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BLACK SPOT NOTIFICATION ON MOBILE PHONES OF TRAVELLERS

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Abstract— Now a day's road and transport has become an integral part of every human being. Black Spot is a place where road traffic accidents are historically been concentrated. Travellers may not be aware of black spot regions on their way earlier. The road side sign boards are often placed only at the spot. This Paper presents an application which will alert the travellers regarding the black spot areas before few meters away from it. In the proposed system the mobile application will be developed which can capture the GIS based location of the user and alert them of nearby black spot on user's mobile phone. From the existing Accident Dataset, the black spot area will be obtained by using weighted severity index and accident density method.

Keywords— Black spot, Weighted severity index, accident density method, Geofence, GIS location.

I. INTRODUCTION

Now a day, road safety has become a major concern throughout the world. Road accident is a pressing problem leading to live loss, property loss and severely impacting the society. Based on the recent statistics, more than one million people were died due to road accident, and approximately twenty to fifty million people were physically disabled as a result of Road accident for the past few years. As Transportation increases, on the other hand accident rate also increased steadily. The main cause of road accidents deals with various parameters such as road type, vehicle fault, drunken drive etc. Beside all these reason the lack of proper road side sign boards plays a vital role in accident count. The road side sign boards indicating the accident spots were placed only at the exact spot, so the drivers were not aware of the black spot areas on their way. Road accident cannot be totally avoided but by using suitable traffic engineering safety plan and management measures, the accident rate can be reduced. The algorithm to filter out black spot region from the large accident Dataset will be obtained by using Accident severity index and Accident density method is given in section IV. The user interface which we developed is also showcased and the goals we have achieved and which we desire to fulfill in the near future are pointed out in section IV.

II. LITERATURE REVIEW

Mr. Sandeep Verma, Jubed Khan has done the Accident black spot identification for NH.86 District Sagar, Madhya Pradesh. The identification Analysis was done with the data from 2012 to 2016. They carry out analysis of black spots using WSI methods; also determine Frequency of Road Traffic Accidents. Identification of each spots also best suited improvement for each black spot was discussed. They carry out detailed analysis of top ranked black spots and provide suggestion for improvement of spots. The main reason for the accident was also identified. They collected data for the last five years from concerned Police department and also inquired about accident cause to police staff of nearest police station and local people. This data were used to identify top ranked black spots. They classified the severity of Accident in to Fatal Accident, Grievous and Minor Accident. Weighted Severity Index value is calculated by the following formula WSI = (41 x K) + (4 x GI) + (1 x MI) Where K is the number of persons killed, GI is the number of grievous injuries, MI is the number of minor injuries. Weightage of the accidents is based on the Characteristics such as location of the accident, number of person injured and number of person died in the accident. The WSI and Road Traffic Accident frequency was used to rank the accident locations on selected section of national highway-86. A comparison was made based on the Road Traffic Accident occurrence between Sagar to Shahgarh study stretch of NH-86The top five spots were selected as black spots as per WSI value from the collected road traffic accident data and suggested some possible measures to improve the transportation system like increasing the radius of the horizontal carves and maintaining super elevation and also suggested to maintain Gradient according to the NH IRC standards

III. DATA COLLECTION

The Accident dataset is collected for different countries like India, Unites States, London, etc... For the past 3 years. The dataset consist of various information such as Incident Address, Date and time of accident, Geo latitude and longitude of the accident spot, severity of the accident, No. of Causalities, and road time. The data were obtained from various sites and also from Local Authorities.

The dataset consist of nearly lacks of information, which cannot be directly used for the application. Methodology for this application includes identification of black spots by correlating the physical survey with existing accident data. . In the Accident dataset, we combine the benefit of both the accident frequency and severity by counting only the number of accidents with high severity and effectiveness (higher weighting factor); fatal and severe injury accidents.

IV. METHODOLOGY

The flow of this application is a two way process, the first part includes data pre-processing and the second part talks about the implementation of the black spot application. The entire dataset cannot be considered as black spot areas, as it may contain various records with minimum weightage which will not results in better outcome. The accident severity index method is used to obtain only maximum ranked spots.

A. Accident Severity Index

The Accident Severity Index method was adopted system of assigning scores based on the number and severity of accidents in a particular location in few years.

