

SMART TRAFFIC IDENTIFYING SYSTEM

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Abstract— Traffic is a large drawback that face by the individuals in developing countries. It differs in degree and varies from location to location depending on that country's population and infrastructure. Earlier systems of traffic management are unable to address this abundant increase of traffic on the roads. In Sri Lanka internet usage has been accumulated at a major rate. Many internet visits of people also occur via mobile device. The aim of this article is to suggest an IOT based intelligent traffic management system and a decentralized approach to road traffic use. Additionally, Intelligent algorithms are also used to more accurately and expeditiously handle all traffic conditions. As an answer for the traffic jam planned application uses global Positioning System (GPS) technology to trace the places wherever traffic jams are placed. We will also create a mobile application and we can provide drivers with accurate information on the traffic ahead of them on their way. Then they will get eliminate in the traffic jam and reach their destinations without facing any bother. Driving is a major type of transportation everywhere around the world. It's typically smart follow to not use your smartphone whereas driving. So as a solution we will create a smart driver assistant that works in parallel with this mobile application. Therefore, most of the options within the planned mobile application is functioning with driver's voice command. To implement this Artificial Intelligence System, Natural Language Processing methods will be used.

Keywords—Global Positioning System (GPS), Natural Language Processing, Artificial Intelligence

I. INTRODUCTION

The rapid growth of vehicle ownership is one of the main key features to identify the economic growth of a country. But on the other hand is an indirect effect of the traffic congestion. In day to day life everyone's goal is to reach their destination without wasting their time and money. But in current infrastructure provided resources are limited. Even though the current traffic light systems control the traffic at intersections, many times it occurs congestion or accidents due to its poor performance. As the range of cars on the routes is growing rapidly and it takes longer to achieve one's destination. And that is why Sri Lankan's spend too much time on the routes, paying more for fuel. So we need an ultimate solution to reduce this traffic issue. It needs a sensible mechanism that deals with the matter with the present traffic controlling system.

II. LITERATURE REVIEW

There are some Literature survey on existing applications and systems with nearly capabilities and functionalities. Some of the eminent researchers are reviewed here.

A. Recognition of traffic clog and circumstances from GPS trace analysis.

This research paper contains detecting traffic clogs and incident from GPS data. They get those GPS information exploitation GPS trackers or drivers mobile devices. They manipulate the GPS and location within the route map. They assign this method to every road section of the map and a traffic state supported the speeds of the vehicle, it sends to the users traffic alert supported the classified segments.[1] [2] Their traffic alert contains the affected area, a traffic state. They give example for traffic state. eg: Incident, slowed traffic, blocked traffic and they give estimated velocity of vehicles in the area for users alerts. They said this proposed system is give valuable support in traffic management for municipalities and citizens. They said their very important for urban and non-urban areas. Their experimental analysis was performed using a combination of simulated GPS data and real GPS data from city. Their result of the incident detection rate 91.6% and an average detection time lower them 7 mins.[3]

B. Algorithm for detection of Hot Spots of traffic through analysis of GPS data.

This document includes about the traffic clogs and they said the traffic blockage is one of the serious issues in different transportation frameworks, Also they said traffic will emerge quickly when unique or unexpected episode or uncommon events.[4] They said special locations and road incidents increase traffic clogs. GPS data is adequate to identify general patterns of traffic. Patterns on particular roads will be average velocity, abnormal conduct will alter the direction. GPS has become a more reliable, economically viable tool and the latest positioning technique to be used in the collection of travel time information. Their study is aimed at identifying the city's unique place. They said special locations or those areas of the city which are always congested and where the flow of traffic is slow or that traffic is moving very slowly or vehicles are completely stopped.[5]

C. WAZE Mobile Application

This is a GPS route portable application possessed by Google. It takes a shot at Mobile telephones and Tablets dependent on GPS Technology. This application is for nothing out of pocket. The application gets our area utilizing GPS and other information gets from clients. Clients can report congested driving conditions, mishaps, police traps, tourist spots, Closers, Speed cameras and so on. Furthermore WAZE demonstrate least expensive fuel station in the course. WAZE urges clients to report traffic or street dangers by offering focuses. [6]

