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Solving Vehicle Routing Problem by Using Improved Genetic Algorithm for Optimal Solution

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Highlights

- Solving Vehicle Routing Problem by Using Improved Genetic Algorithm for Optimal Solution in real case study

Abstract

Context: The Vehicle Routing Problem (VRP) has numerous applications in real life. It clarifies in a wide area of transportation and distribution such as transportation of individuals and items, conveyance service and garbage collection. Thus, an appropriate selecting of vehicle routing has an extensive influence role to improve the economic interests and appropriateness of logistics planning. **Problem:** In this study the problem is as follows: Universiti Tenaga Nasional (UNITEN) has eight buses which are used for transporting students within the campus. Each bus starts from a main location at different times every day. The bus picks up students from eight locations inside the campus in two different routes and returns back to the main location at specific times every day, starting from early morning until the end of official working hours, on the following conditions: Every location will be visited once in each route and the capacity of each bus is enough for all students included in each route. **Objectives:** Our paper attempt to find an optimal route result for VRP of UNITEN by using genetic algorithm. To achieve an optimal solution for VRP of UNITEN with the accompanying targets: To reduce the time consuming and distance for all paths. which leads to the speedy transportation of students to their locations, to reduce the transportation costs such as fuel utilization and additionally the vehicle upkeep costs, to implement the Capacitated Vehicle Routing Problem (CVRP) model for optimizing UNITEN's shuttle bus services. To implement the algorithm which can be used and applied for any problems in the like of UNITEN VRP. **Approach:** The Approach has been presented based on two phases: firstly, find the shortest route for VRP to help UNITEN University reduce student's transportation costs by genetic algorithm is used to solve this problem as it is capable of solving many complex problems; secondly, identify The CVRP model is implemented for optimizing UNITEN shuttle bus services. **Finding:** The findings outcome from this study have shown that: (1) A comprehensive listed of active GACVRP; (2) Identified and established an evaluation criterion for GACVRP of UNITEN; (3) Highlight the methods, based on hybrid crossover operation, for selecting the best way (4) genetic algorithm finds a shorter distance for route A and route B. The proportion of reduction the distance for each route is relatively short, but the savings in the distance becomes greater when calculating the total distances traveled by all buses daily or monthly. This applies also to the time factor that has been reduced slightly based on the rate of reduction in the distances of the routes.

Keywords: Genetic algorithm; ; ; , vehicle routing problem, capacitated vehicle routing problem, optimal solution

1. Introduction

The VRP models are applied in a wide area of transportation and distribution such as transportation of individuals and items, conveyance service and garbage collection. The models have economic importance, particularly in

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