Reduce Traffic with Carpooling

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ABSTRACT

We were tasked to develop an algorithm to find an efficient way to do carpooling in order to reduce traffic. The problem is important because by effectively carpooling we can reduce traffic which has been shown to reduce quality of life, quality of the air we breathe and even reduce how productive someone is at their respective job. Examples of similar problems are transporting food to their locations, routes of doctors that perform their service at the residency of the patient, developing routes to deliver mail and finally the most applicable problem is how Uberpool would determine their routes.

1. INTRODUCTION

Although carpooling has existed for quite some time, it has never really been applied in a large scale. Now with more cars than ever on the road, we have two very realistic problems which are the following; first and foremost with the amount of cars increasing we are now seeing much higher levels of traffic and therefore increased commute times, one solution can be organized carpooling in each job.

2. PROBLEM

We were asked to develop an algorithm that a company could use to come up with a carpooling route between all the car owners of said company. The algorithm wants to know what is the fewest number of cars needed to get everyone to work with the maximum number of occupants being four in any given car. We are to assume that the driver will always take the shortest route to work and only go to work for that day.

3. RELATED WORK

3.1 Getting You Faster to Work – A Genetic Algorithm Approach to the Traffic Assignment Problem

The last decades saw a constant increase in road traffic demand. Trips tend to concentrate on a few central spots,like major roads or large intersections during the rush hour periods. This is very likely to cause congestion in the road network. This paper has demonstrated that genetic algorithms area feasible approach to the route assignment problem in road networks. This optimization is performed with a global view of a microscopic traffic model.[1]

3.2 Order Assignment and Routing for Online Food Delivery:Two Meta-Heuristic Methods

There is a critical need to improve service level (in terms of delivery time)with less delivery cost. For this end, the key problems include the assignment of the orders to the delivery staff and routing of the orders for each staff.The hierarchical method reduces the total traveling distance by at least 11 percent for the instances, which implies a reduced customer waiting time and delivery cost.[4]

3.3 Multiobjective Optimization for Reducing Delays and Congestion in Air Traffic Management

Nowadays, with the increasing traffic density of the European airspace, air traffic management includes the planning and monitoring of the capacity of the network as a way to facilitate the work of the air traffic controllers. This article presents the use of an evolutionary multiobjective algorithm for optimizing a schedule on the time of overflight of the way-points. An evaluation function takes around 3 seconds with the characteristic function method. At this point of the research, we know that the mean fitness of the population increases along the generations.[2]

3.4 An Algorithmic Approach for Environmentally-Friendly Traffic Control in Smart Cities

With the constant development and urbanization of human society in recent years, the density of urban residential areas is increasing all over the world. To serve these increasingly high density urban populations, governments everywhere seek sustainable development approaches [13] that balance commercial and personal needs with environmental protection. Discussed that a fully central optimum solution is likely to be NP-hard and showed our fully distributed algorithm has a bounded performance.[3]

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