D. SYGIC Mobile Application

Sygie is a car GPS route versatile application for Mobile telephones and tablets. It turned into the principal organization to offer route for iPhone and second for Android. Sygie give entryway to-entryway data to well-arranged travel, live traffic and police radar/speed camera alerts, stopping places and so forth. Likewise sygie can utilize on the online and offline. Likewise, it is keeps running on Android, IOS, Windows, Symbian working frameworks. Sygie route utilizes 2D and 3D maps for both on the online and offline. Traffic data is gathered from in excess of 400 million drivers and refreshed at regular intervals. So Sygie basically relies upon the driver's input.[7]

E. AES Algorithm

Encryption is a prevalent system that assumes a noteworthy job to shield information from gatecrashers and Advanced Encryption Standard (AES) calculation is the one of most normal and broadly symmetric square figure calculation utilized in around the world. This calculation has a claim specific structure to encode and unscramble touchy information and is connected in equipment and programming everywhere throughout the world. It is incredibly hard to programmers to get the genuine information when encoding by AES calculation. Till date isn't any proof to crake this algorithm.[8] AES can manage three diverse key sizes, for example, AES 128, 192 and 256 piece and every one of this figures has 128-piece square size. The encryption period of AES has three stages: the underlying round, the principle rounds, and the last round. The majority of the stages utilize a similar sub-erations in various mixes as dd Round Key (in Initial Round), Sub-bytes, Shift Rows, Mix Columns, Add Round Key (in Main Rounds) and Sub Bytes, Shift Rows, Add Round Key (in Final Round). Those principle rounds of AES are rehashed a set number of times for every variation of AES. AES-128 utilization 9 cycles of the fundamental round, AES-192 utilization 11, and AES-256 utilization 13. [9]

F. Execution investigation of information encryption calculations.

The principle objective of any plan information encryption calculation is to shield the information from unapproved individuals. When utilizing this information encryption calculations to handy applications, for the most part we need to worry in execution and speed savvy. In this research paper they give an examination between most generally

utilized calculations. They are DES (Data Encryption Standard),3DES(Triple DES), BLOWFISH and AES(Rijndael). In this exploration paper the examination has been directed through these calculations by running in a few procedures in different sizes of information squares. At that point they assess the speed of information encryption and unscrambling. Likewise, these calculations going through in various programming and equipment stages. So they finish up the exploration paper by referencing BLOWFISH is the best performing calculation among different calculations that used to do contrasting. It concerns protection from unapproved assaults and the speed to information encryption.[10]

G.Traffic clog recognition dependent on GPS coasting vehicle information.

They said clog has been a noteworthy test to the urban traffic framework. They utilized GPS drifting vehicle information (FCD) strategy to identify traffic clog data is contemplated. They utilized information for experimentation. This information extricate from traffic clog data of a major city in China. They remove that thing through GPS information preparing, map coordinating travel speed estimation and after that they demonstrate every one of those subtleties inside the guide. They said the GPS coasting vehicle innovation to gather traffic data turns out to be more practical to gather traffic data in an enormous scale. They said contrasted and the customary fixed recognition gadgets, for example, (inductive circles, camcorders and radar based sensors) skimming vehicle information method can gather traffic data progressively exact and more extensive continuously. They said that they consider utilizing GPS drifting vehicle information to identify traffic blockage data.[11]

H. GSM/GPS Assisted Road and Traffic Clogs Identification System

With this system users can know the traffic condition on the road using GPS and GSM. So users can use alternative routes as well. So the speed sensor of vehicle a controller can get the current speed of the vehicle. When that speed falls below a present threshold the controller is informed the vehicle location.[12] When such a vehicle speed decreasing happens in few vehicles white's locations are contiguous each other the controller identifies there is a traffic grid lock in that location. So then controller informs other users about the grid lock. Then they can use alternative routes to save their times.[13]

I. BLOWFISH Algorithm.

Blowfish, another mystery key square figure, is proposed. It is a feistel arrange, emphasizing a basic encryption work multiple times. The square size is 64 bits, and the key can be any length up to 448 bits. In spite of the fact that there is a mind boggling in statement stage required before any encryption can occur, the real encryption of information is extremely effective on enormous chip. [14][15][16]

