

Traffic Reduction Using Android Application

Diksha Suvarna, Shailendra Khandewale & Tanavi Ghosalkar

Computer Department, Mumbai University, KJSIEIT, Mumbai, India
E-mail : dikshasuvarna@gmail.com, shailendra007k@gmail.com, tanavi.ghosalkar@yahoo.com

Abstract – The road traffic management is based on dynamic routing during peak hour traffic. The real time traffic management has become a hectic problem in daily life due to the increasing traffic, sudden accidents and bottlenecks due to various reasons. The selection of route depends on various parameters such as traffic rate, speed of the vehicle, shortest path and time required. The dynamic route selection is implemented using the Kruskal's algorithm based on different parameters. The end user selects the source and destination and sends the information to the system. Using GPS, system can locate the position of the end user which will help to locate the vehicle in which he or she is present or the position of the person. The commuters in the same vicinity can be clubbed together on comparatively lesser number of vehicles if the source and destination lies on the same path. Since the open source system of Android gives authority to customize our device, an Android based application has been designed to reduce the traffic on roads.

Keywords – Traffic congestion, GPS, optimum path, profile matching, Android operating system

I. INTRODUCTION

These days traffic congestion is one of the major problems in metro cities, because of which precious time of citizens such as top level executives, CEOs, students, workers, teachers, professors, doctors etc. is wasted. With the development of the information era, people hope to access the data anywhere and anytime. Mobile communication gradually changes its trend from simple voice communication to complex data communication. Today's lifestyle is very fast and civilians do not have much of a social life. This is one of the reasons for the diminishing social life of majority of the people.

Nowadays, voice communication on mobile phone is just one aspect of cellular phones. There are many more functionalities that mobile phones provide these days. One of the major factors in smart mobile phone is GPS(Global Positioning System). This system allows us

to locate the position of the device in which it is installed. This system is already present in all smart phones these days. But these functionalities were in the hands of manufacturers until the release of Android open source operating system for mobile phones. Because of this the user can access the hardware directly and allow designer to design customized application such as GPS enabled services.

People use their vehicle to drive to their destination and in many cases the seats in their cars are vacant. Similarly, each individual takes a cab or auto rickshaw to reach his destination, which leads to more traffic on roads.

Thus, our aim is to make use of those vacant seats in the vehicle. We are designing an application based on Android platform by using GPS system which will help to reduce traffic on road in metropolitan cities with the help of Android based smart phones. This application would provide an optimum path with the help of GPS system and Google maps. All the commuters in the path will be visible to the user. It would retrieve the complete information (such as age, gender, occupation, etc) of the user for the purpose of creating their profile. Then the system will track his or her day-to-day route for their destination. This application will provide compatible options based on their profile information to share the vehicle if there are some vacant seats available. This will reduce the number of vehicles on road thereby reducing traffic and hence time will be consumed. In this fast living environment, people will be able to enjoy their social life and spend more time where necessary.

II. PROBLEM DEFINITION

The major problem that people face these days is traffic congestion. The problem begins since there is no such existing system for reduction of traffic. Hardin's notion that individual's inevitably consider their own interest over those of the collective whole does in fact

hold in considering traffic congestion. In the absence of inexpensive and timely transportation alternative, commuters will favor their own cars, thus crowding streets and reducing their value to collective group. However, by presenting feasible alternatives and regulating use of personal automobiles, government entities can reduce this effect, thereby ensuring the continued value is transportation infrastructure to the collective group. The precious time of commuters is wasted which cannot be regained back because of traffic jamming. Various reasons of traffic jamming include accidents on highways and roads, malfunction of signal, traffic during festivals etc.

III. PROPOSED SYSTEM

To start with, the users of this application should have Android based smart phone. This system is beneficial only for such users.

The new user will first have to fill his personal details such as full name, gender, age, occupation, phone number (optional) on the website. The website will give complete information about the application. The user has to sign up for the first time if he wishes to install the application on his cell phone.

After registering on the website, the application will be available to him on his handset. The provided information of the user will then be stored in the database.

