Global Positioning Accuracy of Mobile Phone Localization and Communication using Glocal

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Abstract- Location prediction has recently dragged lots of attention in real time applications. However, predicting user mobility in emergency situations still remains a challenging task due to human mobility patterns. Nowadays, smart phones can also have the abilityto predict the locationbut it results in providing thelocal coordinates of users. Our study shows that there isa strong relationship between global prediction andconsistent coordinates. Based on this finding, we propose Glocal which means think Globally and act locally along with GIS-a proposal based on GPS, to enhance the location prediction and to improve the accuracy of global positioning technology. Moreover, the proposed system removes the assumption held in previous schemes that prediction of only current location can be done and difficulties in establishing communication. We validate our approach in both crowded urban and spacious suburban areas. Experimental results show that G local along with GIS achieves higher precision compared to other schemes.

Keywords: Location prediction, Geographic Information System, Google maps.

1 INTRODUCTION

The rise of mobile communication has opened an avenue to enhance the location prediction of individual users. Usually location prediction is donebyusingthecurrentlocationandmovingspeed. Furthermore, if we analyze the prior knowledge of any user before developing a systemthen it results in a way that user requires a time consuming, efficient, effective and accurate prediction systems. A variety of schemes on location prediction have been proposed,eg.,WhereNext[9],NextCell[11],NextPlace[10]. These schemes contribute to localization techniques [12]. Also for any method of predicting the location, identification of shortest path is necessary.Shortestpathalgorithmwhichaddsastep to increase the accuracy is inferred from transportation networks [4] and shortest problem in large scale graph [5]. These algorithms agree to certain base that the shortest path may be static or dynamicandthesolutionofthosecanbeobtainedby finding the path from initial vertex to a goal vertex using bidirectional algorithm[4][5]. Nowadays, global positioning system accuracy is not upto the level because of various reasons like error in satellite communication also due to tremendous applications development. As a result development of Assisted GPS (AGPS), Differential GPS (DGPS), wide area augmentation, dead reckoning techniques came into account.

For various commercial and military applications, evolution of mobile based applications like location based services and geographical information system (GIS) are enabled. Here GIS details about the spatial data collection andmodeling of spatial processes [8].But predictions depending only on spatial and temporal methods lack in providing high-level precision. Representation of data models in GIS process is represented in computer graphics technique. This computer graphics technique uses a polyline representation where, a polyline is said to be made up of various segments. Another challenge is obtaining the latitude and longitude values of user location. This is done with the help of background GIS support. We develop an ubicomp system which is a post-desktop model of human-computer interaction in whichinformation

processing has been integrated thoroughly into everyday objects and activities. In the course of ordinary activities, someone using ubiquitous computing with many computational devices and systems engages simultaneously, and may not necessarily be aware what they are doing so. This model is usually considered advancement from the desktop paradigm.

More formally, ubiquitous computing is termed as machines that fit the human environment instead of forcing humans to enter theirs. All models of this share a vision of small, inexpensive, robust networked processing devices, distributed at all scales throughout day-to-day life and generally turned to distinctly common-place ends. This suggests that the natural paradigm appropriate with interaction to a fully robust ubiquitous computing has yet to emerge - although there is also recognition in the field that we are already living in an ubicomp world in many ways. Contemporary devices that lend some support which include digital audio players, radio-frequency identification tags, mobile phones, GPS, and interactive whiteboards for latter idea.

Quantitative and qualitative observations show that wide area augmentation also helps us to improve the accuracy of GPS. Generally this process removes the blockage in satellite signals providing integrity and availability to GPS system. Comparison results are shown as: where 100 meters shows the accuracy of the GPS system, which was subject to accuracy degradation by the government imposed selective availability (SA) program and 15 meters represent typical GPS position accuracy without SA and 3-5 meters shows typical differential GPS (DGPS) position accuracy in figure 2 and less than 3 meters shows typical WAAS position accuracy.

