SOLVING THE SCHEDULING PROBLEM USING ARTIFICIAL CHEMISTRY

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Abstract

We present a novel approach, using chemistry as a computational metaphor, for solving the static job-shop scheduling problem. We discuss an efficient computer heuristic termed artificial chemistry (ACHEM) which simulates chemical objects and their interactions to find solutions to hard combinatorial optimization problems such as the scheduling problem. We investigate whether ACHEM can be used to produce sets of schedules that cover a range of contingencies. We compare the quality of the schedules to those produced using deterministic procedures such as linear programming (LP) specifically formulated for tackling job-shop scheduling problems, and find that the schedules produced by ACHEM compare favorably to those produced by LP. Furthermore, we find that the ACHEM schedules are robust in that there are large similarities between each schedule in the set, indicating that a switch from one schedule to another could be performed with minimal disruption if rescheduling is required.