Nearest Neighbour Search in 3D Visualization

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Try it online: https://morsakabi.com/nns/

Introduction

To people unaccustomed to spatial data, understanding nearest neighbour search (NNS) algorithms in higher dimensions can provide difficult. As such, we have developed an easy to use in-browser application to be a visual aid for understanding nearest neighbour searches in 3 dimensional space. This project was developed for the Advanced Algorithmics course in fall 2016/17 in the University of Tartu. The application requires a modern browser with WebGL support.

Features

- Generating a select size set of 3D points
- Interactive view of the 3D points
- Building KD-, random projection and octrees
- Searching for the nearest neighbour of any point in space using radius search
- Visualizing the NNS algorithm one step at a time

Octrees  KD-trees  Random Projection Trees

Conclusions

While the regular implementations of these algorithms are more straightforward, dissecting them in such a way that they can be executed on a per step basis and finding the required polygons for rendering were not. We hope the application will be of use for future algorithmics students and alike.

Project authors are first year Master’s students of the Computer Science curriculum at the Institute of Computer Science, Faculty of Science and Technology, University of Tartu.

The project’s source code is freely available at https://github.com/AndreasGP/NearestNeighborsWebGL3D.