We consider various factors such as total number of accidents in each place, number of fatal, serious and minor accidents and few parameters. This can be applied in dataset collected for past few years. The black spots were prioritized according to the severity of the location and road safety analysis was done in the identified hotspots. The concept of this method is that the number of severe or major injury accidents at a location will be given greater weight than property damage-only accidents. Accident Severity Index is a dimensionless value, which indicates the hazardous of any location. The below equation has been used:

ASI = NfWf + NsWs + NmWm Where,

Nf =No. of fatal accidents at the spot in the last 3 years. Wf=Weight assigned to fatal accident=6

Ns=No. of severe accidents at the spot for the past few years.

Ws=Weight assigned to serious accident=3 Nm=No. of minor accidents at the spot for the past few years .

Wm=Weight assigned to minor accident=1

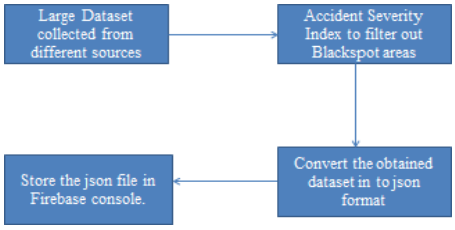

Fig.1. block diagram

B. Firebase console

The dataset obtained by applying accident severity index is stored in firebase console real time database. These dataset should be converted in to JSON format from csv file. The Firebase Real time Database is a cloud-hosted NoSQL database that allows to store and sync data between users in real time. Real time syncing makes it easy for users to access their data from any device: web or mobile, and it help users collaborate with one another. New project should be created in firebase console and the JSON file can be imported in to the real time database. Our android project should satisfy all the firebase dependencies and the authentication should be done in the firebase console. The next process is to add firebase to the android project by enabling suitable Google play services and by adding all the gradle dependencies required for the firebase.

C. Geofencing

Geofencing is a location based service which triggers any action whenever a device enters in to a set location. It is a location-based service in which an app or other software uses GPS, RFID or wireless network to trigger a programmed actions when a mobile device or RFID device enters or exits a virtual boundary created around a geographical location. Geofence API is one of the part of Google's Location API which includes geofence,geofencingRequest,geofenceApi.Geofenc e should be added to all the data values in the firebase console. We created geofence boundary for each latitude and longitude with the radius of 500 meter. The location service such as coarse location and fine location permission should be provided in order to work with geofencing. The geofence object is created using the location API's builder class. It includes different methods.

1. Create Geofence Boundary

Geofencing can be done with the help of geofence.builder function, which includes various methods like set circular region, set expiration duration, set notification responsiveness, set transition types. The method SetcircularRegion () is used to draw the virtual geofence boundary for the given latitude and longitude. It also provides methods like setExpirationDuration, setTransitionType which are used to define the geofence boundary for the period of time. We have set the geofence boundary for the radius of 500 meter, which is the circular boundary for all the given latitude and longitude. This can be achieved by using default geofencing functions like indent and setCircularRegion.

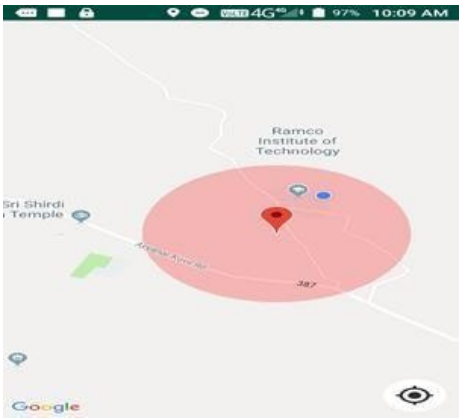

Fig.2, Geofence boundary

2. Notification Module

Geofence has a function called setNotificationResponsiveness which is used for notification purposes. It allows to set the best- effort notification responsiveness of the geofence. For instance, we can set to 300000 milliseconds; the callback will be called 5 minutes within entering or exiting the geofence boundary. However, setting a small SetNotificationResponsiveness value, for example 5 seconds doesn't necessarily mean we will get notified as soon as the user enters or exits a geofence: internally, the geofence might adjust the responsiveness value to save power when it is needed. Whenever the user enters in to the geofence boundary, they will receive the alert message

indicating the upcoming black spot on their way. The notification will be in both text message as well as voice alert. As the Application is capable of running in background, the voice

alert will be more useful for the user. Black spot application will continuously check whether the user current location is inside the black spot region, the comparison will be continued until the GPS location of the mobile phone is turned off.

