Github code repository

Internship Report

Project report for the internship at Healthcare technology innovation center (HTIC), IIT-Madras

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Quadtree Implementation

In this task, we implemented the Quadtree data structure to partition the 2-D search space by dividing it recursively in smaller segments.[literature] [code]

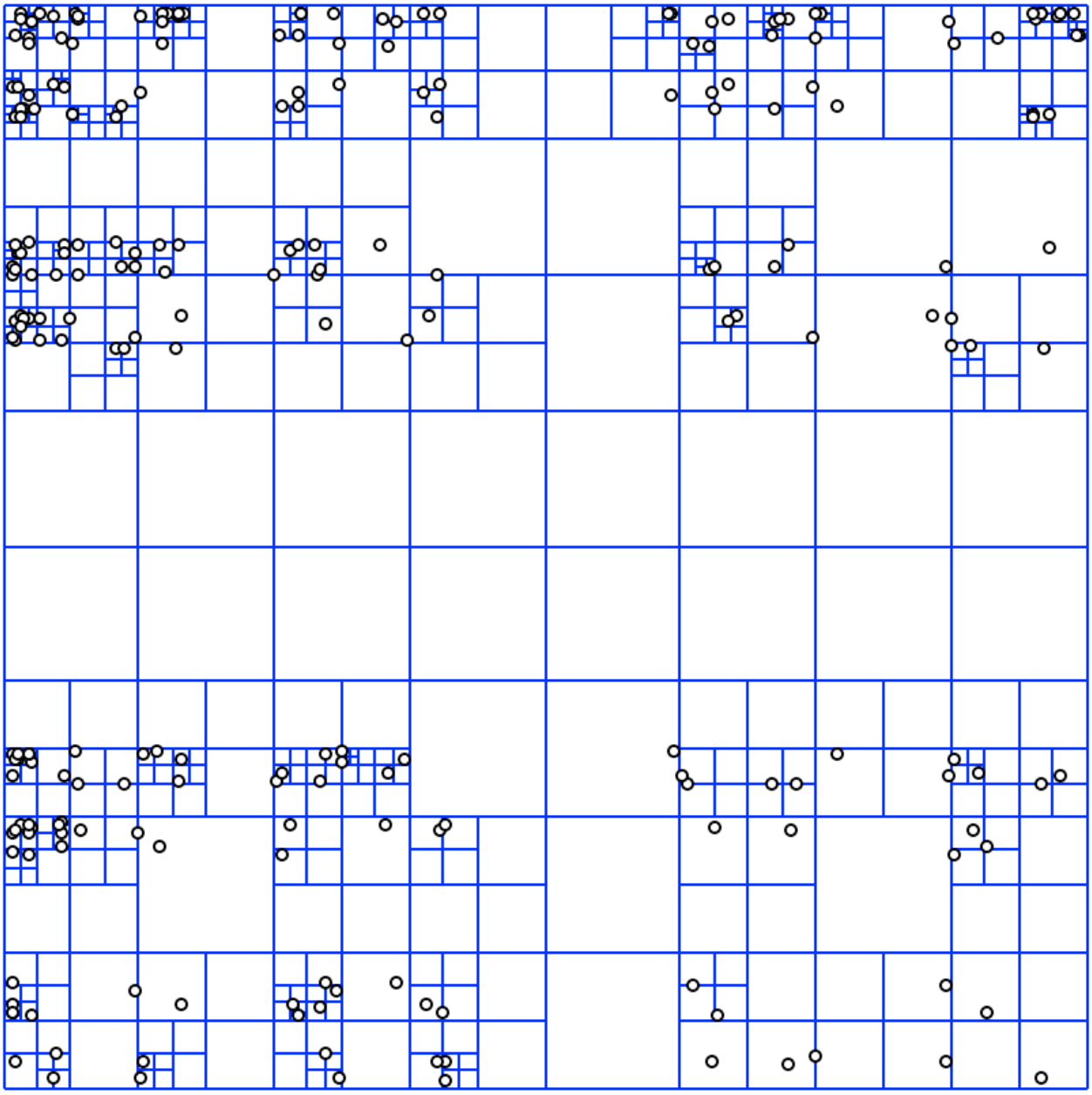

Fig. 1 Region divided into smaller segments
(image courtesy - Wikipedia)

