MA 2233 Data Structures and Applications Lab
Team Project 2 - R-Trees in Spatial Searches
03.11.2022

R-trees are tree data structures used for spatial access methods, i.e., for indexing multi-dimensional information such as geographical coordinates, rectangles or polygons. When the information is of spatial nature, then to obtain nearest neighbours of given queries, an R-tree is typically used.

Typically different sets of points are bounded by hyper-rectangles. Given a query point **q**, only those bounding boxes that intersect with the bounding box containing the query point **q** are searched to find the nearest neighbour of **q.**

Do the following:

- Create 200 points from **[-10, 10]^{10}** , i.e., the points come from a 10-dimensional space with the max values along any dimension lying between -10 and 10.
- Construct an R-tree of different depths and given an arbitrary query point **q** find its nearest neighbour by searching through the R-tree.
- Also check for which type of distances, viz., Euclidean, Manhattan or the L1 distance, is the returned nearest neighbour actually the nearest neighbour of the given query point **q**.
- If you increase the dimension from 10 to 20, do you still get comparable / useful results?
- Can you also comment on the space and computational complexity of building and searching the tree?
- How easy is it to insert or delete a node?