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An analysis of Directions and Profile Matching Approaches in the Carpool System

Jyoti RanjanMohanty[1], Dr. Jitendra Sheetlani[2], Dr. Rasmi Ranjan Patra[3]
[1]*Research Scholar, SOCA, SSSUTMS, Sehore, M.P., India*
[2]*Associate Professor, SOCA, SSSUTMS, Sehore, M.P., India*
[3]*Assistant Professor, Dept of CSA, CPGS, OUAT, Bhubaneswar, India*
Corresponding Author:Jyoti Ranjan Mohanty

Abstract: Nowadays, Many citizens are looking for ways how to utilization present resources more effectively. In India, there is about 1-2 persons per car while the average car capacity is five people.Therefore, it is clear that carpooling has a huge efficiency potential in this matter. It is based on a shared use of personal cars. Carpooling saves a lot of time and fuel but most importantly, from the societal and environmental point of view, reducing air pollution. Carpooling consists of sharing individual car space among people with comparable trajectories. Carpooling has become an economy and stress-free system to transport around.
In this paper, we present anoverview for a Cloud computing-based platform, meant to improve Sustainable Mobility. In particular, this discussion helps vehicle users in selecting a transport solution base to itsecological footprint, matching his/her needs, preferences, and actual location. This review work also shows rate of success for the carpooling system is highly dependent to the matched routes connecting directly points of origin and destination for participating riders and also increasing the number of connections from one to two which requires two consecutive changes of rides for a rider has the least impact on the rate of success.This review paper overviews the state of the art of new scheme of carpooling. It recognizesthe most important issues of the adoption of new carpooling systems and the proposed solutions for such issues.

Keyword: Carpooling service, genetic algorithm, CLACSOON, Advanced intelligent carpool system

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I. INTRODUCTION

Traffic jamming is one of the major problems of metro cities .it destroy the quality of life, leading to a wide set of social, economic and environmental effects. Solving the problem of traffic jamming has risen to the top of the agenda in many cities.Various studies have been conducted to address in efficiencies in the traffic system. Models and solution systems have been proposed to better manage the transportation system, including investigation into signal control optimization and the integration of knowledge-based decision support systems. Carpooling is one of the best solutions to face the challenge of traffic congestion.

Carpooling (Ridesharing) is defined as the sharing of car journeys so that more than one person travels in one car, thus reducing travel costs, such as fuel costs, tolls, etc., but most importantly, from the societal and environmental point of view, reducing air pollution. Carpooling consists of sharing individual car space among people with comparable trajectories. Although there is some software Initiatives to help carpooling practice, none of them really implements features similarly to searching for people with similar trajectories and profile.This review is based on the show importance of community, financial and ecological benefits for using carpooling, because it demonstrates the inspiration of users and could be supportive in structuring a similar platform.

The paper is structured as follows. In order to describe about the carpooling system and its benefits, Section 3 briefly outlines the carpooling system. Section 4 aboutthe carpooling system model and functionalities&give short review of different implementation of carpooling system, Section 5 givedifferent Issues related to Carpooling Section 6 concludes the paper.

II. RELATED WORK

According to the previous studies, the carpooling research has become one of the most motivating and advance research areas. There exist many findings where different alternates of this problem are proposed. A comprehensive review of the carpooling system is offered by Agatz, Erera, Savelsbergh, and Wang (2012). Different objective functions are applied in the related literature of the carpooling system (Najmi, Rey,

&Rashidi, 2017). Some studies have aimed to minimize both fixed cost of car and travelling cost of the network (Guo, Goncalves, & Hsu, 2013a; Huang et al., 2016; Yan & Chen, 2011). Some have focused on penalty cost of delays in carpooling services (Guo, Goncalves, & Hsu, 2013b; Yan, Chen, & Chang, 2014).

An optimization-based approach for the carpooling problem is established by Agatz, Erera, Savelsbergh, and Wang (2011) to minimize the costs of matching drivers and riders. Yan and Chen (2011) applied a time-space network flow technique with multiple vehicle types and person types for the carpooling problem. They applied Lagrangian relaxation method to solve the problem. Bruglieri, Ciccarelli, Colorni, and Lu_e (2011) established a carpooling system for the employees, faculty, and students of the universities. Pelzer et al. (2015) aimed to minimize detours due to picking up and dropping off additional passengers in a carpooling system. They used a heuristic agent-based method to solve the problem. Chou, Jiau, and Huang (2016) presented a stochastic set-based particle swarm optimization (PSO) algorithm to provide appropriate ride matches for carpooling problem.