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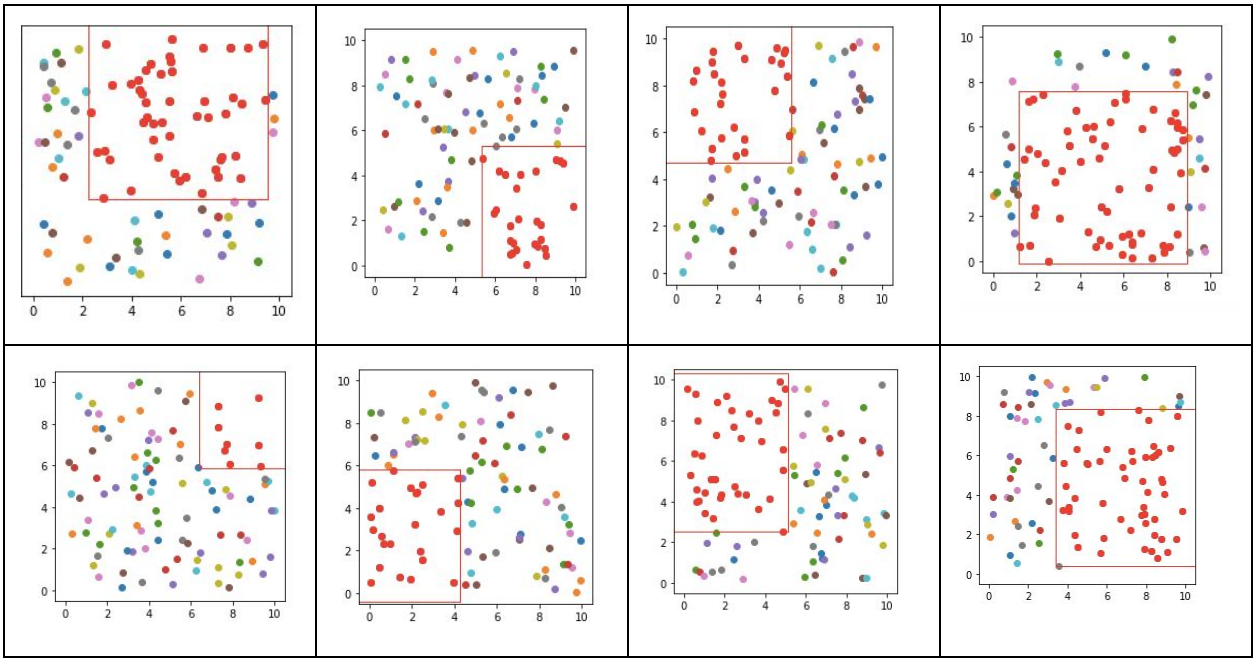

Fig. 2 Point Quadtree

In the figure above, the red dots symbolize nodes sampled in a particular region, separated by the red boundary are the dots in various colors that lie in another region. The main advantages of this algorithm are it reduces time complexity for searching the nearest node when used with RRT thereby eliminating the nodes which don't lead to the optimal path.

Our algorithm divides the entire search space 8 times to find the nearest node thereby speeding up the process of tracing the shortest path.

Please note that we have not implemented the algorithm with RRT. Thus all the above conclusions are based on a literature survey [Link].

