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MADALGO seminars by Peyman Afshani, Dalhousie University

External Memory Lower Bounds for Angular Sorting and Sorted Nearest Neighbor Queries

Abstract:

Sorted range reporting has recently emerged as a non-classical area of range searching with interesting and sometimes challenging problems. In traditional range reporting problems, the goal is to report a subset of the input that match a certain criteria given by the query but the order of the output elements can be arbitrary while in sorted range reporting the order of the output elements is important.

In this talk, we will consider two main problems: angular sorting, which is the problem of sorting a set of input points "around" a query point and sorted nearest neighbor queries which is the problem of outputting the input points sorted by their distance to a query point. We study these (and some other related problems) in the external memory model and prove lower bounds for data structures that can answer queries using optimal number of I/Os. We will also discuss many challenges associated with obtaining lower and upper bounds for the new class of problems that we study. The open problems that emerge from this work will be discussed at the end.

Joint work with Norbert Zeh.