According to our previous review for the carpooling system, it is assumed in most of the previous studies that there are full-time drivers that pick up all of the passengers, so that the drivers are not subject to the transportation request. The car do not belong to the carpooling members themselves. Also, most of reviews have assumed that the cars and the drivers are known beforehand. On the other hand, there are few studies that have not considered the car and drivers, as inputs of the problem.

In these studies, a specific subset of the passengers can potentially provide car to take part in the carpooling tasks and the model is asked to optimally identify who, in the midst of all the members of that subset, should operate as drivers and pick up the others. Hence, the fundamental challenge is the selection of the drivers and assigning the other passengers to them, so as to minimize total expense. Although this assumption increases the structural complexity of the problem, it renders the model more compatible to the realistic conditions. Furthermore, regarding the view of the solution method, it is understood from the literature review that most of the attentions have been paid to manage the carpooling system through the heuristic and meta-heuristic methods.

III. CARPOOLING

Carpooling is car rides with provisions so that many people can travel in a car. This can be done either for commuting or for occasional long rides. Carpooling, offers several benefits. These benefits can be financial, ecological, community or can simply be the reduction of the number of cars on the roads.

It is well-known that expenses can be reduced for the simple reason that carpoolers stake their costs when driving together. But sharing a car can also result in falling travel time and parking expenses.

For ecological benefits, the decrease of Greenhouse gas releases and the reduction of traffic congestion are consulted in the analysis. It is argued that car ownership leads to pollution and environment change. If travellers decide to use carpooling instead of driving alone, it reduces CO2-emissions and plays a part in contributing to ecological shelter.

Another benefit is related to community interaction between users. If unknown persons select to share a personal car, one result is that they gather new persons by using carpooling. As already pointed out, making use of carpooling could lead to acquaintances, friendships or even to married couples. In addition to this benefit, carpoolers also share ideas and experiences with other carpoolers.

The conversation of thoughts is probably an benefit of carpooling and could be of importance for person.

IV. CARPOOLING MODEL

There are various carpooling systems model, like Carpool Global and Share Your Ride are available. In carpool Global system, users can find for requirements and get the suitable matching output. But this system cannot work on Geographical Information System. So it cannot provide real time location. Share Your Ride uses map based interface to accept requests from user and provide digital GIS support in order to match requests. It doesn't make use of Global Positioning System(GPS) handheld devices due to which it cannot provide instant services to get information regarding user locations. This section will discuss the main carpooling model used to work on the different solutions tested for the carpooling

[1] . The CLACSOON System

The CLACSOON system has been designed for an urban area to offer a real-timecarpooling service. The objective is to fulfill the basics of persons that have an unplanned need of mobility in the city that could not be arranged in advance.This system has to be used by persons in mobility, so the access to the system has to be certain by mobile devices. The design of the system architecture considers this ability, and the front-end layer has been designed for mobile devices, considering the operating systems. As for the back-end side of the system, it is used in the cloud to offer good reliability considering the high number of expected networks and then to provide good accessibility and ability features.

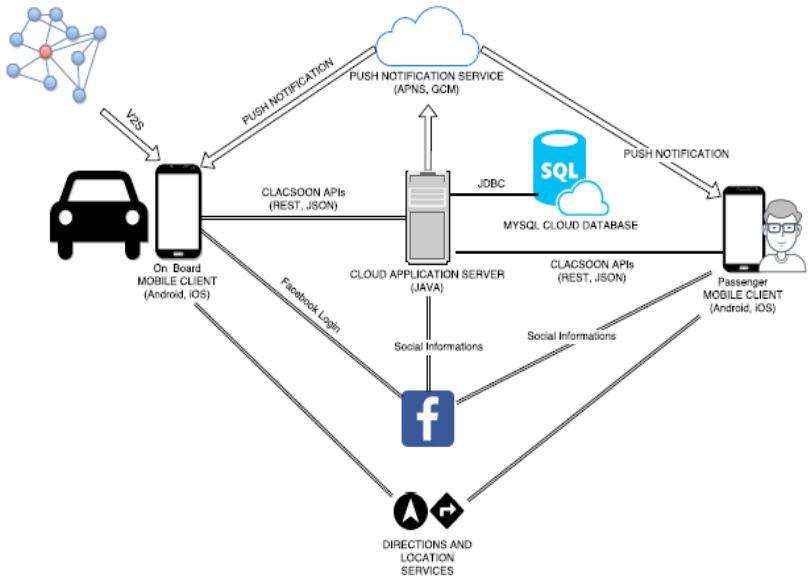

Figure 1. The CLACSOON system

The CLACSOON's route matching algorithm and its ridesharing model algorithm considers the partial ridesharing mode, i.e., it takes into account the possibility for a rider to reach the driver along his/her route, hence preventing that the driver takes a diversion whenever possible. Furthermore, the algorithm implements a technique for approximating the location of the driver's car in an urban context, which enables the possibility for sharing car after the starting of the driver's journey.