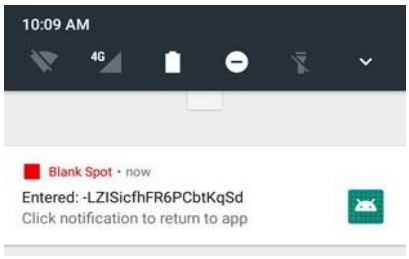

Fig.3, Black spot Notification

3. Reporting Module

Blank spot Application provides an additional feature called Reporting Module. The User can able to report the accident if they saw any accidents on their way. If more than 5 reporting were done on the same place on different date, those data will be added to the console database. They can be easily report the spot by long pressing that place on the Google map. Then it will conform the user whether they want to report the place or not. Once the user reports any location, that particular area will be added to the database.

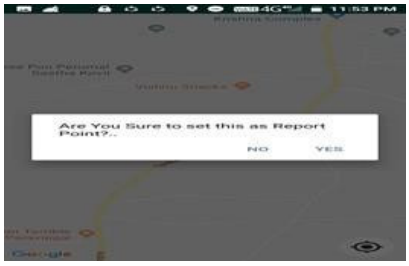

Fig.4, Reporting Module

V. CONCLUSION

This paper presents about Black spot identification and detection using Accident Severity Index mechanism and an application idea which will notify the user about the upcoming black spot in their way using Geofencing. The Accident Black spot areas were obtained based on various factors like fatality rate and grievous injuries. The application was tested and it produces 90.08 percentage accuracy.

REFERENCES

[1] M Mohammed Fayaz, Mrudula S P, Sarah Jaison George, Sherin P Yoyak, Serin Sara Roy, "Black Spot Identification Using Accident Severity Index Method", VOLUME-5, ISSUE-3, MITS,2018.

[2] Ajinkya Patankar, Prof.S.G Walunj, Anand Pimple, Darshan Kadhane, "Black spot Warning System Identification and Analysis.", Vishwakarma Journal of Engineering Research, Volume 1 Issue 4, December 2017 ISSN: 2456-8465.

[3] Mr. Sandeep Verma, Mr. JubedKhan, "Identification and Improvement of Accident Black Spots on N.H.86 District Sagar, Madhya Pradesh", International Research Journal of Engineering and Technology- Volume: 05 Issue: 02 | Feb-2018 p-ISSN: 2395-0072

[4] Sunny Tawar, Sachin Dass, "Identification of Accident Black Spots on NH-65", International Research Journal of Engineering and Technology Volume: 04 Issue: 02 | Feb -2017 e-ISSN: 2395 - 0056 p-ISSN: 2395-0072.

[5] Reshma E.K, Sheikh Umar Sharif, "Prioritization of Accident Black spots using GIS", International Journal of Emerging Technology and Advanced Engineering , Volume 2, Issue 9, September 2012).

[6] Huayun Chen, Zhuji Institute of Surveying and Mapping, Zhuji, "Black Spot Determination of Traffic Accident Locations and Its Spatial Association Characteristic Analysis Based on GIS" Journal of Geographic Information System Nov 2012.

[7] Shelendra Kumar, Hemant Kumar Agrawal, "A study on Nh-11 to find out the causes and High accident Zone between Jaipur to Sikar", International Journal of Scientific Development and Research Volume 1, Issue 5, May 2016.

[8] Apparao. G, P. Mallikarjunareddy Dr. SSSV Gopala Raju, "Identification Of Accident Black Spots For National Highway Using GIS", International Journal of Scientific & Technology Research VOLUME 2, ISSUE 2, February 2013

[9] Bairwa, H.R., 2002, ―A Study on Accident Black Spots on National Highway‖, Unpublished ME Dissertation, Department of Civil Engineering, Indian Institute of Technology Roorkee H VOLUME 2, ISSUE 2, FEBRUARY 2013.

[10] Jain, S.S., Parida, M., Chauhan, M.P.S. and Landge, V.S., 2004, ―Development of an Alternative Method for Identification of Hazardous Location‖, National Seminar on Strategies in Traffic Engineering and Management (STEM –04), Bangalore ISSUE 2-VOLUME 2 FEB-2013.

[11] Athira Mohan, Dr. V.S. Landge. Identification of Accident Black on national highway [Asian Highway-46] International Journal of Civil Engineering and Technology, 8(4) Volume 8, Issue 4, April 2017,

[12] Vivek, Rakesh saini, A Case study on "Identification and Improvement of Accident Black spots on N.H.-03 District Una, Himanchal Pradesh" International Journal Paper - Vol-2, 2015.

