Traffic Signal Optimization with Greedy Randomized Tabu Search Algorithm

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Abstract

Although advanced technologies, such as detection techniques and controllers, have been incorporated within Advanced Traffic Management Systems (ATMS), pretimed signal control still plays an important role in traffic control and management. A wide variety of techniques were proposed to generate optimal or near-optimal solutions for signal optimization problems. However, only a limited research was devoted to the application of tabu search in the signal optimization problem. The characteristics of tabu search could provide accuracy and efficiency with the careful design of local search methods. This research applies a randomized meta-heuristic algorithm, greedy randomized tabu search (GRTS), for network-level signal optimization problems. With the flexibility of the GRTS, detailed representations of signal control settings could be added easily. To compare the performance of GRTS with other algorithms, genetic algorithm (GA) is chosen and implemented. The performance of the GRTS is investigated in numerical analysis in two networks, including a test network and a real city network. Numerical experiments on the test network are used in the comparison of the GA and GRTS algorithms. Numerical experiments on the real city network are conducted to illustrate possible benefits from the proposed approach. The results show that more than 25% reduction of travel time can be achieved for medium and high demand levels.

Keyword：Signal optimization; Greedy randomized tabu search; DynaTAIWAN