Study on Road Accident Data Management System

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Abstract — Road accidents have a definite impact in terms of lives, welfare and traffic congestion, especially with increase in mobility and number of overall vehicles. At least 13 people die every hour in road accidents in India, the latest report of the National Crime Records Bureau reveals. In 2007, 1.14 lakh people in India lost their lives in road mishaps — that's significantly higher than the 2006 road death figures in China, 89,455. So it is necessary to control the accident rate. Hence accidents analysis is carried out in order to identify those areas where the accidents occurred frequently (Black Spot), Black zone, Black route etc. There are various methods used for analysis of accidents. Traditional analytical techniques deals mainly with the identification of accident sequence and seek unsafe acts or conditions leading to the accident, but it requires more time for analysis and also data cannot be uploaded on the spot. Since there are some drawbacks recent methods like web-based analysis methods can be used for analysis. Web GIS oriented platform process spatial data to provide end-users with a reliable tool to evaluate what roads have the highest accident density, the highest danger data and any other statistical indicator which can be extracted from attribute. This paper dealt with the analysis carried out for a selected corridor using RADMS which is one of the web based accident analysis method.

Index Terms — Geographical Information System, Black Spot

I. INTRODUCTION

RADMS is a fully integrated, comprehensive solution that can be used for scientific road safety management. The application is completely web-based, facilitating complete end-to-end accident data management system with built-in intelligent analysis and road safety program management functions. RADMS is backed by a powerful Geographical Information System (GIS) engine that supports multiple GIS standards. This facility helps to plot accident data on digital maps and enables in-depth GIS-based spatial analysis like corridor analysis, cluster analysis for accident black spot identification and grid analysis. RADMS is a web-based accident analysis system is the real time monitoring system. It involves public bodies like Police, transport division, Highway division etc in uploading the data which is collected on the spot. RADMS was developed by TNRSR Highways departments and maintained by Police department. Accident analysis is carried out in order to determine the cause or causes of an accident or series of accidents so as to prevent further accidents of a similar kind. It is also known as accident investigation. The analysis like strip analysis, spot intersection analysis, corridor analysis, cluster analysis etc are carried out to identify black spots, black route, black area in the major corridor of Chennai city in this study.

II. LITERATURE STUDY

Case study: 1 New York State Accident Location Information system

It is the GIS based system to identify areas of high Accident Location System and unusual concentration of Accident types to support mitigation strategies for accidents and road hazard and ensure safer roadways for NYS travelling public.

Location Editing/Simply Query Reporting (LESQR)

It is used by NYSDOT safety group. It refines location of accidents previously location coded. It helps in verifying the interested study area and also update map data available.
Location coding data:

Entry module will consist of a series of screens to front-end the location coding process. It will enable location data entry from non-map formats including electronic data streams and verification of the geographic location to the GIS base map. Operators will be able to view matched candidates for the accident location as well as error flags, and the module will assist with background geo-referenced data sets, such as location references, landmarks, plan metric quads, and digital orthophotos.

Location editing module:

It will enable authorized DMV and DOT staff to select accident records and recode their locations.

Map maintenance module:

It will provide New York State with a tool to recommend, track, and monitor requests for changes to the New York base map.

Graphical user interface:

It will have tools for viewing the current base map, to note locations for new streets, and to indicate requested modifications and changes such as road name changes, road name aliases, jurisdictional changes, addresses, railroad crossings, new landmarks, posted speed limits, and reference marker changes.

Query and report module

It will be able to produce a list of accident records that meet specific geographic requirements and then enable the display of the selected accident records in a tabular or graphical report. This tool will produce a list of accident records that meet specific geographic requirements such as reference marker, intersection, road segment(s), distance (radius) from a point, or jurisdiction.