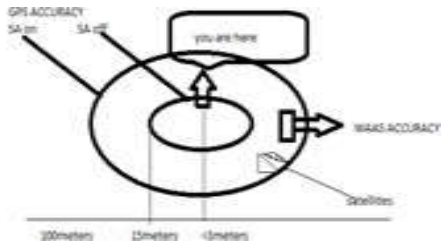


Figure 2: GPS (DGPS) position accuracy

WAAS addresses all of the navigation problems and we switch on to a global positioning refinement technique called Glocal -along with GIS, concentrating on increasing the accuracy of location prediction[2][3], and enabling communications between users providing them a pervasive environment, though many techniques have been used to improve the accuracy of GPS. Glocal first uses the support method as dead reckoning. This method helps the Glocal to track both local and global trajectories of user. These trajectories are measured by using GPS measurements. These enable to transform those trajectories to local and global coordinates. Thereby, we can develop a 2D plane and find inaccurate locations. Both GPS and Glocal initially depend on dead reckoning technique which is illustrated in figure 3. This is due to the reason that determining the previous position and calculating ones current position using course time stamp and speed. Since, navigation plays a major role in predicting, here the navigator plots 9am as initial position and with the help of course time stamp and speed the navigator estimates their own positions at 9.30am and 10am.

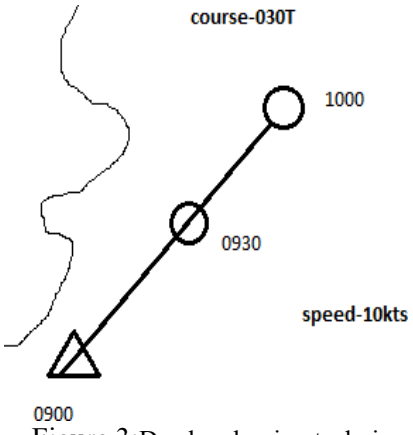


Figure 3:Dead reckoning technique

Even dead reckoning may leads to cumulative errors. Satellite navigation provides accurate information using GPS which make simple dead reckoning technique. Additionally there exist some other concepts that support the accuracy of location prediction [2][3]. Those are required measures to know user mobility they are: localization [12], stay point, stay region, trajectory patterns and the most needed method is war driving. Since this system deals with service provider methodformonitoring and navigating, war driving would be more important since it is a way of access point mapping. This secure location based service can be used in GIS & GPS enabled android devices and can be used along with Google maps to provide accurate search results[1][7].

The rest of the paper is organized asfollows.

Section 2 briefly overviews the related works, section 3 details the proposal of a new prototype called Glocal along with GIS for location prediction long with request and response communication.

2 RELATEDWORKS

In previous research, the study of global refinement has pursued mobile phones via local trajectories. Using these trajectory patterns, the movements of object are forecasted with their location and T-pattern trees [9] are computed. The locations are presented with spatial [8] terms as longitude and latitude values. The Geocode delivers the values of the location with the help of API along with Google Maps. The related body of work concentrated on Location Based Services [6] for obtaining the location and utilizing itfor providing a set of services, where location manager acts as a hook. It offers a wide environment to predict the footprint of the location with proximity alerts. Moreover, it affords a clear-cut location with the help of the system termed asGIS.

Pioneering work is made towards GIS that furnish the geospatial [1] functionality for many Location Based Services to extract the map information, map visualization and directory based services. There are several studies made towards Location Based Services which are useful to handle Public safety, emergency services, consumer services and enterprise services. The main finding is that, they are probably used in Health care [7] center for emergency services.

At first the footprint of the people are made by the mobile sensor which has to be carried by them wherever the moves. It is made by the wireless sensing device which tracks the location of the people by their movement. These sensors cannot predict the location accurately when the user forgetsit and leads to various issues. After that a infrared based spectrum is made in which the footstep of the patient are traced in a home-like environment as well as real home, where the art of localization [12] is made with environmental sensors. This sensing is performed for indoor localization with the application termed as Tele-homecare [13], which controls the remote monitoring of patient with pervasive networks. Thereby, it enhances the communication with medical assistance in critical situation. This approach which contributions to the movements madebytheuser,wherelocationplaysavitalrole.

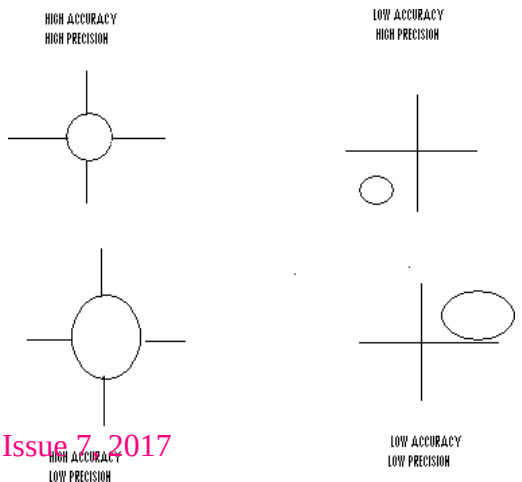
Now the locations marked for tracking the origin andterminaloftheuserwhichisbasedonpath taken by them. The location may arise in any environment where gap between the places must be the shortest path in emergency situation. It can be gained by the Shortest path algorithm [4][5], where theclosestfacilityanalysis handovertherouteacross source and destination for single or multiple landing-place. It can be processed with various algorithms includes Dijkstra"s algorithm[4]and Bi directional ST Algorithm[5].

The Dijkstra"s algorithm[4]finds the shortest path between the nodes in the graph with different variants. The study was made with the dynamic routing system which is based on the integration of GIS and real-time traffic conditionsthat uses ArcGIS [4] for improving the visualization of the map in urban network and car routing analysis. The user friendly ArcGIS is an approach for planning an optimal route based on the shortest path and calculations are performed with the help of Dijkstra"s algorithm by Network analyst. It has a powerful functionality with set of stops where Network Analyst"s route solver attempt of inda way at minimum cost. The ArcGIS 9.3 is a tool which isused to get the fastest and optimum route to reach a health care [7] center. On the other hand, the Bidirectional ST algorithm [5] finds the shortest path from initial to a goal vertex by simultaneously running two searches. The forward search is performed with initial vertex and the backwardsearch is done with goal vertex. This algorithm can be shape up by four aspects pointed as Data preprocessing, improving the evaluation function, improving the structure of internal data,improvingthe way of search. And the simulation of this algorithm visualizes that the higher efficiency are achieved in large scale [5] networks with linear time complexity.

Location are depend on users behavior and the concept Next Place[10],a location prediction technique which forecast the next location with arrival and residence time based on nonlinear time series analysis. It is a pervasive application that has the capacity to predict the future location of the people and presents different location in spatiotemporal [8] point of view. They will extract place via GPS data or Wifi logs. The order-k running average predictor is used to estimate the future values with duration time

of last k visit and interval between k visits to be averaged. The average value is used to obtain a prediction result of future visits. The process which is used to find the next location of the moving object with certain accuracy level is termed as Where Next[9]. They present a decision tree to plan a formal training and test process. The GPS-equipped portable devices record the latitude and longitude position and transmit their trajectories to a collecting server. Some wireless or mobility infrastructure collects the traces which represents a trajectory of a moving object in a sequence of time-stamped locations. It is demonstrated that by using a set of thresholdsittunestheenduserwithaccurateresults.

The Location of a device which plays a role in fetching a spatial [8] terms that can be retrieved either by the Satellites or by the Service Provider Network of Mobile Phones [2]. The location granularityofthecellphones canbeenhancedbythe GPS then it acquires and stores the satellite location information via the cellular networks. Moreover the Android based mobiles with GIS provider has the ability to get relevant information about the location which the user is looking for and it utilities the services of GPS, Google maps, Location Based Service and LCS. Here the GIS provider will be considered as the Google maps with its API. The GIS basedtechniquethatmeasurespatial[8]distributions, accessibility and proximity of healthcare facilitieswith empirical and scientific techniques. In LBS system the android based system offers a number of objects to handle maps, where the Map view is used to display themap.Eventhough the location is gained with the help of location based services using android based operating systems [3]. We cannot identify the traces of global coordinates with this system so, it can achieved only through the network of GPS that obtains the location of the user. In this paper, the method used to extract a kind of location based services with the help of GIS along with some



services that makes to further enhancement to locationprediction.

