time to print it.

Compare the two structures. Report the following times for both the structures and for each type of operation: (i) minimum, (ii) maximum, (iii) average, (iv) standard deviation.

What do you conclude?

Submit the program and the answers through the submission portal only. You must name your submission `studentno_assgn2.zip`. The student numbers (which are *not* the roll numbers) are 2-digit codes and are available from the course website.

We will evaluate the program by running a query file with the same format as the sample one. Marks will be deducted for wrong answers.