ONLINE PARKING SPACE MECHANISM WITH PRIVACY PROTECTION

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Abstract— **Sharing private parking spots has indicated an incredible potential for tending to metropolitan gridlock and unexpected stopping issues in urban areas. Planning to address the internet parking spots sharing issue while guaranteeing the protection of client stopping objective areas, we propose a novel objective privacy-preserving internet. The internet parking spot sharing issue is formalized as a social government assistance expansion issue in a two-sided market, where parking spot suppliers and clients are viewed as dealers and purchasers. At that point, these are based on standards that are intended to decide installments and repayment. We examine the upper bound of the productivity loss of our plan. Broad assessment results exhibit that our plan cannot just accomplish great execution with respect to social government assistance, Supplier fulfillment proportion, protection conservation**.

Keywords— Urban areas, Privacy preserving internet,

Introduction

In recent years, motor vehicle and non-motor vehicles in small cities is the parking lot is far behind the growth rate of the motor vehicle, resulting in small urban areas especially the demand and the supply of parking facilities,the downtown area of the planning and construction of parking policy and management issues have become increasingly prominent, to solve the parking problem has very urgent. Parking space sharing model is more and more attention at home and abroad, MouZhenhua put forward a strategy aimed at reducing the shared parking in the city land use of the city center area, analyzes the feasibility of the shared parking policy. Generation method is proposed to determine the percolation of Sichuan, sharing parking behavior coefficient for domestic actual shared parking demand forecasting model and realize the sharing of parking mode specific implementation measures and policies. Institute of Transportation Engineers (ITE) found more than half of the American local governments have shared parking theory into the local parking management mode, although the practical approach may be used directly or selective use. Related researchers discussed the parking sharing the feasibility of the theory; put forward the application strategy, in the concrete example of application. But the shared parking method is mainly used in the new project berth planning stage, no scholars after the implementation of sharing measures on urban traffic congestion and parking is difficult to solve the problem of the utility is analyzed by a numerical analysis, the utility can be directly obtained by the utility value, easy implementation of shared parking analysis function, providing theoretical support for parking planning and design.

I. LITERATURE SURVEY

A. Title : The Utility of Shared Parking in Small Towns of Mixed Use Lands.

- Author:GuoQingsheng,WengXiaoxiong, SongMinglei
- Year: 2015
- At present, the number of small town's rapid growth of motor vehicles, the dynamic and static traffic put forward more requirements. This paper first analyzes the characteristics of small town traffic, put forward the problems caused by the traffic congestion and parking is difficult because of small cities and towns, proposed the application of car sharing model is the effective measure to solve the problems. At the same time, this paper defines the concept of the solve the traffic congestion utility index & The solve the parking difficulty utility index and has carried on the concrete application of. The application sharing to solve the traffic congestion and parking is difficult to enhance the effectiveness of the obvious conclusion.

B. Title :Minimum delay hot-spot parking

- Author: Biao Xu, Guojun Da, Zhen Jiang, Jie Wu Peng Liu
- Year: 2017
- In Minimum Delay Hotspot Parking, a new PGI, denoted by MDP, has been proposed to mitigate the impact of the parking hassle of delay in average and worst cases. We provide a spatio temporal assignment, to take advantage of the vacancy that grows along the time scale when the demands goes beyond the supply. The unique directive is to solve the forementioned starvation problem in other PGI schemes or similar vehicle dispatching. The

contribution is to reduce delay without increasing the facility supply. Both analytical and experimental results demonstrate that our approach can achieve a bounded service, in terms of vehicle cruising time and the overhead cost of information collection and computation. Moreover, we study the extension by trading in the local waiting when the driver knows how soon the vacancy becomes available. The corresponding assignment is denoted by MDP+. Later full service can be provided for scheduling every parking request. In future work, we will consider the capacity deca-dence when both assisted and non-assisted drivers co-exist in the parking field. We will study the tradeoff between the global optimization and the greedy approximation algorithm, so that even more practical solutions can be achieved. We also expect to apply this spatio temporal assignment scheme to other resource shortage problems (e.g., [4, 22]), while a global optimization is desired.