3 ANALYSIS OF GPSACCURACY

This analysis presents the accuracy of the GPS system. The accuracy presents the possibility to predict the exact location of system. The GPS is a system which usually has less accuracy compared to Glocal . In GPS accuracy is calculated at different situation and it also depends on the precision of the system. The accuracy and precision may be low or high which differ in various environment. It creates a diagrammatic representation as circle for different accuracy and precision of GPS.

For high accuracy with high precision it is plotted in the center of the axis and in high accuracy with low precision it is plotted in the center of the axis. For low accuracy with high precision it isplotted in positive axis and in low accuracy with low precision it is plotted in negativeaxis.

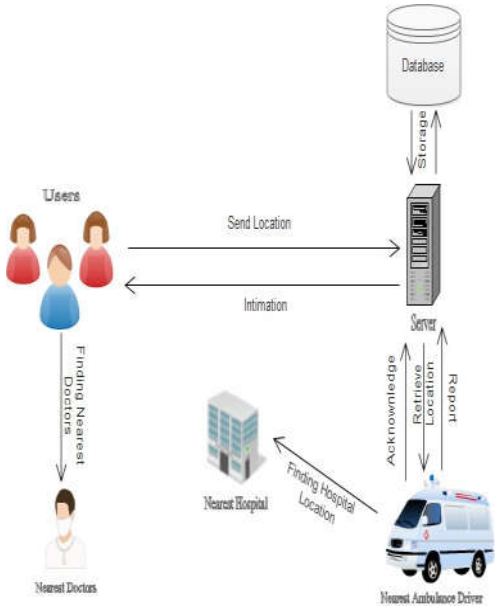
4 GLOCAL - A GLOBALPOSITIONING LOCATIONPREDICTION AND COMMUNICATION USINGGIS

In this section, we present an advanced approach of GPS called Glocal along with GIS support which predicts the user exact location with source and destination is proposed. The enhancement of Global Positioning System (GPS) can be termed as Glocal . The Glocal name indicates „think GLObally and act loCALly'which means it can be accessed in both local as well as global coordinates with consistent data.

SYSTEMARCHITECTURE

The goal of Glocal is to identify exact location of the user for secure location based service. It fetches the location through latitude and longitude value with the help of GIS. The Geographic Information System (GIS) is based on the field of science known as Geographic Information Science that provides knowledge of data collection and processing. It provides different types of data within one map. The accuracy of the Global Positioning for mobile phone system is less. The Global Positioning System which reduces the accuracy of satellite signals that is overcome by Wide Area Augmentation System (WAAS). The WAAS is a process of providing

integrity, availability and accuracy to the GPS system. In real time environment, we need communication between the user at the emergency situation. Due to lack of proper communication it creates several problems to the user, which it solved by this architecture. Moreover, Location prediction is also difficult nowadays that can be overcome by this architecture. In the communication process a proper acknowledgement cannot be gained by the sender and receiver. But this architecture produces the report and sends the acknowledgement to the sender via receiver. Navigation is one of the major problem which has various approaches but still it cannot be rectified. With the help of this architecture along with GIS where we use K-nearest algorithm to find the location which can easily navigate the location of the user. This architecture produces many advancements



that includes time delay reduction and higher location precision prediction.

Our architecture contains a user and driver application where communication is made between them during a emergency situation. The server which acts as intermediate between the user and driver for providing locations. Initially the user sends a request to the deployment server with the help of GPS which uses location service for binding the latitude and longitude [2][3] values.