[2] . AICS (Advanced intelligent carpool system)

AICS is a cloud-computing-based carpool services model. This system is design by the assembly of the web base application. It comprises two primary components: a mobile clients (MC) module and a cloud global carpool services (CGCS) module. Transmission can be created between the MC module and the CGCS module by using the web HTTP protocol through the mobile network.Persons can send the requests for carpooling and get similar outcomes through Mobile Client (MC) component at any time and position.Cloud Global Carpool Service Module received the request from MC component to pair the requests for carpool service. CGCS module consist open Geographical Information System.

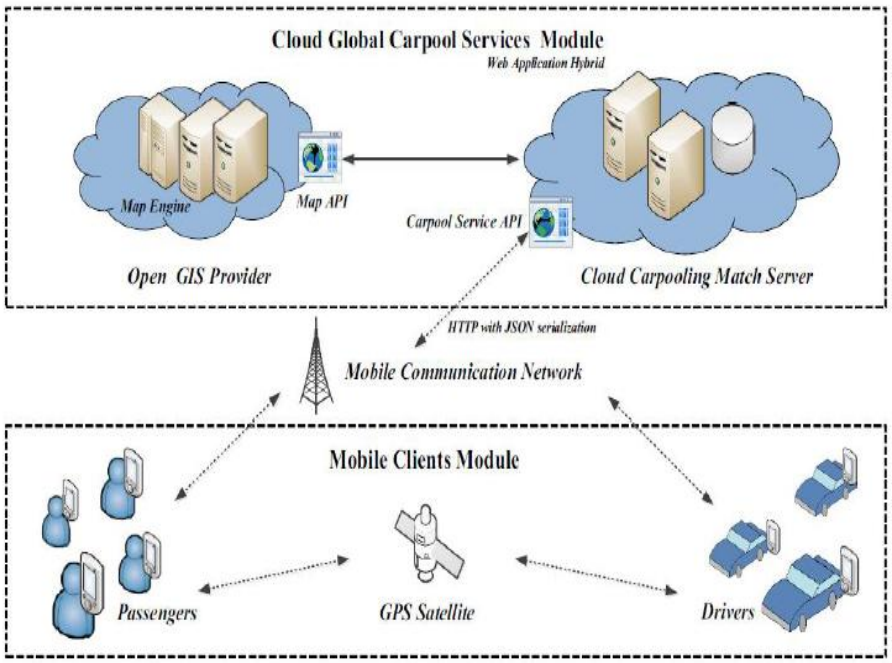

Figure 2 Advanced intelligent carpool system

A genetic-based carpool route and matching algorithm with which to radically reduce the time required to match a large number of persons.

V. ISSUES RELATED TO CARPOOLING

There are only a few problems on carpooling service. Drivers do not have full freedom because, the more persons inside the same car, the more plan constraints need to betaken into account. There are many security issues since people do not know each other. Let us takea close stare at the issues:

- Carpooling with unfamiliar person rises the worries over security and has been aproblem sharing a car with strangers although the risk of crime is small. One common used method to address this issue is using a reputation system that flags problematic users and allow responsible users to build up their trust.
- Flexibility may also be a concern because it can be very hard to adjust route stops or change what already is a very set pattern. Location and schedule limitation and travel flexibility are the top two reasons people do not carpool.
- Accessibility is another issue. Carpooling needs many persons to get the system working, chances of getting a match for similar journey are very low and need a considerable amount of active persons.
- Legal constraints may concern becauseride sharing lets anyone be a taxi driver and these types of service are getting more and more controlled as they become more common.

VI. CONCLUSION AND FUTURE WORK

Carpooling is a type of the private transportation that can potentially help resolve important general problems of the urban area, such as ecological pollution, traffic jamming, etc. The carpooling problemconsists of defining the subsets of travelers thatwill share each car and the ways that the driversshould follow, such that sharing is maximized and thetotal transportation cost is minimized. The aim of thisstudy is analysis some carpooling system model which helps passengers and driver to make their journey suitable and flexible.

In this paper, basically, We discuss an intelligent carpool System which provides a platform in which users can rapidly search for and locate Carpool Alternatives in any Location; we are going to address the entire model of the carpooling. Which provides an platform in which drivers and seekers can easily find carpool matching at any Location. The CLACSOON's route matching algorithm and the Genetic Algorithm is used for matching the route.

In future this work can be extended to implementmultihopcar sharing (i.e. share a ride with multiple drivers). Advanced tour time estimation methods to improve the prediction of ride travel time can be considered further.

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