After the application is available to the user on his handset, he would be asked to enter the user name and password. After that, he can take full advantage of this application. Suppose person A is starting his journey from place P and has to reach destination Q, the application will ask the person A to specify whether he is going to take a lift or give a lift. Thereafter he has to specify his source (if not specified current location of the person will be considered) and destination with two options namely for random use or daily use only for new users. Along with this, the person A will provide information regarding number of vacant seats available in the vehicle he is travelling. Depending on the selected destination and information provided by person A, the system will provide the route.

Initially when user enters the source and destination, the system will provide the optimum path taking into consideration various parameters such as speed, sudden accidents, bottle necks, time, real time traffic and shortest path. The optimum path will then be calculated using Kruskal's algorithm.



Fig. 1 : Route of path from source P to destination Q

Another person B has his destination on the same path as of A. Person B has to fill his personal details such as full name, gender, age, occupation, phone number (optional) after installation of the application. The provided information of the user will then be stored in the database.

Suppose person B is starting his journey from a point in the path of A and has to reach destination Q, the system will ask the person B to specify whether he is going to take a lift or give a lift. Thereafter he has to specify his source (if not specified current location of the person will be considered) and destination with two options namely for random use or daily use, only for new users. System will allow persons to connect to each other based on their personal information such as users of same age, same occupation etc.

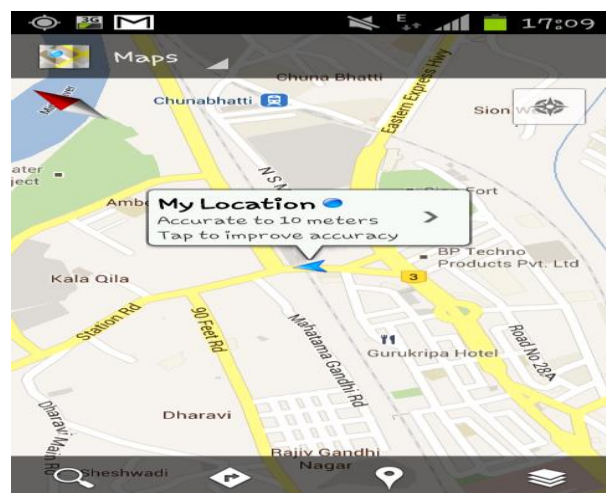


Fig. 2 : Location of person B taking lift

Both persons will then be provided with number of compatible options. Amongst the available compatible options the users will select their preferable option. When person B selects person A an acknowledgement is sent to person A, the latter is also asked for his approval. Once person A gives his approval, person B will receive the acknowledgement. Essential personal information will then be provided to each other by admin from database.

The three nodes- that is, the source, the destination and the person willing to take lift will be considered and the new optimum path will be calculated based on Kruskal's algorithm by the system. Optimum path will be provided from source A to the person taking the lift and from the person taking the lift to Destination Q.

Now current location of person B will be provided to person A. Simultaneously route of person A will be tracked and made available to person B.

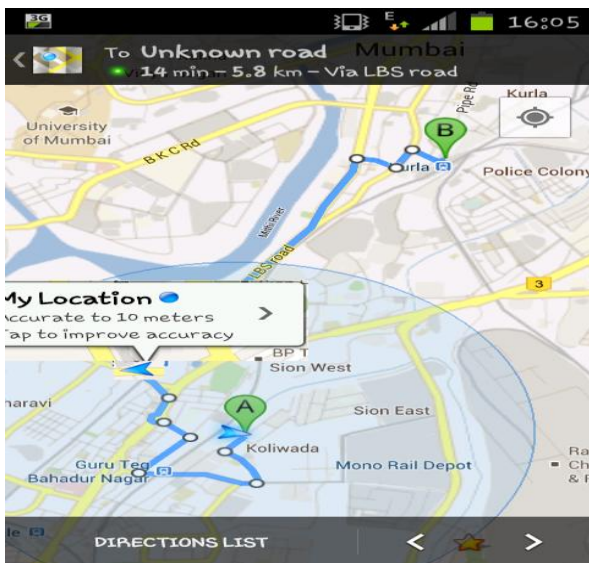


Fig. 3: Optimal path considering the three nodes—source, destination and person taking lift

The system will be updated after every 5 minutes. Now, chat window will be made available to both the users for communication purpose through which they can share their location. Also real time traffic updates will be notified to the users travelling in the specified path. While travelling, if there are traffic jams or accidents in the route of person then system will provide the new optimum path taking into consideration all the parameters. The user will be given the option whether he wants to change the path or remain in the same path. If the user wishes to change the path he will be provided with the next optimum path based on the 3 nodes. The optimum path will be obtained based on the current source.

