Multiprocessor Scheduling with Evolving Cellular Automata Based on Ant Colony Optimization

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Multiprocessor scheduling belongs to a special category of NP-complete computational problems. The purpose of scheduling is to scatter tasks among the processors in such a way that the precedence constraints between tasks are kept, and the total execution time is minimized. Cellular automata (CA) can be used for multiprocessor scheduling, but one of the difficulties in using CA is the exponentially increasing number of rules with increasing number of processor and neighborhood -radius. Here, we propose a combined use of ant colony and evolutionary meta heuristics to search the rule’s feasible space in order to find optimal rule base. Also we introduce a two dimensional cellular automata structure based on the important task attributes in the precedence task graph. The proposed scheduler that uses evolving cellular automata based on ant colony can find optimal response time for some of well known precedence task graph in the multiprocessor scheduling area.

Link to the paper in Persian: