Proceedings of the 8th Annual World Conference
of the Society for Industrial and Systems Engineering,
Baltimore, MD, USA
October 17-18, 2019

Solving Capacitated Vehicle Routing Problem Using Two Phase Heuristic Method

L.Z. Tarawneh, M.D. Serhan, and S.W. Yoon

Department of Systems Science and Industrial Engineering
State University of New York at Binghamton,
Binghamton, NY, USA

Corresponding Author's Email: ltarawn1@binghamton.edu

Abstract: This paper proposes a modified approach of sweeping to solve Capacitated Vehicle Routing Problem (CVRP). CVRP is a combinatorial optimization problem that has an additional constraint to the classic Vehicle Routing Problem (VRP) of limited capacity of the trucks. A set of trucks deliver goods to a given set of customers in which the total travelled distance of the trucks is minimized while the customers demand is fulfilled, and the truck capacity is not exceeded. Even though the problem itself may be complex to solve directly, it can be split into several Traveling Salesman Problems (TSP) using an approach referred to as sweeping, which segments the delivery zones in angular sectors, each corresponding to the delivery capacity of a vehicle. In this paper, a new form of sweeping that allocates vehicles to both angular and radial clusters of locations is proposed to improve solutions to problem instances with location clusters across the radial dimensions in terms of the total distance travelled. The experimental results indicate that the proposed approach reduces traveling distance by 2-4% for instances with clusters on radial positions, while indicating that it increases traveling distance in cases with no clusters present.

Keywords: Capacitated Vehicle Routing Problem, Vehicle Routing Problem, Sweeping, Travelling Salesman Problem