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Comparison results for particular systolic tree automata.

Algorithms and complexity (*Rome*, 1990), 172–187, *World Sci. Publishing*, *Teaneck*, *NJ*, 1990.

Systolic automata are regularly connected conglomerates of identical synchronized processors, each of which computes the same finite function. Data are processed in parallel by transmission in a rhythmic fashion from one processor to its neighbors in the conglomerate.

In case the underlying structure of the conglomerate is, for instance, a leafless infinite tree T, an input, consisting of a word $w = a_1 \cdots a_n$ over an alphabet, will be fed at the first level of T with at least n processors: the symbol a_1 to the first processor, a_2 to the second processor, and so on. Now information flows bottom-up and in parallel towards the root processor, where the accept/reject decision for this input w is made. Immediately after the computation of w has been initiated, new inputs with length not less than the previous input can be fed into T. This phenomenon accounts for the systolic character of the model.

The authors study the case in which T is obtained in a modular fashion from a finite balanced tree b, called the base of T. Each base b yields a corresponding family $\mathbf{L}(T(b)\text{-STA})$ of languages accepted by systolic $T(b)$-automata. A necessary and sufficient condition on b and b' is established for $\mathbf{L}(T(b)\text{-STA})$ and $\mathbf{L}(T(b')\text{-STA})$ to be equal. Conditions are also given for $\mathbf{L}(T(b)\text{-STA})$ not to be included in $\mathbf{L}(T(b')\text{-STA})$, or for $\mathbf{L}(T(b)\text{-STA})$ and $\mathbf{L}(T(b')\text{-STA})$ to be incomparable. Finally, it is shown that the emptiness problem, and hence the equivalence problem, for $T(b)$-STA is decidable.

{For the entire collection see MR1083358 (91h:68005)}

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