GRASP: Advances and applications

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Abstract

GRASP is a multi-start metaheuristic for combinatorial optimization problems introduced in 1989 by Feo and Resende. Each GRASP iteration consists basically of two phases: construction and local search. The construction phase builds a feasible solution, whose neighborhood is investigated until a local minimum is found during the local search phase. The best overall solution is kept as the result. An intensification strategy based on path-relinking is frequently used to improve solution quality and to reduce computation times by exploring elite solutions previously found along the search. This tutorial describes the basic components of GRASP, successful implementation strategies, and effective hybridizations with path-relinking and Lagrangrean relaxation. We also address some tricks to be used in the quest for good implementations, such as use of multiple threads and restart strategies. We visit a number of recent developments, such as continuous GRASP, automatic tuning of GRASP parameters, and multi-objective GRASP. We conclude with examples of recent applications of GRASP.