

Car Parking System using Smart Resource Allocation

Amit Panchakshari¹, Sachin Zine², Chetan Pednekar³, Aman Raj⁴, Mrs. Disha Sengupta⁵

^{1,2,3,4,5} Department of Information Technology

^{1,2,3,4,5} D.Y. Patil College of Engineering, Akurdi, Pune

Abstract- *Parking in major cities, particularly with dense traffic, directly affects the traffic flow and people's life. PARKING is an expensive process in terms of either money or the time and effort spent for the "free spot chasing." Current studies reveal that a car is parked for 95 percent of its lifetime and only on the road for the other 5 percent. If we take England in 2014 as an example, on average a car was driven for 361 hours a year according to the British National Travel Survey yielding about 8404 hours in which a car would be parked. Now, where would you park your car for these very long hours? Cruising for parking is naturally the first problem caused by the increase of car owners globally. A problem faced in major metropolitan areas, is the search for parking space that results in tremendous loss in productivity time, excess pollution, and driver frustration. One of the major causes of congestion and wasted travel time is the search for parking space. More people, especially in business districts, waste a substantial amount of time trying to find a parking space.*

Keywords- Dynamic Resource Allocation, KNN Algorithm, Global Positioning System, etc.

I. INTRODUCTION

Among the challenges that we face in our day to day life one of most unavoidable challenge is parking the car wherever we go. As our need increases our travelling increases but due to continuous increase in usage of vehicles and increase in population we face the tough task of parking our car particularly during the busiest hours of the day. During peak hours most of the reserved parking areas gets full and this leaves the user to search for their parking among other parking area which creates more traffic, increased pollution, loss of time and leaves them with no indication on availability of parking space. A problem faced in major metropolitan areas, is the search for parking space that results in tremendous loss in productivity time, increased pollution, and driver frustration.

The most traditional methods utilized to ease the search for parking are fixed signs to parking lots, variable message signs that continuously update the number of parking spaces which are available at specific parking lots, route planning algorithms which is used from an origin to a specific

parking lot, as well as disincentives to the use of personal automobiles through parking pricing. An innovative methodology to address at least partially the search for parking is through a parking reservation system.

II. LITERATURE SURVEY

- 1) Mathematical Formulation of a Deterministic Parking Reservation System With Fixed Costs

AUTHORS: J. Tavantzis, K. C. Mouskos, D. Bemstein and A. Sansil

In this paper, a mathematical formulation is presented for performing the parking space assignment to the users based on the minimization of the system wide parking cost subject to the assignment constraints and the parking lot capacity constraints. The problem might be solved with any commercially available solver and it can be shown to yield binary integer solutions.

- 2) Understanding driver's perspective on parking guidance information

AUTHORS: Weihong Guo, Yanjie Ji, Phil Blythe, Dounan Tang, Wei Wang

Parking guidance and information systems are thought to enable a more efficient control and the management of the traffic and the use of the available car parking in urban areas. However, the results of the research also show that there is a desire for more accurate, dynamic and personalized parking information at pre-trip stage and en-route stage.

- 3) Effects of Parking Availability Information on System Performance : A Simulation Model Approach

AUTHORS: Masuo Kashiwadani and Yasuo Asakura

The objective of this paper is to evaluate the effects of different types of parking availability information on system performance using a simulation model. The model consists of three sub-models: performance, demand and information service models. The model is designed to describe the dynamic interaction between demand and system

performance and it can be possible to examine the time to time fluctuation of driver's parking choice decisions which resulting congestions in car parkings.

4) Intelligent Parking Reservation Service on the Internet

AUTHORS: K.Inaba, M. Shibui, T. Naganawa, M. Ogiwara, N. Yoshikai

This paper depicts the service concept of intelligent parking reservation systems and the overview of the prototype developed in NTT. In this paper, we discuss an intelligent parking system which provides parking lot reservation service by the Internet, and we show some results of feasibility studies.

III. PROPOSED SYSTEM

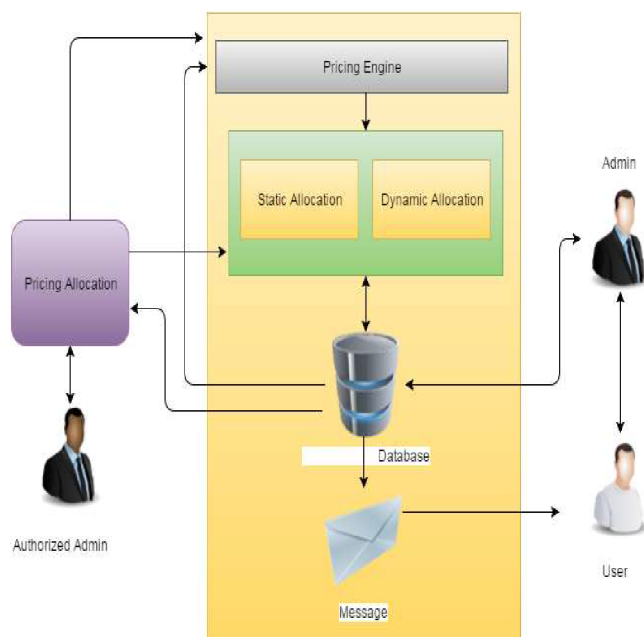


Figure 1. System Architecture

We present a new car parking system, named Smart Car Parking System using Smart Resource Allocation, with static resource scheduling, dynamic resource allocation and pricing models, to optimize the parking system for both parking managers and drivers.

The contribution of our work which we have done includes:

- 1) Increasing parking resources utilization,
- 2) Increasing parking revenues,
- 3) Improving parking experiences of drivers by lowering cost, parking spots searching and walking times. Our work is different from the one in where a dynamic resource allocation model was proposed.

Our new concept is to combine real time reservations (RTR) with share time reservations (STR), thus a driver can reserve a spot while heading to it (e.g., few minutes away) and also can reserve it at any time earlier suppose many days away. RTR are achieved by performing dynamic resource allocation which is similar to skills based routing in call centers. In the case of RTR, drivers are constantly allocated the best parking spots locations available until they reach their destinations from their current location.

1. Techniques Used

1) Tracking User's Location

Before finding the nearest parking slots around the user, we need to track the location of the user. This can be done using global positioning system (GPS).

2) Finding the Locations of Parking Slots

Admin system has an ability to add the parking slots as per its availability. The location can be added in the database by using its latitude and longitude.

3) Calculation of Price

After the use of parking resources, allocated parking slot bill should be generated. This is done by using Pricing Engine which calculates the minimum price.

4) Dynamic Allocation

To save time and money of the user we need to come up with an optimum solution. So to find out the nearest parking slots, (KNN K-Nearest Neighbour) algorithm can be used.

IV. CONCLUSION

We have proposed Smart Car Parking System, a new smart parking system which is based on Mathematical model that yields optimal solution for dynamically and statically allocating parking resources to parkers providing flexible reservation options. The new concept introduced in this is the combination of real-time reservations with share-time reservations. We also have proposed pricing models for both static and dynamic reservations that maximize the profit from parking. Extensive simulation results indicate that the proposed system significantly cuts the total effective cost for all parker.

V. ACKNOWLEDGEMENT

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Department of Information Technology 19 D.Y.P.C.O.E
Akurdi, Pune-44