Illegal Vehicle Parking Detection using Big Data Analytics

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Abstract— Recently, the value of big data is being considered important. Also, the government, public institutions and private enterprises began to be interested in big data. Now, data has a lot of values, unlike the past. With the emergence of various planning and analysis techniques which are based on this data, big data is being established as a foundation for new high-level information creation and decision making advancement. This study aims to find an alternative for illegal parking using this big data. For achieving this purpose, this study attempted an approach to the plan to improve illegal parking using big data facilities. In this study data about illegal parking areas and vehicle location was detected using GPS technology and data about vehicle was collected through vehicle detection chip which contains all the information about vehicle and owner of that vehicle. Data collected using GPS and vehicle detection chip was then analysed by Big data techniques.

Keywords: Illegal parking prevention, Big data, Street parking, Vehicle detection chips, Data analysis

I. INTRODUCTION

"Big data is extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations. Especially related to human behavior and interactions"

Big data consist of four attributes that differentiate from conventional data analytics. These attributes are value, variety, volume, velocity.

- Value includes the wisdom the data can provide if effectively mined. This wisdom can consist of predictive capabilities.
- Variety addre1sses the types of data that can be analyzed. This includes structured data such as conventional SQL datasets, and unstructured data such as media, documents, and written statements.
- Volume of data deals with the amount of data that is collected.
- Velocity defines the speed at which the data is collected.

These four attributes demand different data analytics tools to do real-time analytics. They also require new types of NoSQL databases such as Cassandra, Mongo, and Hbase.

In traditional illegal parking system toying van moves around streets where no parking places are there to collect vehicle parked in no parking zone this took so many time, money, human resources and fuel.

This system works on the principle of distributed architecture of big data. Here the information about vehicle and vehicle owner are stored in the distributed manner. As all the data about vehicles from same city, illegal parking locations, and data about vehicle owner are stored in distributed system but can be accessed from anywhere through centralized server.

For this problem our focus in this paper is on data analysis tools for smart illegal parking system, which does not need any of the human interference to work with illegal parking and for our designs, tests and considerations, we use data from all the illegal parking in city.

This deployment features all the vehicles must have GPS tracker and collection of all the illegal parking places from city on the map.

Specifically, we design processing tools to extract relevant statistical features from real-life parking data with the ultimate goal of classifying parking spaces according to their patterns. Besides this, we also provide a means to automatically detect outliers, i.e. to identify that which vehicle is parked in the illegal parking area. As well as it will report about that particular vehicle to R.T.O. and the fine receipt will be sent to the owner of that vehicle.

As Big data known as huge collection of data, the data about each vehicle and vehicle owner was analysed by big data tools as well as the data collected from map i.e. illegal parking location and vehicle location are stored in big data for analysis.

A. Data analysis:

Data analysis is a process of inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, informing conclusions, and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, while being used in different business, science, and social science domains. In today's business, data analysis is playing a role in making decisions more scientific and helping the business achieve effective operation.

B. Process of Data Analysis:

Analysis refers to breaking a whole into its separate components for individual examination. Data analysis is a process for obtaining raw data and converting it into information useful for decision-making by users. Data are collected and analyzed to answer questions, test hypotheses or disprove theories.

Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data.

There are several phases that can be distinguished, described below. The phases are iterative, in that feedback from later phases may result in additional work in earlier phases.

1) Data Requirement
2) Data Collection
3) Data Processing
4) Data Cleaning
5) Exploratory data analysis
6) Modeling and Algorithms
7) Data Product
8) Communication

II. SYSTEM RELATED WORK

In this paper the idea of a tool which will be helpful for R.T.O. department that use to confiscate vehicles from illegal

parking places. In this paper we propose an idea which contain following aspects,

A. Map:

In this concept map are required to pin all the illegal parking areas. Like we add coordinates of particular illegal parking area in map and vehicles having GPS tracker comes across the area the vehicle will be detected, whenever the vehicle enters in the pined area i.e. the location of pined area and location of vehicle are same then it analyse the data of the vehicle on which the particular GPS is assembled.