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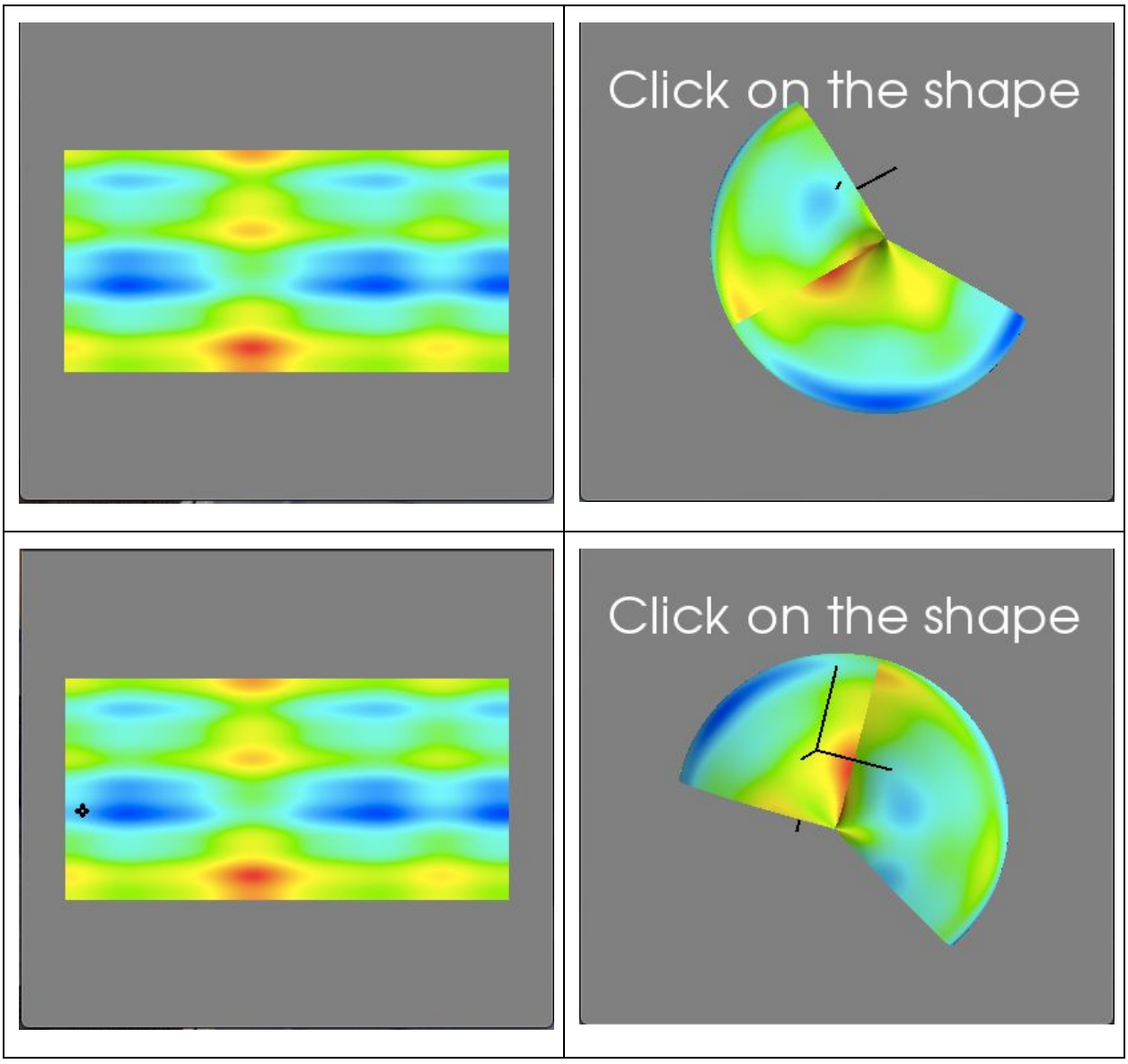
Curves and Contours

In this task, we tested a variety of python-based libraries for visualizing parabola and various curves.

1) Using Mayavi [code]



[Github code repository]

