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ABSTRACT

We give a result that implies an improvement by a factor of $\log\log n$ in the hypercube bounds for the geometric problems of batched planar point location, trapezoidal decomposition, and polygon triangulation. The improvements are achieved through a better solution to the multisearch problem on a hypercube, a parallel search problem where the elements in the data structure S to be searched are totally ordered, but where it is not possible to compare in constant time any two given queries q and q'. Whereas the previous best solution to this problem took $O(\log n(\log\log n)^3)$ time on an n-processor hypercube, the solution given here takes $O(\log n(\log\log n)^2)$ time on an n-processor hypercube. The hypercube model for which we claim our bounds is the standard one, SIMD, with $O(1)$ memory registers per processor, and with one-port communication. Each register can store $O(\log n)$ bits, so that a processor knows its ID.

Keywords: Parallel algorithms, hypercube, multisearching, trapezoidal decomposition, point location, polygon triangulation.