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Assignment on Computational Geometry - Sheet 4

Due Date 12. 06. 2023

Due by 12. 06. 2023 via email to weller@informatik.uni-bremen.de)

Exercise 1 (Modification of the NN algorithm with kd-Trees, *6 Credits*)

In a straight-forward implementation of the NN search using kd-trees, the "bounds overlap ball test" involves the computation of a Euclidean distance, which has complexity $O(d)$ in d-dimensional space.

Describe a modification of the test that takes time $O(1)$. (This might make the algorithm descend into subtrees that don't necessarily overlap the current ball $K(q, r)$.)

Exercise 2 (k-NN search using kd-Trees, *6 Credits*)

Describe an algorithm that determines all k nearest neighbors from a given query point q using a kd-tree. Present it in pseudo code.

Exercise 3 (Nearest Neighbors with BSP-Trees, *8 Credits*)

Extend the simple recursive algorithm for nearest neighbor search that it can be combined with BSP-Trees.