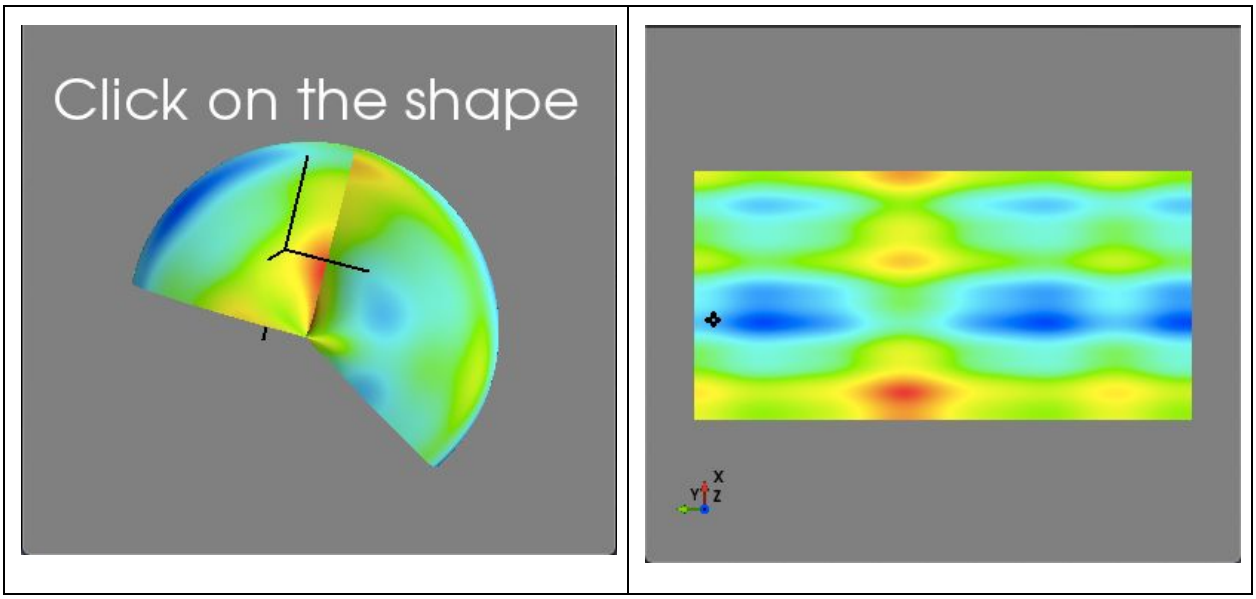


Fig. 3 Curve and plane

2) Using Matplotlib [codes]

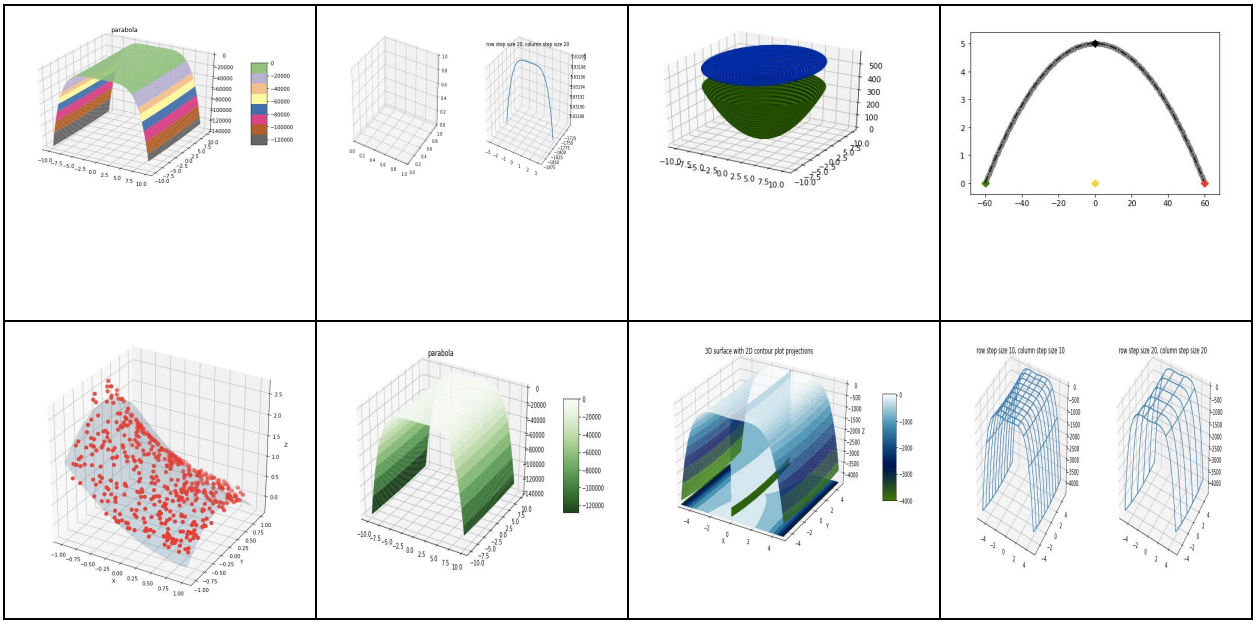


Fig. 4 Curves using Matplotlib

[Github code repository]