C. Title : Smart Parking System with Privacy Preservation and Reputation Management Using Blockchain

- Author: Mahmoud M. Badr , Wesa Al Amiri , Mostafa M. Fouda, Mohamed Mahmound, Abdulah J. Aljohani and Waleed Alasmary
- Year: 2017
- Block Chain Drivers and the dependence on them will mitigate the traffic congestion and the air pollution negatively affecting many communities. With the emerging intelligent transportation system, modern vehicles are equipped with internet accessing facilities and self-parking functions, and also self-driven cars. The smart parking system can be perfectly applied to all types of vehicles. The internet access can facilitate the communication between vehicle and parking system. Moreover, once a car reaches its reserved parking slot or respective destination, the self-parking functions can be activated to park the car.In the future, we expect to hybrid smart parking system that allows both public and private parking owners to participate in the system. Private parking owners such as home inhabitants can share their parking slots suppose they are not using it. This will increase the potential of number of slots available for parking. However, in such cases the privacy of the private parking owners should also be consider into account, and the parking system needs to be updated.

D. Title : A Distribution Model for Shared Parking in Residential Zones that considers the Utilization Rate and the Walking Distance

- Author : Wenhui Zhang, FanGao, ShuruiSun, QiuyingYu, JinjunTang, BohangLiu
- Year : 2019
- Efficient parking tends to be challenging in most large cities in China. Drivers often spend substantial amount so time looking for parking lots while driving at low speeds, thereby resulting in interference with road traffic. This paper focuses on efficiently allocating parking spaces to the demanders. A double-objective model is proposed that considers both the utilizing rate and the walking distance. First, managers want utilize parking resources fully. However, demanders typically choose parking spaces according to convenience. The second objective is the acceptable walking distance from the parking space to the destination. We collected parking demand and supply data in a Central Business District (CBD) of Harbin in China and evaluated the feasibility of the model.The results demonstrate that the proposed model increases the occupying rates of parking lots in residential zones while decreasing the walking distance. The shared use of parking spaces maximizes the utility and alleviates the shortage of parking spaces in downtown.

E. Title : Research on parking sharing strategies considering user overtime parking.

- Author :Xin Huang, Xueqin Long, Jianjun Wang, LanHe
- Year : 2019
- A parking sharing strategy is proposed to solve the problems of parking difficulty caused by the imbalance between parking spaces and parking demand. The vacant parking spaces of residential area can be efficiently utilized to meet the parking demands of those who are working at nearby or come for other activities based on the parking sharing strategy. The paper analyzes the distribution of vehicle arrival numbers and parking durations, and then establishes a shared parking allocation model aiming to maximize the parking benefit considering the overtime parking behavior of the parking users. Simulation methods are used to the analyze the relationship among the parking benefit, proportion of reserved parking, numbers of parking demand, acceptance rate of parking demand and utilization of shared parking spaces. Then, based on that of maximum parking benefit, we can determine the optimal proportion of reserved parking, number of shared parking spaces that should be purchased from the residents. Taking the utilization of shared parking spaces as an indicator, the validity of the static allocation is proved to be effective..

F. Title : Parking Assignment: Minimizing Parking Expenses and Balancing Parking Demand among Multiple Parking Lots.

- Author: Oanh Tran Thi Kim, Nguyen H. Tran, Chuan Pham, Tuan LeAnh

- Year: 2020

Recently, a rapid growth in the number of vehicles on the road has led to an unexpected surge of parking demand. Consequently, finding a parking space has become increasingly difficult and expensive. One of the viable approaches is to utilize both public and private parking lots (PLs) to effectively share the parking spaces. However, when the parking demands are not balanced among PLs, a local congestion problem occurs where some PLs are overloaded, and others are underutilized. Therefore, in this article, we formulate the parking assignment problem with two objectives:

1. Minimizing parking expenses
2. Balancing parking demand among multiple PLs.

First, we derive a matching solution for minimizing parking expenses. Then, we extend our study by considering both parking expenses and balancing parking demand, formulating this as a mixed integer linear programming problem. We solve that problem by using an alternating direction method of multipliers (ADMM) based algorithm that can enable a distributed implementation. Finally, the simulation results show the ADMM-based algorithm produces performance gains up to 27.5%

G. Title : Privacy-Preserving Vehicle Assignment in the Parking Space Sharing System

- Author: Tingting Fu, Peng Liu, Kun Liu, and Peng Li
- Year : 2020

- In privacy-preserving vehicle assignment problem in the parking space sharing system is studied and analyzed. A homomorphic encryption-based privacy protection matching scheme (PPMS) is introduced and designed. In order to enhance the technology and security, a block algorithm based on the longitude and latitude (BABLL) is proposed. Through the security analysis, the scheme is proved to be able to protect the privacy of sensitive information such as location, time, identity of both requestors, and space providers. The scheme is also robust against attacks, e.g., Replay. We implement the prototype system and conduct comparative experiments. The results show that the proposed scheme can ensure very good success rate of matching with high time efficiency. In addition to that, the system reduces multiple rounds of practical attacks, while maintains normal operations.