The server passes the received value to the driver's application where the driver retrieves the user location with the help of geocode [6] that converts the values into corresponding address and the GPS sends back the desired location of the driver to the server. Once the location is retrieved a polyline Google map is drawn from the user location (source) to the driver's exact location(destination)wherea marker will be shown on the map for easy access. Then, the driver sends the immediate response to the user application as report via server for acknowledgement. Then, the user application finds the nearest doctor and driver application finds the nearest hospital. The GIS is responsible for fetching the nearest hospitals as well as doctors and uses k-nearest algorithm with the help of Google Map API for finding it. The API [2] is provided by the central component of the location framework known as Location Manager System Service. Finally,the

nearest and exact locations are fetched with the help of GIS using Glocal .

This application is one touch emergency calls for Ambulance - which will locate the user through Google maps (Integrated). The user can checkfordoctorsnearbytoattendforanyemergency medical condition with the help integrated Google maps. It's a simple application that helps you to track your own locations and send the details to driver through server. This application works with GPS (Global Positioning System) where with the help of GIS (Global Information System) it fetches the near by doctor's exact location and also nearby hospitals. Just give the time intervals to record the location and save it to the database, and ambulance driver will get the notification. This application won't load any of our personal data/locations and it just store the locations in your phone. View your complete locator points on map from source to destination. Share your current location with one click. Location based services [3][6] andgeographical information [1] current information services such as those on the web and a smobile apps, the GIS has achieved a greater height of developments in various fields of computing. Better database software allows the management of vast amounts for information which can be referenced to digital maps.

The main objective of this application is to get intimation about the ambulance. Thisandroid app has two application one for the user to access another one is for the driver to fetch location from user. In user application current location of the user will be listed, and that location will be send to the server, server will push the location to driver application. In which driver can retrieve the details of the user location. In this application we design and implemented a high-accuracy positioning solution for global coordinates based on GPS which provides the path for user and driver. In this application we track useraccessbehaviorofwebdocuments.andtheform of web logs are captured through user-access behavior.

For each document, the meta-information may correspond for different users to the browsing behavior. This kind of logs can be used to enhance the quality of the mining process in a way which is more meaningful to the user through application sensitive. This is because the logs can often pick up correlationsincontent,whichcannotbepickedupby the raw text alone. In proposed, design of an application in done in such a way that the user can get the ambulance with one touch access. With the help of GPS (Global Positioning System) the user desired location will pass to the server, the serverwill check the nearest ambulance driver automatically then it will pass the location to the driver's application. A path will be drawn which will intimate the userwherethedriveris.AndwiththehelpofGIS (Global Information System) driver can able get the detailsofnearesthospitalsandDoctors.Throughthis application we can able to get the details of ambulance driver. With the help of GIS we can able to get the nearest hospitals and Doctors details. With help of maps we can able to view where the driver's exact location. In existing system only contain the low level data but it contains the deep level data becausethosedataarecollect fromglobally.Satellite information is easily incorporated. Accurate positional information that is best for storingdiscrete thematic features. Increase communication, productivity & collaboration. This application is just ONE TOUCH ACCESS for user and ambulance driver.

PROCESS FLOW IN GLOCAL WITHGIS

A. Send location to server: In this module, user can send the location to the deployment server with the help of GPS (Global Positioning System). The GPS uses the location service through which the exact position gets bind up, and then passes to server. Applicationsaccesstothelocationservicessupported bythedevicethroughclasses.Thecentralcomponent of the framework is the location manager system service, which provides APIs to determine the location and bearing of the underlying device. Concerning that whether local positioning could produce precise depiction of user's real trajectories, we now fuse the outcome of geocode where latitude, longitude values arepassed.

B. GIS based nearest search: The Geographical Information system is responsible for fetching the nearesthospitalsandaswellasdoctors.The GISuses k-nearest algorithm with the help of Google places API which finds the nearest hospitals. All types of spatial or geographical data are captured and managed by GIS system. Search engine logs are emerging new type of user profiling component and it creates interesting opportunities for data mining. The development of user profiling methods creates positive preference towards search engine log with different levels of terms. The algorithm is designed in such a way that it easily fetches the nearest doctors, hospitals.