RSA- RSA is established in 1977 is an open key crypto framework. RSA is a deviated cryptographic calculation named after its authors Rivest, Shamir and Adelman.[17] RSA utilizes a variable size encryption square and a variable size key. It is a hilter kilter (open key) cryptosystem dependent on number hypothesis, which is a square figure framework. It utilizes two prime numbers to produce the general population and private keys size is 1024 to 4096 bits. These two diverse keys are utilized for encryption and decoding reason. Sender encodes the message utilizing Receiver open key and when the message gets transmit to beneficiary, at that point collector can unscramble it by utilizing his very own private key.[18] [19]

K. Triple DES Encryption Algorithm

3DES - Triple DES was created from DES, utilizes a 64-piece key comprising of 56 compelling key bits and 8 equality bits. In 3DES, DES encryption is connected multiple times to the plain text.[20] The plain text is encoded with key A, unscrambled with key B, and scrambled again with key C. 3DES is a square encryption calculation.[21]

L. An Intelligent Driver Assistance System (I-DAS) for Vehicle Safety Modeling utilizing Ontology Approach

As indicated by Article this System utilizes a metaphysics demonstrating approach for helping vehicle drivers through security cautioning messages during the time basic circumstance. This framework called, I-DAS (Intelligent Driver Assistance System). I-DAS produce the alarm messages dependent on the setting mindful parameters, for example, driving circumstances, vehicle elements, driver action and condition. I-DAS deals with the parameter portrayal, reliable update/upkeep in XML design while the understanding of a basic circumstance is finished utilizing philosophy demonstrating. Related Safety advances, for example, Adaptive journey Control, Collision Avoidance System, Lane Departure Warning framework, Driver sleepiness discovery framework, Parking Assistance framework, which produce admonitions and alarm to driver persistently , for help, as indicated by the setting which is coordinated with vehicle and vehicle 2 Driver Communications by Driver vehicle interface had been connected. [22]

III. METHODOLOGY

The system approach is segregated into two sections: (1) Mobile application and (2) Server side data manipulation and tracking process. Figure 1 describes the flow of the system.

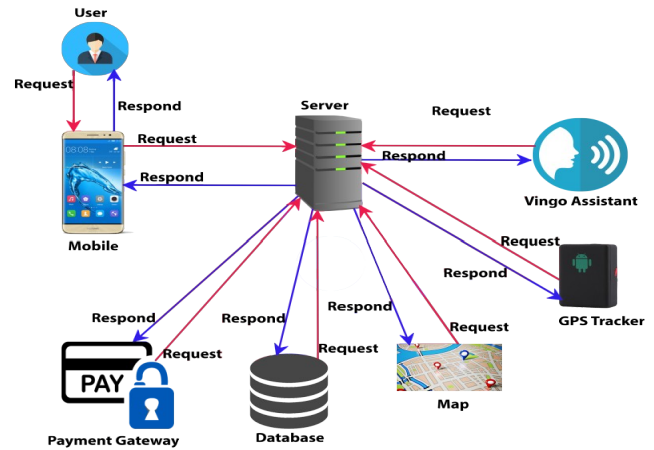


Figure 01 Overview of the system

[A]The proposed system consists of a mobile application mostly focused on drivers and passengers. It will be helpful to drive vehicles on the road very safe. Our mobile application can interact with passengers, drivers and others who like. This application is connected via cloud server to connect with inbuilt RESTful server in our application and connect to the google map. In the application user can get ads and promotion in current business and shops. It can buy goods and services from this mobile application.

[B] Also there is a special feature in this mobile application. That is an intelligent mobile assistant called “VINGO”. “Intelligent Driver Assistant” feature is basically focused on the drivers. It is dangerous to use this app when a driver drives his car. Figure 02 explain the working process of Intelligent Driver Assistant.

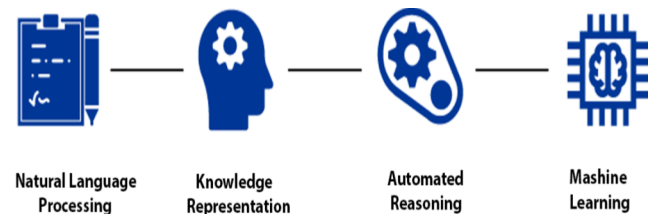


Figure 02 Working Process

It is also dangerous for the driver to use the phone for general purposes. For example, a driver receives a text message from his or her driver when he / she drives it. This allows reading and answering very dangers, because then the likelihood of breaking in the mental integrity of the victim is at a very high level. So most of the features in the proposed mobile application is working with driver’s voice command. Figure 03 explain how the mobile application is handling.

