Amato, N. M.; Preparata, F. P.
A time-optimal parallel algorithm for three-dimensional convex hulls. (English)

Summary: We present an O(1/α log n)-time parallel algorithm for computing the convex hull of n points in \( \mathbb{R}^3 \). This algorithm uses O(n^{1+α}) processors on a CREW PRAM, for any constant 0 < α ≤ 1. So far, all adequately documented parallel algorithms proposed for this problem use time at least O(log^2 n).

In addition, the algorithm presented here is the first parallel algorithm for the three-dimensional convex hull problem that is not based on the serial divide-and-conquer algorithm of Preparata and Hong, whose crucial operation is the merging of the convex hulls of two linearly separated point sets.

The contributions of this paper are therefore (i) an O(log n)-time parallel algorithm for the three-dimensional convex hull problem, and (ii) a parallel algorithm for this problem that does not follow the traditional paradigm.

MSC:
68W15 Distributed algorithms

Keywords:
CREW PRAM; convex hull problem

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References:


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