A PREVIEW ON VEHICLE ROUTING PROBLEM

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Abstract

Vehicle Routing Problem is one of the important issues that exist in transportation systems. Many researchers have been working in this area to discover new methodologies in selecting the best routes in order to find better techniques for different types of problems found in Vehicle Routing Problems. This paper presents the most common types of problems solved by past researchers. A discussion is given to study the characteristics of problems addressed by the researchers. Based on the characteristics of the problems, new issues that have not been covered by provided solutions are introduced for future improvement.

1. Definition

Vehicle Routing Problem (VRP) is defined in many ways according to the particular problems addressed by the researchers. The VRP which was originally posed by Dantzig and Ramser (1959) may be defined as a number of customers at known locations are to be supplied with a commodity which is delivered from a single depot by vehicles with both capacity and distance restrictions. The focus of this research is how to deliver goods or commodity to known customers with capacity and distance constraints. This means that the vehicle is assigned to the route for goods movement to different locations. Fahrion and Wrede (1990) defined a basic VRP as how to route the vehicles in such a way that each vehicle is assigned exactly one route, which has its source and sink node in the depot node.

Most VRP researches are intended to minimize operational cost as the focus of the research as defined by the following researchers. The vehicle routing problem involves the running of a vehicle from one warehouse picking up or delivering shipments to a set of customers, and strives to minimize costs (Uchimura & Sakaguchi, 1995). A different definition is also given by Ahn & Shin (1991), saying that vehicle routing problem is to find the routes of customers to be visited that minimize total routing costs, satisfying some constraints. Nygard & Kadaba (1991) stated that vehicle routing problem involves a known collection of stop points that have demands for service, and a fixed fleet of limited capacity vehicles to serve the stops. Vehicle routing problem is concerned with the design of routes for a fleet for vehicles servicing a set of customers with known demand. The objective is to construct routes that service all customers at minimum cost and do not exceed the capacity of each vehicle (Potvin & Rousseau, 1995).

Vehicle routing problems involve the movement of a given set of objects from their original positions to their respective destinations (Muslea & Rey, 1997). This research addressed VRP that is similar to the problems addressed by Dantzig and Ramser (1959) in which the vehicle is assigned for goods movement to different locations or destinations. A specific definition on Multiple Depot Capacitated VRP is given. The Multiple Depot Capacitated VRP is an extension of well-known vehicle routing problem that involves routing a fleet of homogenous vehicles, originating and terminating at different depots with limited capacities and reach to service a set of customers with known demands (Filipec et al., 1997). Furthermore, Filipec et