

Framework Analysis of Fatal Accidents and Reductions of Fatality Rate by Using Data Mining Technique

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Abstract— This project work has designed and enforced a Framework Analysis of Fatal Accidents and Reductions of death rate by mistreatment data processing Technique for Bharat which is able to alter traffic police offices and different road safety stakeholders to induce summarized on-line traffic accident data at numerous levels simply and quickly. System necessities are strictly collected from the federal police commission central traffic accident analysis department and by consulting connected literatures and software package product that area unit employed in different countries. The planning and implementation of the system is finished in accordance to the known practical and non-practical necessities. The system has completely different scheme to satisfy its core functionalities. Associate degree administration scheme authenticates directors and traffic cops to login to the system and executes their outlined task. The accident registration sub system permits the traffic lawman to enter and submit road traffic accident details employing an easy to use wizard primarily based interface. A report and question scheme allows any interested users of the system to look at some predefined reports and notice specific accident records. Furthermore the system is enforced with Amharic language interface for maximizing its usability associate degreed it can even displays an accident location on Google map.

Key words: Road Traffic Accident, National Road Accident Database System, Car Accident Data System, Web based Road Accident Reporting System; GIS- enabled Road Accident System, Car Crash Data Management System

I. INTRODUCTION

A road traffic accident (motor vehicle collision, automobile accident, automotive accident, or car/road crash) is once a road vehicle collides with another vehicle, pedestrian, animal, or geographical or branch of knowledge obstacle which may lead to injury, property harm, and generally death too.

Road traffic injuries area unit world issues touching all sectors of society. Consistent with the planet Health Organization (WHO) quite 3000 folks die on the world's roads a day, tens of countless folk's area unit black-and-blue or disabled per annum. A recent international organization Economic and Social Commission report conjointly disclosed that the quantity of road traffic accidents will increase per annum within the world which these accidents kill around a Meg folks and injures twenty three million others and eighty fifth of the fatalities occur within the developing countries.

Road accident in Asian country is one in all the worst accident records within the world, as expressed per ten, 000 vehicles. Some places may contribute a lot of to the accident than others. New Flower, takes the lion's share of the danger having higher variety of vehicles and traffic and also the price of those fatalities and injuries incorporates a

nice impact on the socio-economic development of the society. Every year, around three hundred folk's area unit killed on Addis Ababa's roads and 1500 area unit gently and seriously black-and-blue. The govt. has launched many campaigns, like "Think!" and Road Safety Campaign (RSC), to assist folks become tuned in to road issues of safety and check out to scale back road accident. Country's traffic accidents within the last 3 years, for instance, have increased by seventeen per cent and fatalities increased by ten per cent that is within the vary of 129 and a hundred forty five per 10 thousand automobiles. Matters is probably going to be even a lot of severe than shown within the statistics owing to the attainable important under-reporting.

II. RELATED WORK

The existing road accident coverage system merchandise seem normally in 2 forms as Desktop application (using Mainframe or Microcomputer) and Web-based. Recently, each sorts of the appliance classes may be additionally GIS enabled for easy mental image of accident locations and accident analysis.

Web primarily based applications are a lot of advanced and powerful for accident information access and sharing than desktop applications. Internet primarily based applications are developed on prime of international, national or regional road accident databases and created accessible through the net or Intranets. But, desktop applications are designed to run on an area information of a standalone laptop. Some internet primarily based applications are reviewed within the following sections.

A. Road Safety Management System (RSMS)

RSMS may be a merchandise from India's transportation IT systems supplier, IBS software package. It's Associate in Nursing accident management system that redefines the method road crash information is managed. RSMS permits the police to record a bunch of data concerning road crashes (in the shape of circumstances associated with humans and vehicle(s) concerned and road at the time of the crash). The software package is GIS enabled, permitting users to pinpoint the precise geographic location of the crash by directly plotting on a map or victimisation GPS handsets to get coordinates. This integrated data is then offered during a format of option to multiple stakeholders, (traffic police, road engineering departments, motorcars departments, insurance firms, healthcare, and non- government agencies concerned in road safety) which may facilitate them scientifically arrange and implement acceptable intervention measures to scale back road accidents/enhance road safety RSMS has 3 versions: one. RSMS enterprise: internet primarily based, country level application two. RSMS Lite: internet primarily based, province level application three. RSMS desktop: single, native installation as a web-based system, RSMS

facilitates straightforward information entry from multiple locations guaranteeing prepared handiness of live information for all approved users whenever needed. Since information drives higher cognitive process, delay in actions, irresponsibility and inconsistent reaching to cut back road accidents attributable to cumbersome paper-based coverage processes, inconsistent and inaccurate coverage, lack of handiness of knowledge and an important backlog would all be an issue of the past. The merchandise may be utilized by customers of each developing countries and people with mature road networks.