C. Retrieve location from deployment server: In this user send their location to the server with the GPS (Global positioning System) Server evaluates the received latitude, longitude value, and then the values are passed to the driver's application. Driver's application retrieves the location from the deployment server and the location of the user is viewed in map. Once the GPS estimates the desired location of drivers from the deployment server, details of the drivers is passed to server. On one hand, we suspect that such results benefit from the better transformation residual errors under larger unit distances.

D. Navigation from source to destination: Once the location is retrieved from the deployment server, a path is drawn from source to destination.

To the driver's exact location(destination).The Application Programming Interface automatically handles access to Google Maps servers, map display on the map. A Marker will be shown on to the map, which makes the easy for user and driver to get accurate location in the path. With the help map, Drivers can look specific buildings and services onto the map such as local nearby hospitals and doctors which increases the efficiency of thesystem.

E. Report and status generation: In this module, the reports are generated. The content,user description all details are thrown to the server for further process .Once the deployment server gets the location of the user, it sends the value within desired location to driver's application. If the driver gets the Users location, the driver's details are passed to the server. Easily Retrieve the Particular data into database.

DIRECTIONALGORITHM

The Direction algorithm is used to identify the direction of the user location in our system. It uses the latitude and longitude values to find the direction of the user location. Thedirection algorithm keeps track of the change in direction or angle of the mobile asset as the location data set with similar angle will not be reported. It contains the track of points includes the last sent point, the current point and the angle between the new points. The fixed decrease in the potential function is gained by the steps achieved by the direction. From the Euclidean one, the direction is viewed by descent direction as metric in the original feasibleregion.

We hereby, derive a formula by using certain constraints. Then the constraint ≥ -n is automatically strictly satisfied, and e + d must be positive foreverycomponent.Theoptimalsolutionis denoted as d (e_p^T). (dε) and the minimization on a compact set is given as (SP'(ε)) for a continuous function. The optimal solution is denoted as d(e_p^T). (dε).Then the direction is calculated by

$$\nabla_x \phi_n (e + \bar{d}(\varepsilon), z) + A^T y + \mu((\varepsilon) \bar{\varepsilon}) = 0,$$

$$A \bar{d}(\varepsilon) = 0,$$

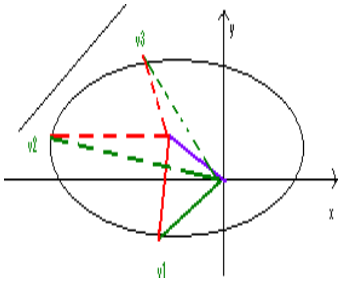
$$\mu \geq 0, \mu(\bar{\varepsilon}(\varepsilon \rightarrow \bar{\varepsilon}$$

$$\varepsilon \bar{\varepsilon}) = 0$$

RADIUSALGORITHM

The Radius algorithm handles speed changes in the mobile asset, wherein any change in speed will result in change in frequency of the data sent to the database server. Their performance considerably improves when the step-size forLMS

(or forgetting factor for RLS) is chosen according to the Doppler speed, that is the speed of a vehicle in which the receiver is located relative to the base station. A higher Doppler speed usually requires a higher step-size. However, it is not straight- forward to derive Doppler speed estimates from the received data. The radius algorithm can be represented as.



It can be calculated with different equations and we considered certain calculations to determine the radius of the distance .

The calculate are made as

5

$r_a(m) = 1 - \frac{\quad}{\quad}(2 - \quad - \quad)$

is obtained.