Broadcast message feature will also be made available to the commuters using this application if they wish to know the number of people travelling in a particular path at a particular time. This can be useful to make prior plans for travelling to a particular destination which is rarely visited.

IV. METHODOLOGY

Route process on Dynamic Vehicle Navigation System

The Dynamic Navigation System is a dynamic traffic route generation and route assistance system. The route decision process can be divided into two phases, before-driving and on-driving. While before-driving is the first route planning. Figure 2 gives the route process of dynamic navigation system.

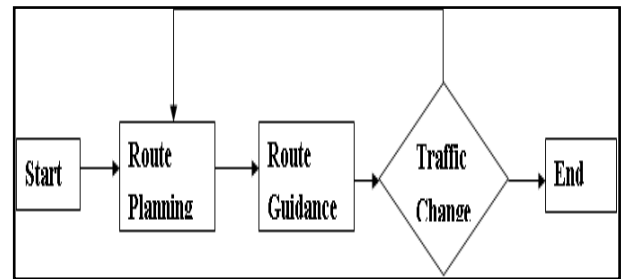


Fig. 4: Route process of Dynamic Navigation System

Both the phases use traffic data while routing. The difference is that the first phase uses historical data to predict the driving path and the second phase uses the real time data to calculate the path in time. The requirements of the traffic database are listed below:

- Store traffic flow and traffic event data and build the relationship between these two data
- Support quickly the query current traffic information with time and spatial attribute
- Use travel time attribute instead of travel speed in traffic flow data [7]

V. ALGORITHM

Start with an empty set A, and select at every stage the shortest edge that has not been chosen or rejected, regardless of where this edge is situated in the graph.

KRUSKAL (V, E, w)

$A \leftarrow \{ \}$ ▷ Set A will ultimately contains the edges of the MST

for each vertex v in V
 do MAKE-SET(v)

sort E into non decreasing order by weight w

for each (u, v) taken from the sorted list

do if FIND-SET(u) = FIND-SET(v)

then $A \leftarrow A \cup \{(u, v)\}$

UNION(u, v)

return A.

- Make SET (v): Create a new set whose only member is pointed to by v . Note that for this operation v must already be in a set.
- FIND_SET (v): Returns a pointer to the set containing v .
- UNION (u, v): Unites the dynamic sets that contain u and v into a new set that is union of these two sets.

VII. IMPLEMENTATION

When the user enters the source and destination, he/she will be able to retrieve the maximum speed that needs to be covered to reach the specified destination. He/she will be also provided with the actual distance between the source and destination and while the traffic is on a heap, appropriately how much time he will take to reach his specified destination is calculated. All this information will be retrieved from the database. The user can also check the path he is travelling has what kind of traffic – low, medium or high [2]. The figure below demonstrates the above explanation:

