

A Metaheuristic Approach for the Pollution-Routing Problem

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Abstract : This paper presents an Ant Colony Optimization (ACO) approach, combined with a Speed Optimization Algorithm (SOA) to solve the Vehicle Routing Problem (VRP) with environmental considerations, which is well known as Pollution-Routing Problem (PRP). It consists of routing a number of vehicles to serve a set of customers, and determining fuel consumption, driver wages and their speed on each route segment, while respecting the capacity constraints and time windows. Since VRP is NP-hard problem, so PRP also a NP-hard problem, which requires metaheuristics to solve this type of problems. The proposed solution method consists of two stages. Stage one is to solve a Vehicle Routing Problem with Time Window (VRPTW) using ACO and in the second stage, a SOA is run on the resulting VRPTW solution. Given a vehicle route, the SOA consists of finding the optimal speed on each arc of the route to minimize an objective function comprising fuel consumption costs and driver wages. The proposed algorithm tested on benchmark problem, the preliminary results show that the proposed algorithm can provide good solutions within reasonable computational time.

Keywords : ant colony optimization, CO2 emissions, speed optimization, vehicle routing

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