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ICT based Wireless Sensor Network for Retracing the Parked Vehicle

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Abstract— It is normal to be in the following 100 years, world's most extreme populace will be living in urban areas. Henceforth the utilization of vehicle and its connected administrations will be vital. As the quantity of vehicles increases, parking of the vehicle in urban communities will be testing issue, particularly concerning contamination and keeping up with the eco arrangement of the area. Many individuals are not intrigued to utilize conventional or robotized stopping region as a result of the trouble they face during the utilization. Indeed, even individuals find it hard to follow the return way to their own vehicle. The bigger number of shrewd vehicle leaving frameworks is executed in different nations which typically take care of the issue of parking spot and powerful use of utilities. Yet, in a profoundly populated region security of individuals in a leaving opening and following of the vehicle will be extremely difficult because of its tendency of heterogeneous individuals and assortment of vehicles. An IOT empowered Sensor network based Advanced parking spot with camera and sound sensors will actually want to gather enormous measure of information which can be used to create intriguing example utilizing appropriate AI algorithms.

Keywords— Automated Parking, Machine Learning, IoT**.**

I. INTRODUCTION

With the high level of vehicle populace in India, parking has turned into a conflicting and confusing circumstance for individuals. Tracking down a space to park in the city is becoming troublesome as the quantity of vehicles are expanding. The urban communities in India are exceptionally blocked and on top of that the left vehicles guarantee a ton of room that could somehow or another be utilized in a superior manner. This makes part of befuddlement in finding the parked vehicle.

One of the difficulties of an advanced metropolitan climate is to be agile and friendly towards the needs of people with disabilities. One help towards this direction is the arrangement of convenient parking access to different areas so that individuals with even handicaps can complete their exercises effortlessly. If the parking area is located within the safe area or unsafe area etc, then parking could be allotted based on the safety of the customers including children, aged people and physically challenged people etc.

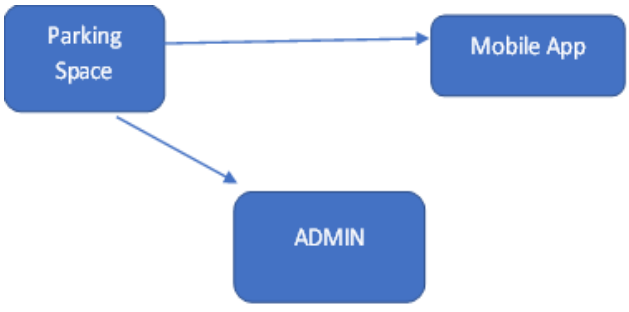

Figure 1. Architecture of Automatic parking

The framework as displayed in figure 1 is a computerized stopping region which is associated with an android telephone through which the client can track down the quantity of free openings. These spaces are being overseen by the administrator. The client can enroll through his/her telephone using any and all means of information like voice, signal or physically making it simple for the uncommonly abled.

It is expected to be in the next 100 years, world's maximum population is going to be living in cities. Hence the usage of vehicle and its related services will be crucial. As the number of vehicles increases, parking of the vehicle in cities are going to be challenging issue, especially in terms of pollution and maintaining the eco system of the area. Many people are not interested to use traditional or automated parking area because of the difficulty they face during the usage. Even people find it difficult to trace the return path to their own vehicle.

The larger number of smart car parking systems is implemented in various countries which normally solve the problem of parking space and effective utilization of utilities. But in a highly populated area safety of the people in a parking slot and retracing of the vehicle is going to be very challenging due to its nature of heterogeneous people and variety of vehicles. An IOT enabled Sensor network based Advanced parking space with camera and audio sensors will be able to collect large amount of data which can be utilized to generate interesting pattern using suitable machine learning algorithm. As the environment is complex and heterogeneous; a better

optimization always will be able to provide improved safety to the people as well as vehicle in the area.

II. RELATED WORK

The independent vehicle leaving framework with utilization of camera[2,9] and recognition of vehicles utilizing pictures yield a practical arrangements however it increment the computational intricacy of the framework and the precision of the identified picture generally rely upon the keen procedure applied.The camera based vehicle recognition method can be improved by utilizing helpful indoor utilizing wide-point fisheye-lens[1] or catadioptric cameras consequently the general execution of vision based leaving framework can be moved along.

IOT[3,5] based wireless sensor network[4,6] course of action for get-together the left vehicle data makes the framework shrewd however powerful utilization of assembled data should be guaranteed any other way the framework can't be viewed as savvy. The sensor network generally experience the ill effects of inclusion and organization lifetime, computational complexity or cost likewise a difficult issue here. The most recent innovation like Internet of Things (IoT) paradigm[7, 8] with cloud-based wise vehicle leaving administrations in shrewd urban communities gave great outcome concerning client accommodation and application network of different web servers. Be that as it may, the utilization of web only for network alone is by all accounts underperformance as other extension like data from web and so forth isn't really utilized.

