A DYNAMIC TRAFFIC SIGNAL MAINTENANCE PROBLEM: FRAMEWORK AND PRELIMINARY RESULTS

陳昭華, 廖凱怡

Transportation Technology and Logistics Management

Management

erchen@chu.edu.tw

Abstract

Traffic signal maintenance work includes both routine inspection and repair of malfunctioned traffic signals. The service demands of routine inspection are usually known before daily maintenance work while the occurrence of malfunctioned traffic signals are unknown in advance and revealed stochastically. By considering the problem as technicians carried in vehicles travelling in traffic network to do maintenance jobs, this research tackles the problem as a Dynamic Vehicle Routing Problem with objectives of both minimum total travel time and maximum total utility. Furthermore, this study proposes a dynamic routing framework to dispatch the maintenance vehicle and designs a dynamic weight associated with each designated traffic signal to account for the dynamic nature of traffic network. The dynamic weight is a function of the wait for service and associated attributes of the intersection at which the designated traffic signal located. A heuristic algorithm based on Genetic Algorithms is proposed to solve for the dynamic route for the maintenance vehicle and test in a time-dependent traffic network, which is reconstructed from real world data. By applying parallel computing techniques in the proposed GA model, the preliminary results show the proposed framework and model are quite promising in resolving real world needs.

Keyword：Optimisation, Routing, Stochastic Systems.