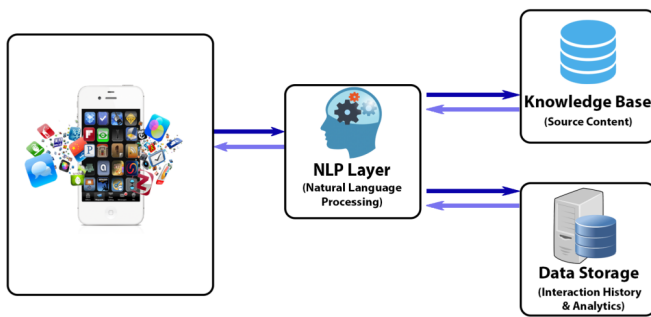


Figure 03 Handling Mobile Application

[C] Server side data manipulation and tracking process.

we have server for synchronizing data from app to back-end and vice versa. Mobile app is engage with back-end for do request and response. So, we use web service API for passing data between mobile app and back-end. Following figure indicate how data passing works:

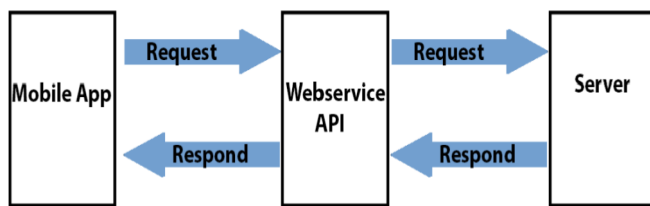


Figure 04 Passing GPS through web service api

We use arduino for detecting or identifying vehicle's position on Google maps. Before positioning or detecting a map, we have GSM shield to connect to the internet, send and receive send. This GSM shield module not working without implements the GSM library. After we use GSM module all disables functions are enabled as follows

- GSM phone
- Receive voice calls
- Send and receive SMS

We use these as components

- Arduino
- Node MCU
- GSM Module
- GPS (Global Position System) Module
- Connecting Wires

Figure 05 explain how data processing using arduino.

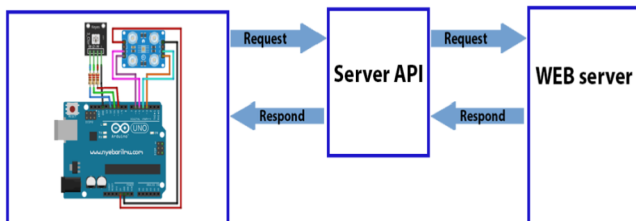


Figure 05 GPS Receiving from tracker

[D] Evaluate the best existing secure data transmission and storing methods

We utilize a PC i7 2.5GHz CPU that gathers execution data for this reason. The laptop encrypts a distinct file size from 5MB to 200 MB in the tests. This collects several performance metrics. For example, encryption and decoding time. The time it takes for an encryption calculation to deliver a figure content from a plain content is viewed as the time it takes. The time it takes to decode is viewed as the time it takes to deliver the first message from the figure content. Here 3DES, AES, RSA and Blowfish calculations execute in netbeans IDE utilizing java language. By using

these algorithms we compute the encryption and decryption time taken by different text files. One text file will execute

three times and get the average time as the encrypt and decrypt time.

E. Map Matching Algorithms

This algorithm is one of the best algorithms for gps road map and to obtain location information in order to get the real position of the vehicles in a road network. So there is a certain error in the satellite positioning in the vehicle. The error will cause the drift point of the position point, which makes the vehicle route shift to the real road.[23]

Map Matching Process

Described the three information sources, the link, node and placement information. To identify a right connection, the method is launched with nodal matching. This has an equation to calculate to get real road. Figure 7 of processed data using this algorithm.