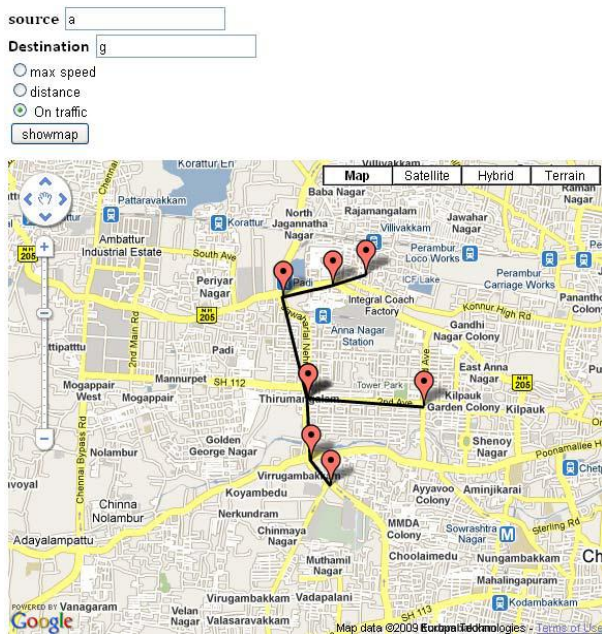


Fig. 5 : Path based on traffic

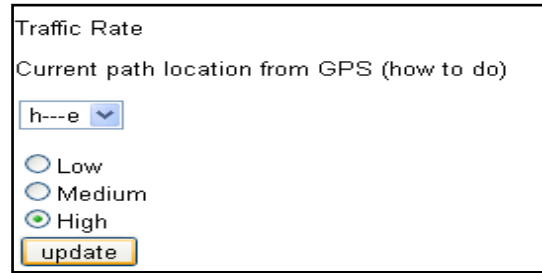


Fig. 6 : Traffic frequency

1) Web-site designing

An attractive website will be designed in Adobe Dreamweaver which will contain all the information about the application. All the necessary information will be displayed on the website. Along with this, primarily the user has to register if he/she wishes to use the application. The user has to sign up for the very first time. The user will be asked to fill his personal details viz. first name, middle name, last name, age, occupation, give lift or take lift, password, telephone number, etc. After the registration form is filled, authentication will be done by the admin and the application will be made available to the user on his cell phone.

2) Calculation of shortest path

Calculation of shortest path will be done by Kruskal’s algorithm. The basic idea of the Kruskal’s algorithms is as follows: scan all edges in increasing weight order; if an edge is safe, keep it (i.e. add it to the set).

- A little more formally, given a connected, undirected, weighted graph with a function $w: E \rightarrow R$.
- Starts with each vertex being its own component.
- Repeatedly merges two components into one by choosing the light edge that connects them (i.e., the light edge crossing the cut between them).
- Scans the set of edges in monotonically increasing order by weight
- Uses a disjoint-set data structure to determine whether an edge connects vertices in different components

3) Profile matching

Since all the users are strangers to each other, their profile matching needs to be done. This is done by using the Aadhar card’s Unique Identity Number for authentication. When users populate their data with

personal information on the website, all the information is stored as backend in the database. On the basis of the information from the database, clusters will be made based on persons of same age, persons of same profession, persons with same last name etc. Then accordingly the options will be provided.

4) Chat window insertion

For the user to communicate with each other, a chat window will be provided. This chat window is similar to the Whatsapp application that is being used these days. In this chat window, group chatting as well as one-to-one chatting will be possible. It will also be possible for end users to even communicate with each other via audio messages. Audio messages could be useful when the person is driving the vehicle and will not able to chat via typing messages. At that time, audio messages will be of much ease.

VIII. SCOPE AND APPLICATIONS

The last five years has witnessed great interest in research on Android applications. This has paved the way for a large number of new techniques and systems and a growing interest in associated fields to support such systems. Likewise, Location Based Services and Global Positioning System have expanded its horizon in many directions, resulting in an explosion in the volume of labor data required to be organized. The need of the hour is to establish how this technology can reach out to the common man in the same way text retrieval techniques have. For example, Google and Yahoo are household names today, primarily due to the benefits reaped through their use.

It is to be noted here the subtle difference in the level of importance of the user community involvement between the individual having different skills given the expected level of success. The scope of this application is that it will be easily accessible by common man. It can be useful for public transportation and travelling. Taxi drivers and rickshaw drivers can use this application to drive the people to their destinations, further reducing traffic on roads. Since many features will be integrated into one application it will be of great use in the near future.

IX. CONCLUSION

Thus the user is able to retrieve his current location with the help of Google maps, address of any location can be retrieved in Android smart phones. Also, this application will enable in reducing the traffic, especially during peak hours. Being an application that provides immense security, this application ensures safety of the user and their personal information.

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