III. PROPOSED MODEL

The framework will assist the actually incapacitated individuals with voyaging without hesitation in their vehicles even in a complicated transportation climate and gives help to observing vehicle leaving area through advanced mobile phone and to follow back the vehicle with bearing help. This paper presents an IOT based smart parking framework where parking region and client applications are get associated. With this framework, the clients can undoubtedly observe a free parking space basically cost in light of new execution measurements to calculate the client parking cost by considering the distance and the complete number of free places in every vehicle leave. It likewise assists the client with observing the return way to their vehicle utilizing an android application

With the high percentage of vehicle population in India, parking has become a conflicting and confusing situation for the people. Finding a space to park in the city is becoming difficult as the number of vehicles are increasing. The cities in India are highly congested and on top of that the parked cars claim a lot of space that could otherwise be used in a better way. This creates lot of befuddlement in locating the parked vehicle.

The parking problem stresses on the point that how the parking system could be used more efficiently, effectively and also how to improve the retracing of parked vehicle by using new technologies and methodologies. One of the challenges of a modern urban environment is to be agile and friendly towards the needs of people with disabilities. One service towards this direction is the provision of convenient parking access to various locations so that people with even disabilities can carry out their activities with ease.

Safety of vehicles, peoples etc at huge and closed parking area considered to be a challenging issue because their could be accidents in parking due to not so well experienced drivers, design of that particular area etc. it is very crucial to be identify such vehicle as well the parking area and improvethe safety across the area.

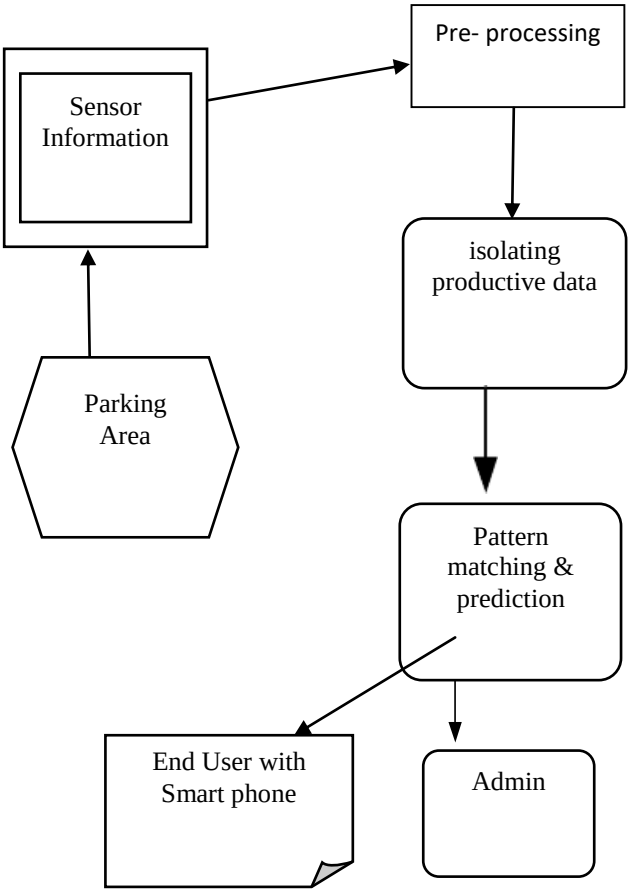

Figure 2 . Proposed Architecture

An Internet of Things based solution which interfaces the subtleties of parking area and advanced mobile phone of an individual which primarily assists with figuring out accessible parking areas, Inform the client on the off chance that regarding mishaps and furthermore render bearings to their own vehicle from any place. The solution Improves certainty of debilitated individuals to involve their own vehicle in a complex parking environment like shopping center, multiplex, public parking regions, and so forth. It likewise means to work on the likelihood of fruitful parking and limits the client holding up time.

Figure 2 shows the overall architecture of the framework where numerous sensors are sent at the parking region which incorporate camera for video capture and picture assortment, receiver for catching audio/sound. As the information is gathered intermittently it need not to be in a valuable structure henceforth reasonable pre-processing is applied with assistance of channels to make the information gathered into more exact. Indeed, even subsequent to pre-processing as the information is enormous and gathered at ordinary stretch the every one of the information need not be enlightening.

A suitable regression technique/ feature selection technique could be used to separate procedure could be utilized to isolate productive data from this big data. Presently from the useful information framework could apply any appropriate AI approach like naive bayes or support vector machine algorithm to derive interesting pattern

IV. RESULT ANALYSIS

As the implementation of realtime system is costly a testing model of the proposed system has been developed. The user module is developed using Android application. The sensor network and data collection is done with the help of Raspberry pi based hardware system. The same hardware is wifi enabled and it is accessed through internet. The Administrator module is a JAVA based desktop application where vehicle allotment has been done.

The operational performance of the system is mainly depend on the machine learning technique and other operations included in the algorithm.

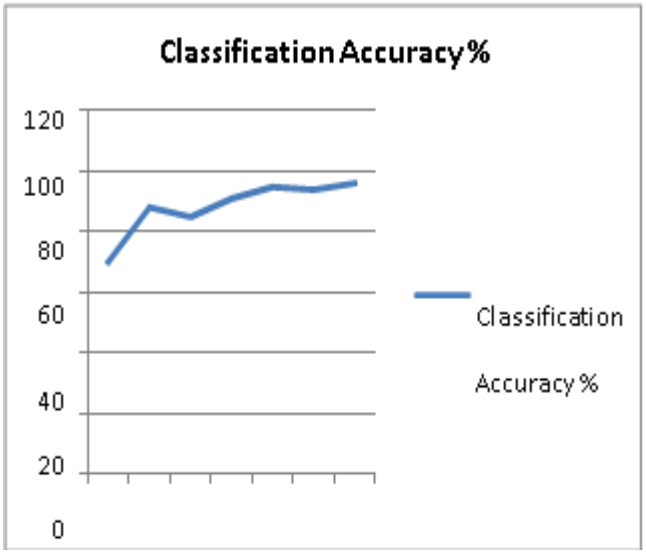

Figure 3 Classification Accuracy

The graph shown in Figure 4 is a plot to describe the performance of the classification technique against the no of data set used. The graph evidently shows that as the no of data set increases the system performances also improves.

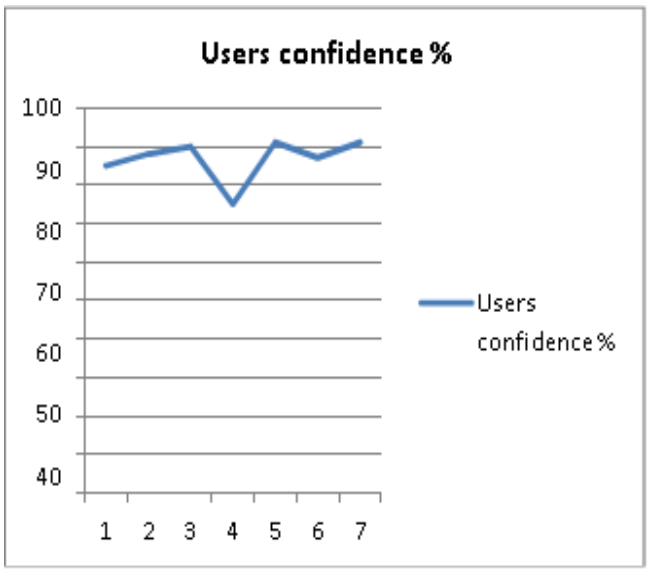

Figure 4 User acceptance ratio in percentage

The operation of the system is also tested against the user satisfaction rate, the same is plotted as graph shown in figure .The plot shows that as the numbers of users are varyingthe satisfaction ratio of users are still high.

The operation of the system is also tested against the user satisfaction rate, the same is plotted as graph shown in figure. The plot shows that as the numbers of users are varyingthe satisfaction ratio of users are still high.

As the data is collected periodically it need not to be in a useful form hence suitable preprocessing is applied with help of filters to make the data collected into more precise. Even after preprocessing as the data is huge and collected at regular interval the all the data need not be informative. A suitable regression technique/ feature selection technique could be used to separate fruitful information from this huge data. Now from the informative data system could apply any suitable machine learning approach like naïve bayes or support vector algorithm to derive interesting pattern.

The autonomous car parking system with use of camera and detection of vehicles using images yield a cost effective solutions but it increase the computational complexity of the system and the accuracy of the detected image always depend on the intelligent technique applied. The camera based vehicle detection technique can be improved by using convenient indoor using wide-angle fisheye-lens or catadioptric cameras hence the overall performance of vision based parking system can be improved.

IOT based wireless sensor network arrangement for gathering the parked car information makes the system smart but effective use of gathered information need to be ensured otherwise the system cannot be considered as cost effective. The sensor network always suffer from coverage and network lifetime, computational complexity or cost also a challenging issue here.

V. CONCLUSION AND FUTURE SCOPE

One of the difficulties of the advanced metropolitan climate is to be deft and agreeable towards the need of individuals with hardships and incapacities. One help towards this is the solution of advantageous stopping access in different areas so that individuals can complete their exercises easily. Here the IOT based solution assists the clients with observing their stopping opening with smallest expense in light of new execution measurements. It mainly assists individuals with migrating their vehicle by supporting area-based administrations. Also it provides user friendly interface with the help of machine learning based well trained system which helps the people with disabilities and also helps in detecting accidents in the parking area. One of the challenges of the modern urban environment is to be agile and friendly towards the need of people with difficulties and disabilities. One service towards this is the provision of convenient parking access in various locations so that people can carry out their activities with ease.

Here the IOT based solution helps the users to find their parking slot with least cost based on new performance metrics. It mainly helps people to relocate their vehicle by supporting location based services. Also it provides user friendly interface with the help of machine learning based well trained system which helps the people with disabilities and also helps in detecting accidents in the parking area. The machine learning approach helps the system to yield good performance in terms of accuracy and user satisfaction.

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