Now,

$E[a^2(l)] = r_a(0) = 1 - \frac{\quad}{\quad}(2 --)$

Finally,

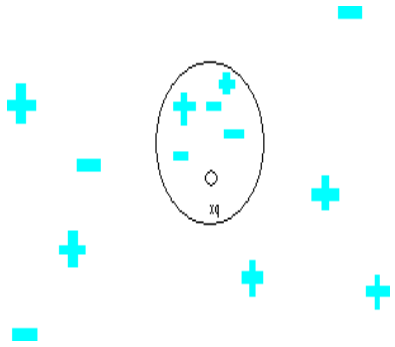
$E[\ ] = \beta^{*}(\ \frac{(\quad)}{\quad})+$

is obtained with

$\beta = \frac{\quad}{\quad}[]$ ——

NAVIGATION USING GIS: K-NEARESTALGORITHM

The K-nearest neighbor algorithm is termed as Lazy Learning algorithm which defers the decision till a new query is encountered to generalize beyond the training examples. It is a method based on the closest matching entries obtained from the training set of data objects are classified. It is similar to GIS which finds the location in the map withless distance. The sections of space are divided through its classification of training data set. We find the K nearest neighbors when a new point is classifiedfrom its training set. The measures for calculating the distance with the K -nearest neighbor contains Euclidean distance, Minkowski distance, Manhattan distance. This algorithm stores a unique features representedasvectorandtheclassofeachdatainthe training phase. The Whole distance is calculated with training data against a classified object in the classification phase. Then, the obtained result is sorted in ascending order and with the K number of selected data the closest distance is calculated Given a query instance $x_q$to be classified into k instances are denoted as $x_1,x_2,\ldots..x_k$from the training examples that are nearest to x_q. The maximum of K instances can be returned intoclasses.



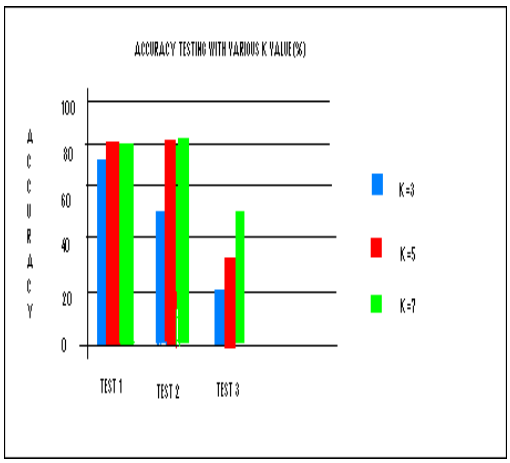
The nearest neighbor are termed as negative when the query instance x_q is given the value of k=5.Here the three of its nearest neighbor are denoted as negative. This algorithm is used to pick the nearest driver from the user location and this is done by the

deployment server. Then the K-nearest algorithm can be formulated as:

$$\Sigma()I(v=y_i)$$

Here v is considered as the class label, y_i is i-th nearest neighbor of the class label and I returns the values 0 or 1 as it is the indicator function. The several activities determine the accuracy of the K-nearest neighbor algorithm

Now we can determine the performance measure of the k-nearest algorithm with the help of accuracy testing as follows with various k values.



. The accuracy can be increased when K values are increasing order as k=3, k=5, k=7. It can be concluded that k=5 and k=7 has the best value with accuracy of 70-80%.

6 CONCLUSION

Thus, we conclude an exact method of location prediction where the application may be used for any type of emergency cases. Here the requestandresponsecommunicationwithoutsharing or storage of any personal data can be handled. Maintaining a standard step of accuracy is followed and this application is secure. Also, it enables us to identify the source and destination location that is promoting a dual side view. Moreover, GPS is supported my many concepts which enables to meet many opposing challenges. This accuracy is improved by using the user trajectories also which is an important part forprediction.

7 FUTUREENHANCEMENT

We can enhance this application by using Google street maps instead of Google maps. As Google street maps has more wider view of navigation. This is an upcoming trend which is now majorly used small applications. We can extend this toglobalusageforviewingthecloserviewofanarea by an individual user itself. This ongoing work can assist accurate navigation prediction in unmanned aircraft and shippingprocess.

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