BOOKING PARKING SLOT USING MACHINE LEARNING

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ABSTRACT- The goal of the machine learning project for parking slot booking is to provide a practical and effective way to manage parking spots in a congested area. Discovering open parking spaces has become more difficult since there are more cars on the road. This initiative makes it simple to book available slots, enabling users to secure parking spots ahead of time.This system trains machine learning models using historical parking data, which includes details on parking availability, length, and use trends. The real-world dataset of parking data from a large metropolitan region is used to assess the suggested solution. The results show that the system is capable of optimizing parking slot allocation, accurately predicting parking availability, and customizing parking suggestions. Additionally, the method reduces traffic and the amount of time spent looking for parking, which improves traffic flow and uses less fuel. A potential remedy for the problems caused by urban parking congestion is the ML-based parking slot booking system. The technology may decrease traffic congestion, increase parking efficiency, and improve customers' overall parking experiences by using machine learning (ML) approaches to assess parking data and adjust to real-time demand.

1. INTRODUCTION

Parking has grown to be a significant problem in today's metropolitan environment. Finding a parking space may be a time-consuming and irritating task due to the growing number of cars on the road. In densely populated cities, where parking is in short supply and demand is strong, this issue is especially severe. The parking problem may have a bright future thanks to machine learning (ML). In order to forecast parking availability and maximize parking use, machine learning algorithms are able to assess real-time data from a variety of sources, including traffic cameras, parking sensors, and mobile applications. Then, by using this data to direct cars to open parking spaces, traffic may be lessened and the parking experience can be enhanced overall. Machine learning (ML) may aid in easing

traffic congestion and enhancing general traffic flow by directing cars to parking spaces that are available.By locating underutilized parking lots and routing traffic there, machine learning (ML) can maximize parking use.Finding a parking place may take less time and hassle when drivers have access to real-time parking availability information thanks to machine learning.By optimizing parking rates and assigning parking spots more effectively, machine learning (ML) may assist parking operators in increasing income. Labeled data is used by supervised learning systems to develop a mapping between input attributes and output labels. Supervised learning algorithms may be used to parking slot booking in order to forecast parking availability based on both historical and real-time sensor data. Algorithms for unsupervised learning are able to recognize links and patterns in unlabeled data. Unsupervised learning algorithms may be used to detect parking spot clusters based on use trends in the context of parking slot booking. Reinforcement learning algorithms interact with their surroundings to maximize rewards while they learn by making mistakes. Reinforcement learning algorithms may be used to learn the best parking practices for dynamic surroundings in the context of parking slot booking. Training and deploying

Models need timely and accurate data. Maintaining and gathering high-quality data may be difficult.

Machine learning models must be adaptable to various parking situations and settings.Integration of ML solutions with the current infrastructure and parking systems is required. It is necessary to solve privacy and security issues in order to encourage drivers to utilize ML-based parking solutions. Sensor-equipped smart parking meters can identify when a car is parked and display the availability of parking spaces in real time. Parking guidance systems guide cars to open parking spaces by analyzing data from cameras and parking sensors using machine learning algorithms. Mobile parking applications that use machine learning algorithms may provide drivers alternatives for pre-booking, navigation to available parking spaces, and real-time parking availability information. By matching cars looking for parking with available spots, shared parking platforms use machine learning to maximize parking use. The capacity of autonomous cars to navigate to parking places, estimate parking availability, and park properly will all be made possible by machine learning algorithms. The need for additional parking sensors, cameras, and other data collecting tools will arise from the

growing need for real-time parking data. Effective parking management will depend on efficient data transfer and communication between ML algorithms, user interfaces, and parking sensors. In order to manage the massive amounts of data produced by ML systems, parking operators will need to build strong data integration and analytics platforms. To safeguard sensitive user data and guarantee the integrity of ML-based parking systems, privacy and security measures must be put in place. In order to provide smooth user experiences and guarantee interoperability across various ML-based parking systems, standardization initiatives will be crucial. One kind of UML (Unified Modeling Language) diagram that shows the several states an item or system might be in at any one time is the state chart diagram. They illustrate how an object behaves dynamically, showing how it changes states in response to circumstances, events, or actions. Especially helpful for simulating the behavior of complicated systems are state chart diagrams.

