A PARALLEL ALGORITHM FOR CONTEXT-FREE PARSING

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Abstract

We present an algorithm which solves the parsing problem for any context-free grammar, and is suitable for execution on a synchronous computer with unbounded parallelism. The algorithm parses arbitrary input strings of length n in time $O(\log n)$ on a unit-cost SIMDAG, or in time $O(\log^2 n)$ on a log-cost SIMDAG, using $O(n^6)$ processors in each case. (A SIMDAG is a model of a synchronous parallel machine [3].)

Comments

Only the Abstract is given here. The full paper appeared as [1]. The result shows that context-free language recognition is in Pippinger's class NC. This result was obtained independently by Ruzzo [4], but his proof is rather indirect and his processor bound is $O(n^{15})$, so our method of proof is more likely to be of use in practice. Our exponent 6 is still uncomfortably high, and can be reduced somewhat using "fast" matrix multiplication techniques [2].

References

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