RSMS has six major sections: Accident Recording Engine, GIS Engine, Safety Analysis Engine, customary Reports, Dynamic customary and abstraction question Builder and Administration and Tools sections

B. TrackView

TrackView is a web primarily based application that was developed to assist enforcement agencies and insurance firms in United States of America and Canada manage and access traffic accident reports during a lot of economical manner.

1) TrackView Benefits include

- Flexible searching tools to help you find the report quickly and easily.
- Allow multi-jurisdictional data sharing and searching.
- A comprehensive system to facilitate web accessible availability of accident reports for insurance companies, officers and citizens.
- Remove the police department from the billing and request fulfilment process.
- Reports are available from work or home, 24 hours a day via the Internet.
- Reports are converted to PDF format making them easy to view, save, print and email.
- Reports are accessible usually within 24 hours of being scanned.
- Reports cannot be modified, maintaining report integrity.

C. Road Crash and Victim Information System (RCVIS)

The objective of the RCVIS is to produce governments and development stakeholders in Kingdom of Cambodia with correct, continuous and comprehensive data on road crashes and victims for the needs of raised understanding of the present road safety scenario, designing applicable responses and policy, and evaluating impact of current and future initiatives.

Traffic law enforcement officials on the most Cambodian national roads are currently equipped with GPS devices to accurately identify road crashes location. By accurately locating road traffic accidents, precise digital maps are often made and facilitate to spot black spots, a key part for understanding the character of accidents, prioritizing actions to cut back accidents and measurement progress.

D. Accident Coverage System (ARS)

ARS, GIS primarily based net application that provides details of all the road accidents in Pune [one of the biggest town found in India] region. It's a software system application developed for Traffic local department to enter all details of associate accident and precise location of the accident. Innovative use of map technology makes it doable

to look at all accidents on map of Pune. It will generate varied reports and helpful statistics supported accidents knowledge. This helps Traffic Police to spot accident prone areas and analyze causes behind accidents. Necessary action are often then taken to stop future accidents

1) An ARS Key Feature Includes

- Simple form to enter all important details of an accident such as details of people involved, vehicles involved, cause of accident, road and weather conditions.
- Detail map of Pune region with facility to Zoom In, Zoom Out and Quick Zoom. Exact accident spot can be located on the map
- Police jurisdiction boundaries are shown on the map
- Search feature to quickly find out relevant accident from all accident data
- User can specify accident parameters, form query and see results on the maps to get the insight
- At a click of button, twenty different types of reports (accident statistics) can be generated based on accident data
- All reports and results on map can be easily printed for offline use

III. METHODOLOGY

A. Data Collection

For the purpose of requirement elicitation for the new system, primary data from the federal police commission and other potential organizations such as insurance companies for their accident data recording and reporting requirements, has been collected and analyzed.

Traffic accident reporting systems designed and implemented in other countries have been also consulted for incorporating key and useful design and implementation features with the current system.

B. Significance of the Project

- The project's result could be applicable in different areas benefiting different target groups. The main beneficiaries could be the following.
- Traffic police officers are the main users of the system in registering traffic accidents, submitting or communicating it, initiating report generation and using the reports to take appropriate actions.
- Citizens, NGOs and media can get access to accident statistics and take necessary action with the help of local government.
- Insurance Companies who's insured was involved in an accident can also use the system to get current and up-to-date information about their client and take measure.
- Ethiopian Road Authority for identifying those roads which might have caused repeated traffic accidents and improve these road standards.
- Firefighting and rescue department to provide prompt rescue services.
- Ministry of Transport and Communication to identify and monitor which of those licensed drivers and registered vehicles by the ministry are causing repeated accident.