2. LITERATURE REVIEW

Urban areas are severely congested with parking due to the fast rise of urbanization and the subsequent increase in the number of cars on the road. This problem impedes traffic movement, increases fuel consumption, and adds to pollution in the environment. A rising number of people are interested in creating smart parking systems that use machine learning methods to lessen traffic and increase parking efficiency in order to solve this difficulty. To forecast the number of parking spots that will be available in a certain region, machine learning models may be trained using both real-time sensor readings and historical parking data. By directing cars to open parking spaces, this data may shorten search times and ease traffic. Through the analysis of parking trends and the identification of underused regions, machine learning algorithms can improve the distribution of parking spots. This improvement may save wasted space and increase parking capacity. Parking demand may be predicted using machine learning models based on variables like day of the week, time of day, and special events. Parking companies may better manage resources and be ready for expected demand increases with the aid of this forecasting. Parking costs may be dynamically priced by using machine learning algorithms to adapt for availability and demand in real time. This dynamic price may encourage drivers to choose alternate forms of transportation and discourage them from parking in crowded locations.

Urban areas are severely congested with parking due to the fast rise of urbanization and the subsequent increase in the number of cars on the road. This problem impedes traffic movement, increases fuel consumption, and adds to pollution in the environment. Conventional parking management systems are often ineffective and unable to adjust in real time to fluctuations in demand. One potential solution to the problems caused by parking congestion and to increase parking efficiency is machine learning (ML). Numerous research have shown that machine learning algorithms are capable of precisely forecasting the availability of parking spots in both parking slots and on-street locations. A research by Parket al. (2018), for instance, shown that a machine learning model could anticipate parking availability 95% of the time.Parking demand, availability, and user preferences are just a few of the variables that may be taken into consideration when optimizing the distribution of parking spots in parking lots using machine learning algorithms. A machine learning model, for instance, was able to improve parking slot allocation at a university parking slot, resulting in a 30% reduction in the average parking search time, according to a research by Xu et al. (2017). Users may get parking

suggestions that are tailored to them based on real-time parking information, preferences, and prior parking history thanks to machine learning algorithms. For instance, a research by Chen et al. (2019) shown how a machine learning model might increase user satisfaction with parking by personalizing parking suggestions for them.Machine learning (ML) has the ability to completely change how we handle parking in cities. The livability of cities may be significantly increased by ML-based parking slot booking systems via increased parking efficiency, decreased transportation congestion, and improved user experience overall. By directing cars to open parking spaces, this data may shorten search times and ease traffic. Through the analysis of parking trends and the identification of underused regions, machine learning algorithms can improve the distribution of parking spots. This improvement may save wasted space and increase parking capacity. Parking demand may be predicted using machine learning models based on variables like day of the week, time of day, and special events.

3. PROPOSED SYSTEM

enables users to reserve parking spots ahead of time and to leave their cars parked in an emergency or when they need to get away

quickly. Unpaid timeslots are not reserved in advance; thus, they remain unfilled. The fee for both prior reservations and on-site parking is time-based. When making an advance reservation, payment will be collected when the reservation slot is verified. When parking urgently or in an emergency, payment will be collected when the vehicle is removed. Using a dynamic pricing mechanism A dynamic pricing model might be used by the application to modify parking spot prices in response to demand. The machine learning-based parking slot booking system that is being suggested uses a sophisticated method that incorporates dynamic pricing mechanisms and supports both paid and unpaid parking situations. In order to maximize parking resource usage and provide a smooth experience, this system seeks to enable customers to book parking spaces in advance.

4. EXISTING SYSTEM

This online parking reservation system makes use of machine learning to forecast open spots and assign them to customers. It incorporates real-time sensor data together with previous parking data.When assigning slots, ML models take these preferences into account and provide personalized recommendations to increase user happiness.

