Android Application for Vehicular Traffic and Accident Analysis
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Abstract—with the population of the world growing exponentially if there’s one thing that is going to remain constant then it is traffic. Traffic is a condition that exists in all major cities and causes a huge wastage of time which in turn leads to a decrease in individual and collective productivity. The simplest solution to traffic is to understand the areas that are severely affected and use that information to find an alternate route. To fully realize the power of such a technology it must be implemented in a medium that is common and already heavily used and only cell phones fit the description of such a device. Even amongst cell phones the most prevalent operating system in use currently is the Android operating system and hence this application has been designed for it.

Keywords: - Android, traffic, mobile, route, google maps, cloud, database

I. INTRODUCTION

Traffic is a problem that has been consistently growing by trumping every means that is being applied to control it. With a phenomenal rise in population and a consumer culture that instills individuals to have more than one vehicle, traffic is a problem that is only getting worse with time. No deterrent measures, such as fines and taxes, currently being used are able to combat the rising cost that traffic is imposing on us. The only pragmatic solution to traffic is to understand where it is collected so that alternate routes can be taken.

The main aim of this application has been to bring about a user centric approach to both collection and dispersion of traffic and accident related data. Currently all data being collected is done using covert means without any information being provided to the user about how his data is being collected. This application aims to bring the flow of control back into the hands of the user as it is solely the user who determines when his data is collected and it is used only to help other users understand the traffic scenario.

II. SUSTAINABLE LARGE SCALE SMARTPHONE BASED MEASUREMENT SYSTEMS

The challenge at hand is to design a system from the granular level to all the way up that addresses both technical issues, like the process of collection itself, as well as non technical issues like the factors used to incentivize the users to continue posting traffic updates.

It must have a framework for a wide set of tasks including, but not limited to, computer power and wireless transmission resource allocation, software revision handling, incentive strategies for the voluntary end-users, and a business model that secures that the effort is profitable for the commercial actor.[1]

Thus the goal of this application is to introduce a solution that is both commercially viable as well as solves the core traffic problem by sticking to its fundamental values, which in the case happens to be to be user centric as shown in [4] and [5].

Fig 1: The triple helix providing the foundation for a sustainable large-scale measurement system based on a large number of smartphones as measurement probes.

In the article, the primary data is data for road traffic monitoring of societal value. The secondary data includes the driving behavior parameters, or the risk profile, of the individual end-users, of commercial value for the insurer running a usage based insurance program. The individual car owners or end-users are offered incentives like discounts on the insurance premium. [1]

III. EXISTING SYSTEM

The current systems that are in place to provide vehicular traffic data are Google Maps, INRIX and Waze. Google Maps uses undisclosed means to extract traffic information from users of the android operating system and Waze uses maps that lack in detail, especially in rural areas. INRIX, although having maps that are high in precision, is only applicable in cities concentrated in North and South America and Europe thereby ignoring the Asian market.

Fig 2: Google Maps showing traffic [3]
Thus all the current systems either lack in coverage, technology or transparency in their functioning. It is to address these concerns that the application developed by us has been developed keeping in mind the drawbacks of the existing system so that the same mistakes are not repeated.

IV. PROPOSED SYSTEM

Our system is built keeping in mind the core values of transparency and adaptability thus ensuring that it does not contain any of the problems that are present in the existing systems. The working of our system is quite simplistic and user oriented. In this system, the user who wishes to input traffic data around him is given an option between 1 and 9 to describe the traffic around him. This information is then transmitted to the database along with their GPS coordinates. This information is stored in a key value pair with the GPS co-ordinates being the key and the value entered by the user being the value.

When any user wants to view the traffic situation around him he can click a button to view the map which brings out the map loaded with locations that have been entered by other users into the database.

Thus we see that the process is absolutely user centric as the producer and consumer of data in this application is the end user itself.

Our system was designed to be extremely fast to use. Keeping with that philosophy, the application can now take inputs from users in under 5 seconds. This ensures that the application only takes a very tiny fraction of the time that a user spends in any traffic signal.

Just as a user can enter the traffic related information, he is also provided with an option to enter accident related information. This is to ensure that the user gets a whole rounded opinion about the roads that he wishes to take since traffic is quite a simplistic view. We believe that to effectively choose a route it is necessary to know both the traffic and accident related information. This is because there may be some roads that have very less traffic but a very high accident rate and this could lull the user into a false sense of security if the accident related information is not provided.

The maps used by our application is Google Maps which is one of the most detailed and open source maps that are currently available on the Internet. This ensures a high reliability for our application which is not necessarily attained by other applications using much less detailed maps.

The main factor that separates our application from the rest is the way we incentivize users to enter traffic and accident related data. We know that humans are inherently social creatures that exist in a form of social hierarchy and we're using this information to build a feedback system that
ensures that the users who contribute most are "rewarded". There will be a high score page where the users who have posted large numbers of accurate readings will be listed on top. These users will also receive special discount vouchers which will be paid for by the revenue generated from advertisements that are present in the application. Thus the users are incentivized both commercially and socially paving the way for them to be in continuous use of this application.

![Screenshot of traffic and accident data](image)

We also have an added functionality of "GPS Memory", whereby the application uses the last known GPS coordinates in case the current coordinates cannot be procured by the device due to various issues like lack of satellite coverage, tunnels, device malfunction and other reasons that cannot be controlled by the user.

V. MODULAR DESIGN

Our proposed system is divided into two very simple modules to avoid unnecessary complexity, they are:

A. Traffic Input Module: This module pertains to the complete process of user input from accepting the data to storing it in a database. When the user enters the traffic information, it is collected along with his current GPS coordinates and stored into the cloud database. The cloud database then uses a special averaging algorithm to sift through the various values that have been received for that location from multiple users and shows a value which it believes is the closest to the actual condition. Thus with varying inputs too the end user only sees one concrete output which is as close to the real situation as possible.

![Modular design of the system](image)

B. Traffic Output Module: This module pertains to the complete process of the display of information, right from loading the maps to displaying the areas with most traffic. When the user clicks a button to have as output the traffic information of the areas around him a couple of processes are executed at the same time. Firstly, Google maps are loaded from the server. Secondly, this map is populated with data that has been taken from the database in the form of circles. The color of the circles represent the traffic around them. If the value of traffic is under five on a scale from one to nine then the circle is colored blue otherwise it is colored red. Thus the colors also have been chosen to be as intuitive as possible.

VI. CONCLUSION

In this paper and Android based application for Traffic and Accident Analysis has been presented. It uses the social media architecture along with cloud computing to ensure that the user is always presented with information without any delays.

![Schematic view of use of traffic data](image)

This application has the potential to have widespread use as it finally brings into traffic applications the social element which has been missing from most of its predecessors. This application will especially be prevalent in regions with high traffic density like India, China and North America. With the traffic growing day by day the usability of this application only increases with time.

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