Finding Approximate Solutions for the Cooperative Communication Problem in Ad Hoc Networks

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Abstract

We consider the problem of maximizing the total connectivity for a set or wireless agents in a mobile ad hoc network. That is, given a set of wireless units each having a start point and a destination point, our goal is to determine a set of routes for the units which maximizes the overall connection time between them. Known as the cooperative communication problem in mobile ad hoc networks (CCPM), this problem has several military applications including coordination of rescue groups, unmanned air vehicles, and geographical exploration and target recognition. The CCPM is known to be NP-hard, therefore we look for efficient heuristics to provide high quality solutions for real world instances. In this work, we propose a metaheuristic based on Greedy Randomized Adaptive Search Procedure (GRASP). Numerical results are presented and compared with standard integer programming techniques.

Keywords: Optimization, Cooperative Control, Ad Hoc Networks, GRASP, Integer Programming