III. CRITERIA FOR THE SELECTION OF STUDY STRETCH

A. Major accident-prone Suburban roads in Chennai

GST Road and Mount-Poonamallee Road are two of the major accident-prone stretches in the suburbs. For example, GST Road has witnessed 312 accidents, including 52 fatal ones and Mount-Poonamallee High Road and Poonamallee High Road recording 31 fatalities each while Velachery Main Road saw 37 accidents during the same period. Moreover, about 50% of all fatal accidents in the suburbs involve two-wheelers while 30% of fatal accidents either involve pedestrians or cyclists.

B. Accident rate on GST road

Statistics reveal that one-third of the total number of victims was involved in accidents on Grand Southern Trunk Road between Kathipara and Perungalathur. On this stretch, 32 people have been killed in accidents so far, and for the same period in 2011, the number stood at 46.

IV. CORRIDOR ANALYSIS ON GST ROAD

Stretch taken for analysis is from Kathipara to Vandalur. Grand Southern Trunk road is first divided into various segments (corridors) and each and every segment of the road is selected using corridor analysis tool. After selecting the corridor, run analysis to find out the high crash...
locations in the selected corridors. Analysis is carried out for a period of three years from May 2009 to May 2012.

V. ANALYSIS

1. Grand southern trunk road from kathipara to vandalur

GST road from Kathipara to vandalur is divided into 37 corridors and analysis is carried out for those selected corridors.

Corridor 1 Near Kathipara junction

Corridor 2 Near St. Thomas mount

Corridor 3 MKN road connecting with GST road

Corridor 4 Connection of Pallavanthalag subway with GST road

Corridor 5 National Airports Authority

Corridor 6 Near Cargo terminal

Corridor 7 Connection of Meenampakkam Subway with GST road

Corridor 8 Tirusulam Station

Corridor 9 Near International Airport terminal 2
Similarly the analysis was carried out in another direction from Vandalur to Kathipara and the results are arrived.

VI. FINDINGS
1. From Kathipara to Vandalur

Figure 1 reveals the percentage of accidents occurred in 18 spots of the selected corridor. The total number of accidents found is 71 from Kathipara to Vandalur.

Figure 2: Percentage of Accidents Occurred in Corridor

Figure 2 reveals the various category of accidents like fatal, Injury and Non injury and also the no of accidents that takes in the selected corridor.

2. From Vandalur to Kathipara

Figure 3 reveals the percentage of accidents occurred in 18 spots of the selected corridor. The total number of accidents found is 71 from Kathipara to Vandalur.

Figure 3: Categories of Accidents

2. Pedestrian accident

More number of pedestrians are also killed on this road due to lack of signal control, improper speed management, night invisibility due to poor lighting etc.
3. Junctions

There are many junctions along the GST road like
- Staggered junction
- T-junction
- Y-junction
- Cross junction

The basic aim should be to reduce pedestrian conflicts with vehicular traffic to the minimum. Efforts should be made to create such conditions that pedestrians are not forced to walk in unsafe circumstances.

Recommendations for the safety of pedestrians
- Providing foot over bridges
- Foot path
- Fixing cat’s eye on the major pedestrian markings on road
- Pedestrian underpass or subway
- Road markings as per IRC standards.
- Sign boards

These are the 3 ways to control the pedestrian accident,
- Pedestrian island or refuge island
- Rumble strips
- Fixing of Cat’s eye just before the crossing

VIII. CONCLUSION

Web GIS oriented platform process spatial data to provide end-users with a reliable tool to evaluate what roads have the highest accident density, the highest danger data and any other statistical indicator which can be extracted from attributes. Another example of interest is which roads are more dangerous for pedestrians as opposed to roads which are more dangerous for vehicles. The collaborative environment is an added value where future surveys update the database with new information and also it provides a single system for the three departments, including data capture, analysis, reporting and management.

In addition to this the new system, RADMS, is a comprehensive, web-based, GIS-enabled online system that facilitates end-to-end crash data management, from crash scene data collection, to final analytical outputs. It also facilitates safety management, including planning and implementation of interventions based on data

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