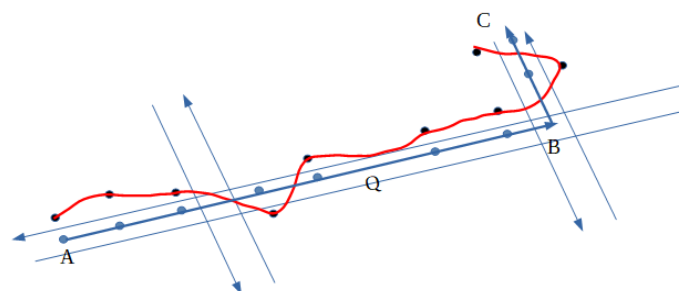


Figure 7 Map Matching Algorithm

First grab the gps locations of the running vehicles and we pass those vehicle gps information into direction API. Because this API gives us the real road gps coordinates we can compare the vehicle gps location and direction road API location. Then implement an equation to calculate a correct gps to remove noises on gps coordinates

IV. RESULTS

Analyzed Map-Matching algorithm by using different samples data sets. Figure.8 explains one of different samples

data. But here we needed actual road coordinates and real coordinates to analyze this algorithm.

According to below result, Actual road represent in blue color and real coordinates represent in red color. After, used this algorithm to the data set that indicates green color.

Actual Coordinates	Real Coordinates	Matched Coordinates (After used algorithm)
Latitude: 6.82321	Latitude: 6.85039	Latitude: 6.833685948687076
Longitude: 80.28769	Longitude: 80.29799	Longitude: 80.27855659028332

Figure 8 Data Comparison

Following figure 9 shows how it represent after using the algorithm.

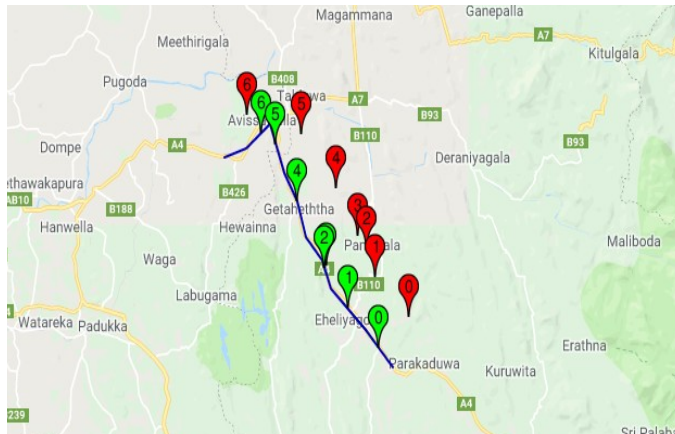
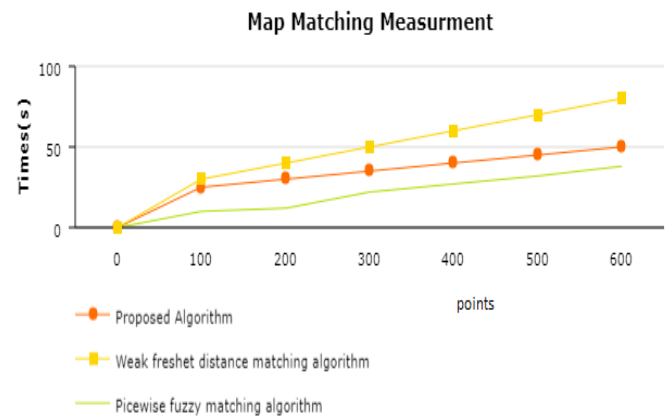


Figure 9 represent algorithm data in map

After experimented of different algorithms, efficiency of the proposed algorithm very similar to piecewise fuzzy matching algorithm. Also proposed algorithm better than weak frechet distance matching algorithm.



Time(s) - Running time of algorithm.

Points - Coordinates (lat,lon)

V. DISCUSSION & FUTURE WORKS

The research explored the literature about traffic control systems.. The finding shows that great work has been done by previous research efforts. But this problem has not been completely addressed in one research. Some of components has been addresses isolated. However optimal smart traffic control system to a mobile application can achieve better results than other systems. As a further development of this research this can be developed to island wide to control traffic situations. Also this mobile assistant will train to many words that people are using in day to day life. So that it will be much easier to handle to drivers while driving vehicles.

VI CONCLUSION

In this research work a modern traffic controlling system was explored which is more efficient than the systems currently in use. As traffic has been a key feature which affects the economy of the people as well as the country this system can lead to a more sustainable approach to the traffic handling. In the end the wide use of this system can affect the time management and the economy management of people in metropolitan areas positively. Additionally this product can be developed further and the productivity and the efficiency can be enhanced to increase the advantages on the traffic controlling.

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