

December 2009

**MADALGO seminar by Kostas Tsakalidis, Aarhus University**

**Dynamic 3-sided Planar Range Queries with Expected Doubly Logarithmic Time**

**Abstract:**

We consider the problem of maintaining dynamically a set of points in the plane and supporting range queries of the type  $[a,b] \times (-\infty, c]$ . We assume that the inserted points have their  $x$ -coordinates drawn from a class of *smooth* distributions, whereas the  $y$ -coordinates are arbitrarily distributed. The points to be deleted are selected uniformly at random among the inserted points.

For the RAM model, we present a linear space data structure that supports queries in  $O(\log \log n + t)$  expected time with high probability and updates in  $O(\log \log n)$  expected amortized time, where  $n$  is the number of points stored and  $t$  is the size of the output of the query.

For the I/O model we support queries in  $O(\log \log_B n + t/B)$  expected I/Os with high probability and updates in  $O(\log_B \log n)$  expected amortized I/Os using linear space, where  $B$  is the disk block size.

The data structures are deterministic and the expectation is with respect to the input distribution.

Joint work with: G.S. Brodal, A. Kaporis, S. Sioutas, K. Tsichlas