IV. SYSTEM DATA ITEMS

General Details	Road Type	Environmental Condition	Precise Location
<ul style="list-style-type: none"> Report no Year Month Date Time Region/State District code Police station no. Severity Collision Type No. of casualties No. of cars Vehicle damage cost 	<ul style="list-style-type: none"> Class of road/road no. Carriageway type/no. of lanes Speed limit Junction type Road width Road shoulder width 	<ul style="list-style-type: none"> Light condition Road lighting Road surface condition Road surface quality Weather Geometry Hit & run Road works 	<ul style="list-style-type: none"> Map reference Longitude Latitude Y-coordinate Kilometer post Location description Accident description
Vehicle/Driver details			
<ul style="list-style-type: none"> Vehicle model Vehicle type Vehicle damage Vehicle ownership Registration no. 		<ul style="list-style-type: none"> Driver age Driver sex License no. License status Seat belt/Helmet Alcohol/Drugs suspected 	
Casualty Details			
<ul style="list-style-type: none"> Type of road user Age Sex Race Severity Passenger location 		<ul style="list-style-type: none"> Pedestrian location Pedestrian movement School Pupil 	
Road Accident General Description			
1 Accident ID	24 Property Damage Cost Estimate		
2 Year	25 Photos Taken?		
3 Month	26 Severity of Accident		
4 Date	27 Weather Condition		
5 Day	28 Light Condition		
6 Hour	29 Road Separation		
7 Region/City Administration	30 Road Surface Type		
8 Zone/Subcity	31 Road Width		
9 District	32 Road Surface Condition		
10 City	33 Road Junction Type		
11 Taluka	34 Accident Type		
12 No. of Vehicles involved	35 Accident Contributing Causes		
13 No. of Drivers dead	36 Investigating Officer Name		
14 No. of Drivers with Heavy Injury			
15 No. of Drivers with Slight Injury	Description of Accident Location		
16 No. of Passengers Dead	37 Road Number		
17 No. of Passengers with Heavy Injury	38 Road Name		
18 No. of Passengers with Slight Injury	39 Accident Area		
19 No. of Pedestrian Dead	40 GPS Reading -Latitude		
20 No. of Pedestrians with Heavy Injury	41 GPS Reading -Longitude		
21 No. of Pedestrians with Slight Injury	42 Nearest KM post Reading		
22 No. of Animals Injured	43 Accident Location Distance from Nearest KM post		
23 No. of Animals Dead	44 Reference Landmark		

Accident Location from Reference Landmark	Description of Driver	
	71 Driver's Name	
Description Of Vehicle		
46 Vehicle Number	72 Sex	
47 Vehicle Name	73 Age	
48 Vehicle Age	74 Profession	
49 Vehicle Model	75 Driver Condition	
50 Vehicle Ownership	76 Injury Severity of Driver	
51 Vehicle Type	77 Driver License Number	
52 Vehicle Maneuver	78 Hit and Run?	
53 Vehicle Damage Extent	79 License Issue Place	
54 License Plate #	80 Driver's Address(Region/city Admin, Zone, City, House No)	
55 Speed-Estimated	81 Driver-Vehicle Relationship	
56 Vehicle Related Deficiency	82 Driver's Driving Experience	
57 Vehicle Damaged Parts	83 Drivers Education Level	
58 Vehicle Owner Name	84 Driver Errors	
59 Insurance Company Name	85 Nationality	
60 Insurance Policy No	Description of Injured Pedestrian	
61 Insurance Expiry Date	86 Pedestrian Number	
	87 Pedestrian Name	
Description of Injured Passenger		
62 Passenger Number	88 Sex	
63 Passenger Name	89 Age	
64 Sex	90 Address(Region/city Admin, Zone, City, Taluka, House No)	
65 Age	91 Injury Severity of Pedestrian	
66 Address(Region/city Admin, Zone, City, Taluka, House No)	92 Pedestrian Maneuver	
67 Injury Severity of Passenger	93 Profession of Pedestrian	
68 Seating Position	94 Health Condition	
69 Profession of Passenger	95 Hospital Name	
70 Hospital Name		

Table 1: Common Data Parameters in Accident Data Recording

V. ARCHITECTURE OF THE SYSTEM

At a high level, the architecture of an application defines how different parts of the system are organized and logically separated yet ensuring that they work together. The architecture used for the system is three tiers Client-Server architecture: client tier, middle/web tier and the data tier as illustrated in Figure 1. Such architecture is one of the most commonly used type of architecture for web-based applications as it provides greater application scalability, high flexibility, high efficiency, lower maintenance, and better reusability of component

