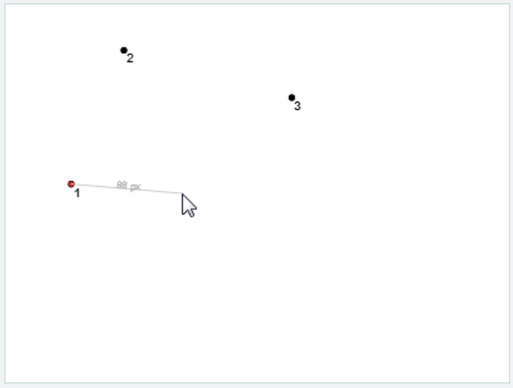
2D Nearest Neighbour Search

There are many data structures and algorithms to do a nearest neighbour search in low- and high-dimensional spaces. We've implemented some of them for a 2-dimensional case and created an interactive web application that allows everyone interested to try out those approaches for NNS.

http://nns.tume-maailm.pri.ee

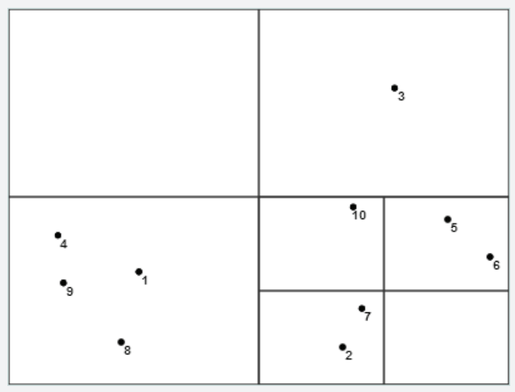
Linear Search

The most basic technique that one might even call the brute-force solution. Linear search calculates distances from query point to every point in the dataset.



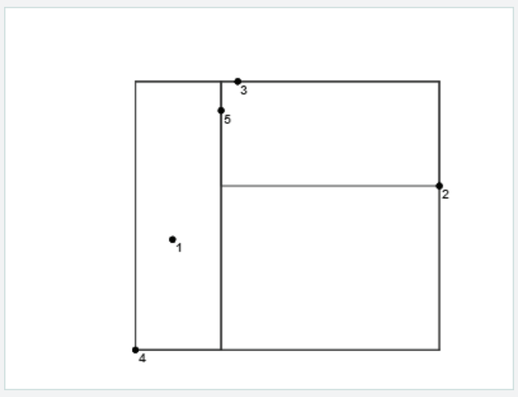
Quadtree

One of the more common solutions for a low-dimensional case. Quadtree divides the space into 4 equal parts recursively until the datapoint count in one node is above some threshold.



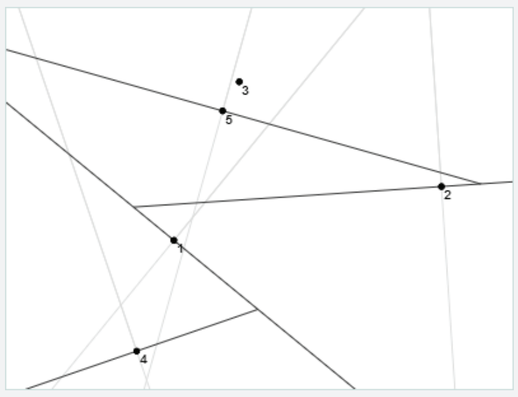
K-Dimensional Tree

Another quite common approach in low-dimensional space. Improvement over a quadtree comes because space is now divided based on the dataset. On every level space is divided into 2 from the median at an alternating axis.



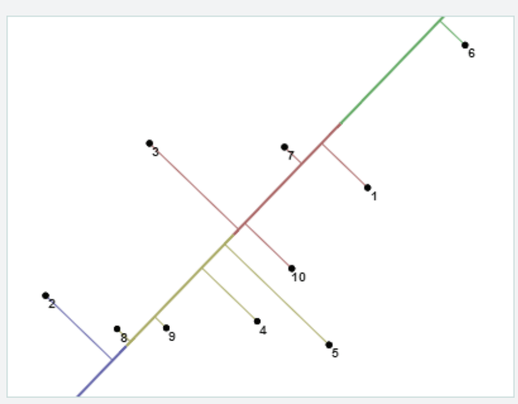
Random-Projection Tree

Following the K-D tree's approach of dividing the space into 2 in regard to the actual dataset, RP tree will divide via a randomly directed projection. This causes the nearest-neighbour search to be probabalistic. With high probability we can get an accurate result in logarithmic time.



Locality-Sensitive Hashing

This method uses a number of hash-tables with some bucket width to collect together nearby datapoints in random projections. When finding a nearest neighbour, we hash the query point and only search among the collisions in our random projection hash-tables.



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Project is managed in Assembla.com
https://www.assembla.com/spaces/2d-nearest-neighbour-search

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