B. GPS:

We use GPS in this system so that we can trace the vehicles. GPS provide real time data. It always need vehicle to connect with internet connection to work with GPS. GPS tracker tracks all the vehicles which are travelling and it will notify the system about the vehicle which is standing in illegal parking area for more than 10 minutes i.e. if for 10 minutes the location of vehicle and the illegal parking was same it will access the data of vehicle detection chip. The id of GPS will be collected and is checked with the vehicle detection chip and it will collect all the information about owner of the particular vehicle.

C. Vehicle Detection Chip:

Vehicle detection chip contains all the information about vehicle as vehicle number, vehicle type and vehicle owners details. When any vehicle was get detected at illegal parking area by the GPS it will notify the system and by matching the GPS id along with Vehicle detection chip all the details about vehicle and owner will be collected and the fine receipt of illegal parking will be sent to owner by mail.

III. System diagram

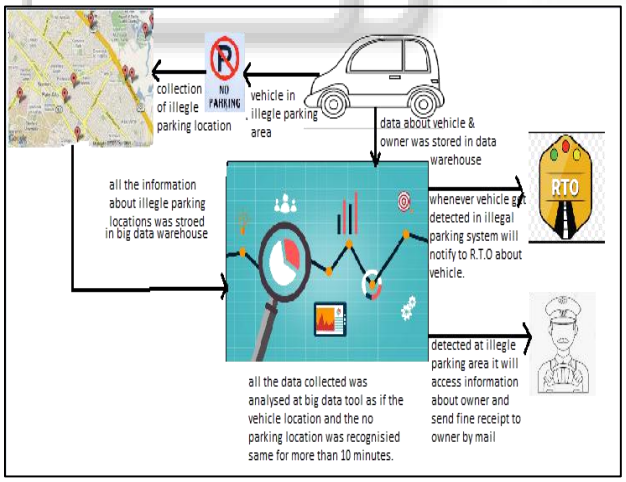

Fig. 1: Working of illegal parking detection system

A. System Description

The ultimate goal for this illegal parking prevention system using big data is to reduce the rate of illegal parking which cause traffic congestion and unnecessary wastage of fuel and time. As solution to this problem there is idea of automated system in which most of the issues get resolved.

This system needs every vehicle to connect with a GPS system which tack the vehicle at all its route. Every GPS contain a unique id and it will send all the real time data to satellite, this is the reason we are using GPS in this system. We collect all the illegal parking places from city at the map in these we will collect all the coordinates of the illegal parking places and place them on map so that we can detect all the illegal parking places. Here we are using vehicle detection chips which contain all the information about vehicle and vehicle owner.

All this data from map, GPS and vehicle detection chip was stored and analysed by big data as when a vehicle was travelling the location of vehicle was continuously updated and monitored using big data analysis techniques when any vehicle get detected standing in a illegal parking area it will activate a self-timer and if the vehicle detected standing at the same place in the illegal parking area the tools will collect all the details about vehicle and vehicle owner which are collaborated with the GPS id through vehicle detection chip. It will collect the details about owner of vehicle and then send a notification to R.T.O. as well as it will send auto generated receipt to the owner of the vehicle as the fine for parking vehicle in illegal parking area. This fine will be collected by bank or online transaction to the account of R.T.O.

In case of owner not paying fine the fine amount will be increased by certain amount per day and after deadline of particular time period the license of that owner will be cancelled and renewed after paying fine only.

B. Features

Illegal parking prevention system consists of main and secondary features for different purposes and situations .The main features are:

1) Detects vehicle in illegal parking area.
2) As this system gathers information about vehicles and illegal parking places in big data to analyse the vehicle in illegal parking and details of vehicle owner.
3) Create an auto generated receipt about illegal parking and send it to owner of vehicle which is detected in the illegal parking area.

IV. Conclusion

In traditional illegal parking rules may lead to waste of fuel, money, time, and human efforts. Sometimes in India it may reflect corruption. This illegal vehicle parking system gives us a solution for above listed problems it can reduce the cost required by government for traditional system.

As all the transactions goes online so the chances of corruption may reduce as owner has to pay the amount of fine which will be decided by the by the government itself. As the vehicle in illegal parking are get detected by GPS no need of toying van to move around city to find vehicle in illegal parking area which saves fuel as well as the human resources which are needed by the traditional methods.

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