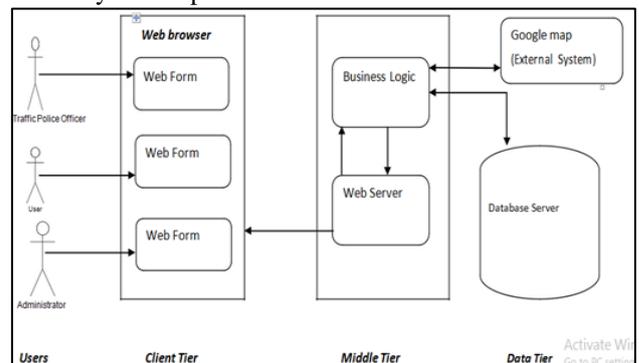


Fig. 1: System Architecture

VI. CONCLUSION

Alleviating the harmful road traffic accident desires a nationwide or perhaps world level movement and call over numerous sides of road safety. For the various stakeholders to pass the proper call and take action, organized and timely

data ought to be accessible to all or any of them. In India, the present road accident knowledge assortment, process and news task continues to be done essentially employing a manual system, nonetheless Asian nation is one in all the countries with the worst accident records within the world, particularly as expressed per ten, 000 vehicles .

In this project, we have a tendency to developed an online based mostly road traffic accident news system for Asian nation that conjointly has GIS modify feature. This sort of road traffic accident knowledge assortment, analysis and news systems area unit ordinarily employed in different countries to help all those road safety stakeholders deciding } process. Hence, traffic police offices, road engineers, insurance corporations, mass media, applied mathematics authorities, the final public etc. will simply get and share timely data from such systems.

Such a system might conjointly generate a number of the most pre-defined reports needed by the various parties mechanically in a very tabular and graphical manner. Accident records that occur at any corner of the country will simply be searched by totally different parameters. Additionally, accident locations is visualized on-line on Google map.

By this data we have a tendency to area unit reducing rate of accidents on Indian roadways.

REFERENCES

- [1] Elizabeth Kopits and Maureen Cropper, "Traffic Fatalities and Economic Growth", 2003, retrieved from http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_I_D636397_code167828.pdf on February 7, 2010.
- [2] Getu Segni, " Causes of Road Traffic Accidents and Possible Counter Measures on Addis Ababa – Shashemene Roads", MSC thesis, Department of Civil Engineering, Faculty of Technology, Addis Ababa University, 2007.
- [3] Andrew Greasley, "A redesign of a road traffic accident reporting system using business process simulation", Business Management Process Journal, Vol.10, No.6, 2004, pp.635-644.
- [4] Fanueal Samson, "Analysis of Traffic Accident In Addis Ababa: Traffic Simulation", MSC thesis, Department of Mechanical Engineering, Addis Ababa University, Faculty of Technology, 2006.
- [5] "Estimating Global Road Fatalities", retrieved from http://www.factbook.net/EGRF_Regional_analyses_Africa.htm on February 5, 2010.
- [6] Stein Lundebye, " Road Accident Analysis by Microcomputer", 1991, retrieved from <http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-119275973157/td-rd5.pdf>, on February 7, 2010..
- [7] Asian Development Bank, "Road Accident Data Systems", retrieved from <http://www.adb.org/Documents/Books/Road-Safety-Guidelines/chap4-2.pdf> on March 18, 2010.
- [8] Josef Mikulik et al., "PIARC: Road Accident Investigations Guidelines for Road Engineers", 2007, retrieved from http://www.irfnet.ch/files-upload/knowledge/piarc_manual.pdf on March 21, 2010.
- [9] Peter Elsenaar, Samar Abouraad, "Road Safety Best Practices Examples and Recommendations", 2005, retrieved from <http://www.grsproadsafety.org/themes/default/pdfs/Road%20Safety%20Best%20Practices.pdf>, on March 12, 2010.
- [10] Breton, P. L., & Vervialle, F. "Multivariate Analysis Applied to the French Accidents Database as A Multilevel Accidents Register. Road Safety on Four Continents", 5-7 October 2005, Warsaw, Poland.
- [11] "RCVIS", retrieved from <http://www.roadsafetycambodia.info/action2> on March 22, 2010. [31] "GIS Based Accident Reporting System", retrieved from <http://www.indictranstech.com/gu/ars> on March 21, 2010.
- [12] Analysis of Road Traffic Fatal Accidents Using Data Mining Techniques Liling Li, Sharad Shrestha, Gongzhu Hu Department of Computer Science Central Michigan University, USA (li8l, shres1s, hu1g)@cmich.edu, 2016