

Marts 2010

MADALGO seminar by Peyman Afshani, Aarhus University

Orthogonal Range Reporting: Query lower bounds, optimal structures in 3- d , and higher-dimensional improvements

Abstract:

Orthogonal range reporting is the problem of storing a set of n points in d -dimensional space, such that the k points in an axis-orthogonal query box can be reported efficiently. While the 2- d version of the problem was completely characterized in the pointer machine model more than two decades ago, this is not the case in higher dimensions.

In this talk we provide a space-optimal pointer machine data structure for 3- d orthogonal range reporting that answers queries in $O(\log n+k)$ time. Thus, we settle the complexity of the problem in 3- d . We use this result to obtain improved structures in higher dimensions, namely structures with a $\log n / \log \log n$ factor increase in space and query time per dimension.

We also prove the first non-trivial query lower bound for the problem in the pointer machine model of computation.

At the end, we shall discuss some intriguing open problems that come from our results.

Joint work with: Lars Arge and Kasper Dalgaard Larsen