H. Title : A Federated Learning based Parking Space Estimation with Parked Vehicle assisted Edge Computing

- Author : Xumin Huang, Peichun Li, Rong Yu, Yuan Wu, Kan Xie, and Shengli Xie
- Year : 2021
- Here, they introduced FedParking to study federated learning based parking space estimation with PVEC management. PLOs were instructed to train shared LSTM model for parking space estimation without exchanging the raw data. A parking space constraint is presented to each PLO, which acts as an incentive designer to determine how to stimulate the vehicles to enter the parking spaces and share their idle computing resources in PVEC. The interactions between PLOs and vehicles as a multi-leader multi-follower Stackelberg game and provided theoretical Stackelberg equilibrium analysis under complete information. Dynamic arrivals of the vehicles and time-varying parking capacity constraints, a DRL approach was specifically proposed to reach the Stackelberg equilibrium in privacy-friendly way. Finally, results are demonstrated that the scheme is effective for high-accuracy parking space estimation, and it can seek a solution under the complicated situations.

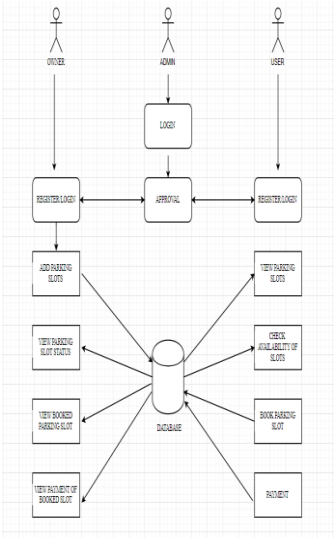
II. PROPOSED METHODOLOGY

The proposed system of project is that provides easy way of reserving a parking space online using web portal. It overcomes the problem of finding a parking space in areas that unnecessarily consumes time. Hence, this project offers a web application based reservation system where users can view various parking spaces and select nearby or specific area of their choice to view whether space is available or not. If the booking space is available, then user can book it for specific time slot.The booked space will be marked and will not be available for anyone else for the specified time.

A. Advantages:

- It is representing clearly with maps.
- It has authorized parking slots with authorized address.
- It is so easy to use with simple UI.
- It has reserved for particular timing.
- Users can get details about parking areas for particular locations.
- The system provides a view of the parking spaces.
- It excludes the need of human efforts for managing parking spaces.
- It is representing clearly with clear locations.
- It has authorized parking slots with authorized address.
- It is so easy to use with simple User Interface.
- It has reserved for particular timing.

III. SYSTEM ARCHITECTURE



IV. RESULTS AND DISCUSSIONS

The project can be implemented on intranet in future. Project can be updated in near future as and when requirement for the same arises, as it is very flexible in terms of expansion. With the proposed software of database Space Manager ready and fully functional the client is now able to manage and hence run the entire work in a much better, accurate and error free manner. The following are the future scope for the project. In this paper, we proposed a new solution for privacy-preserving user profile matching with holomorphic technique and multiple servers. Our solution allows a user to find out the matching users with the help of multiple servers without revealing the query and the user profiles. Security analyses have shown that the new protocol achieves user profile privacy and user query privacy. The experimental results have showed that the new protocol is practical and feasible. Our future work is to improve the performance of computing conditional gates by parallel computation.

V. CONCLUSION

This shared parking allocation problems between parking demands in commercial buildings and parking supplies in residential zones. The concept of shared parking is proposed, which is according to the preconditions of shared parking implementation. Then, the feasibility of shared parking between parking requests from commercial buildings and private paid or public free parking lots in residential zones is initially evaluated by analyzing the characteristics of shared parking, which include win-win, convenience, economy, and real-time performance. Next, a bitrate parking spaces allocating model involving the minimum walking distance and the maximum utilization is proposed. The model comprehensively considers the drivers' walking distance and the utilization of parking spaces. It not only receives reception requests for buildings in commercial zones, but also assigns them to corresponding vacant parking lots in accordance with the model hypothesis and parking space-time constraints. PSO algorithms applied to solve the parking allocation model.

VI. REFERENCES

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