Negative aspects He/she waits or gives up trying to reserve the time slot if all the spaces are taken. ☐ In some locations, the scarcity of parking spots might increase the cost.
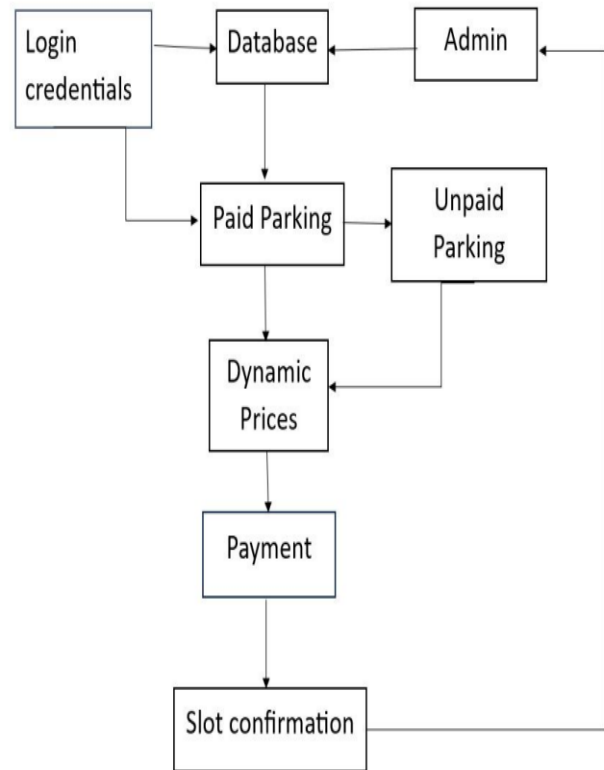
4.ARCHITECTURE
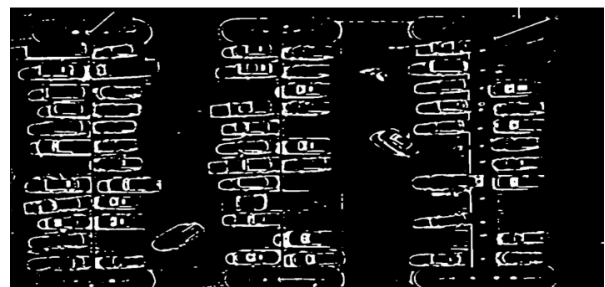

Fig1. System Architecture

5. RESULTS

Fig 2. Binary image

convert the grayscale image img Blur into a binary image img Threshold. A binary image is an image where each pixel is either black or white. This is useful for object detection and image analysis, as it can simplify the image and make it easier to identify objects

Blur image

The purpose of using imgBlur in this code is to apply a Gaussian blur to the image. Thisis done in order to reduce noise and make it easier to detect the parking spaces. The Gaussian 36 blur works by convolving the image with a Gaussian kernel, which is a bell-shaped function that assigns higher weights to pixels closer to the center of the kernel. This has the effect of smoothing out the image and reducing the sharpness of details, such as noise and high-frequency edges

Parking Detection

This step checks whether the number of non-zero pixels in the cropped image img cropis less than 900. If it is, then it assumes that the parking space is available and draws a green rectangle around it. Otherwise, it assumes that the parking space is occupied and draws a rectangle around it.

6. CONCLUSION & FUTURE SCOPE

Paid spots are accessible in advance and provide a reliable parking experience as the charges are paid in advance. On the other hand, free spaces are not blocked off and may be used right away, avoiding overbooking. Furthermore, by modifying rates in response to demand and optimizing the distribution of parking spots, a dynamic pricing model guarantees efficiency and justice. This cutting-edge solution improves customer happiness and expedites the parking procedure by using real-time sensor data, historical data, and machine learning algorithms. Our product provides an effective and user-centric solution, alleviating the stress of parking in congested urban environments at a time when obtaining parking places is often difficult.

Give consumers accurate and current parking information by using real-time data from

cameras, traffic monitoring systems, and parking sensors. Provide a platform for users to exchange real-time information about parking conditions and availability. Permit customers to establish and maintain customized parking preferences, including desired parking spots, budgets, and needed accessibility. To provide individualized parking recommendations and suggestions, apply machine learning to examine user parking trends and preferences. Provide a parking preference management system that is dynamic and can adjust over time to user preferences and parking circumstances. To provide consumers seamless parking options, integrate ride-hailing services and navigation applications with parking slot booking systems. Provide a parking concierge service that proactively helps customers locate and reserve spaces according to their current requirements and preferences.

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