

A hybrid soft computing approach for subset problems

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Subset problems (set partitioning, packing, and covering) are formal models for many practical optimization problems. A set partitioning problem determines how the items in one set (S) can be partitioned into smaller subsets. All items in S must be contained in one and only one partition. Related problems are set packing (all items must be contained in zero or one partitions) and set covering (all items must be contained in at least one partition). Here, we present a hybrid solver based on ant colony optimization (ACO) combined with arc consistency for solving this kind of problems. ACO is a swarm intelligence metaheuristic inspired on ants behavior when they search for food. It allows to solve complex combinatorial problems for which traditional mathematical techniques may fail. By other side, in constraint programming, the solving process of Constraint Satisfaction Problems can dramatically reduce the search space by means of arc consistency enforcing constraint consistencies either prior to or during search. Our hybrid approach was tested with set covering and set partitioning dataset benchmarks. It was observed that the performance of ACO had been improved embedding this filtering technique in its constructive phase. © 2013

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