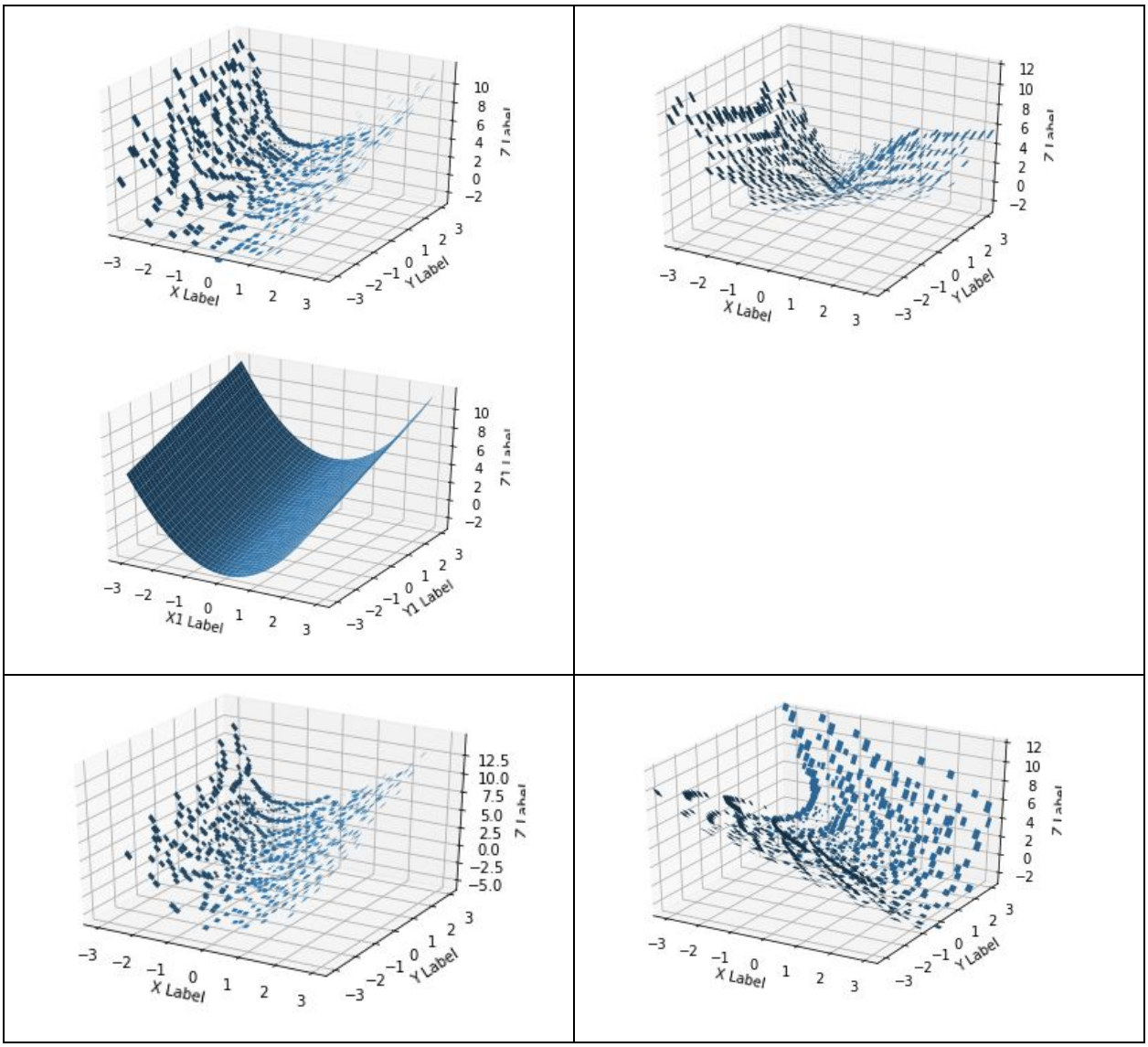


Fig. 4 Curves with offset using Matplotlib