

An Ant Colony Optimization Approach for the Pollution Routing Problem

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Abstract : This paper deals with the Vehicle Routing Problem (VRP) with environmental considerations which is called Pollution Routing Problem (PRP). The objective is to minimize the operational and environmental costs. 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. In this context, we presented an Ant Colony Optimization (ACO) approach, combined with a Speed Optimization Algorithm (SOA) to solve the PRP. 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 solutions. Given a vehicle route, the SOA consists of finding the optimal speed on each arc of the route in order 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 is able to provide good solutions.

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

Conference Title : ICMESA 2016 : International Conference on Manufacturing Engineering and System Analysis

Conference Location : San Francisco, United States

Conference Dates : September 26-27, 2016