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Development Of Crash Prediction Model Of Mid Size City And Accident Analysis

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ABSTRACT

In most cities and towns, the majority of crash black-spots occur at major intersections. Given this, crash reduction studies often focus on the major signalised intersections. However, there is limited information that links the phasing configuration, degree of saturation and overall cycle time to crashes. While a number of analysis tools are available for assessing the efficiency of intersections, there are very few tools that can assist engineers in assessing the safety effects of intersection upgrades and new intersections. Separate models were built for peak periods and for motor vehicles and pedestrians. The key crash types that were analysed were right-angle, right-turning, lost-control and rear-end type crashes.Considerable research has been carried out in recent years to establish relationships between crashes and traffic flow, geometric infrastructure characteristics and environmental factors for two-lane rural roads. Crash-prediction models focused on multilane rural roads, however, have rarely been investigated. In addition, most research has paid but little attention to the safety effects of variables such as stopping sight distance and pavement surface characteristics. Moreover, the statistical approaches have generally included Poisson and Negative Binomial regression models, whilst Negative Multinomial regression model has been used to a lesser extent. Finally, as far as the authors are aware, prediction models involving all the above-mentioned factors have still not been developed in Italy for multilane roads, such as motorways. Thus, in this paper crash-prediction models for a four-lane median-divided Italian motorway were set up on the basis of accident data observed during a 5-year monitoring period extending between 1999 and 2003. The Poisson, Negative Binomial and Negative Multinomial regression models, applied separately to tangents and curves, were used to model the frequency of accident occurrence. Model parameters were estimated by the Maximum Likelihood Method, and the Generalized Likelihood Ratio Test was applied to detect the significant variables to be included in the model equation.The developed methodology and results can be used to incorporate safety into long range transportation plans and land use decisions so as to minimize anticipated crashes in the future. The models developed using the methodology can also be used to examine the effect of changes in land use characteristics (new development or re-zoning) on safety. Road safety is the main concern in many developing countries including India. Road accidents are influenced by many factors and the factors that influence road accidents interact in obscure ways which are not easily identified. Hence, factor analysis is used to classify observed variables into several groups and also to reduce the number of observed variables to a smaller set of factors. In this study, factor analysis is used to analyze the correlation among observed variables in order to estimate and describe the number of fundamental dimensions that underlie the observed data. The model suggests that road factors and traffic factors, both exhibit strong correlations among themselves and are also strongly related to traffic accidents.Most research has been carried out about crash modeling but there is little attention to the urban highways. The candidate's set of explanatory parameters were: traffic flow parameters, geometric infrastructure characteristics and pavement conditions. Statistical analysis is done by SPSS on the basis of nonlinear regression modeling and during the analysis, principal components are identified to assist the principal component analysis method and more important variables recognized that could indicate the best description of crash occurrence on the basis of available logics. The presented models show that the crashes occurrence increase with the increase in each of section length, peak hour volume and longitudinal slope variables whereas it is decreased with the decrease of curvature. The remarkable result in this study was the effect of longitudinal slope variable on the crash occurrence.

INTRODUCTION

Accidents have been a major social problem in the developing countries of world for over fifty years. It is strongly felt that most of the accidents being a multi factor event, are not merely due to drivers fault on account of driver's negligence or ignorance of traffic rules and regulations, but also due to many other related factors such as abrupt changes in road conditions, flow characteristics, road user's behavior, climatic conditions, visibility and absence of traffic guidance, control and management devices. In the above context an attempt is made to study various types of accidents including causative factors and black spot identification in Guntur area of Hyderabad

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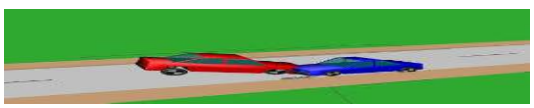
city. The study involves collection of accident data from various police stations for the period of four years. Based on the collected data various models were developed. A fuzzy logic, Sensitivity Analysis, SPSS techniques used for development of accident prediction models. A comparison was made among various models and found that a fuzzy logic model gives the best prediction model. Further, black spots identification has done by quantum of accident method.The majority of the bigger intersections in our urban areas have signalised controls. In most cities the majority of crash black-spots occur at major intersections. While crash reduction studies often focus onthe major signalised controlled intersections, there is little information that links the phasing configuration of signals, degree of saturation of each movement, and overall cycle time to crashes. Most changes to the signal phasing, other than right-turning phases, occur for efficiency reasons. Safety improvements tend to focus on other factors such as conspicuousness of the signal displays, the amount of inter-green time, and the skid resistance of the pavement. Crash estimation models are extremely important for transportation planning and are frequently used in transportation safety studies.



Accident is an unexpected event that interrupts the completion of an activity. The Predictable accidents are avoidable and unpredictable accidents are unavoidable. Road crash fatalities and casualties have been increasing over the past twenty years. The problem of road accidents around the world is increasingly becoming the main concern of the general public, particularly those in relevant government agencies such as the Ministry of Transport, Ministry of Works and the Traffic Police. It is a known fact that India has one of the highest accident rates in the world. The reasons are high population, rapid growth of motor vehicles in the recent past and the inadequacy of road systems and narrow streets dominated by slow moving vehicles.

LITERATURE REVIEW

Early crash analysis models were generally based on simple multiple linear regression methods assuming normally distributed errors. However, researchers soon discovered that crash occurrence could be better fitted with a Poisson distribution. Hence, a Poisson regression model based upon a generalized linear framework was soon adopted over conventional multiple linear regression techniques. Several such Poisson regression approaches for exploring the relation-ship between the risk factors and crash frequency have been proposed.Yannis T.H. (2014) was presented A Review of The Effect of Traffic and Weather Characteristics on Road Safety. Despite the existence of generally mixed evidence on the effect of traffic parameters, a few patterns can be observed. For instance, traffic flow seems to have a non-linear relationship with accident rates, even though some studies suggest linear relationship with accidents. Regarding weather effects, the effect of precipitation is quite consistent and leads generally to increased accident frequency but does not seem to have a consistent effect on severity. The impact of other weather parameters on safety, such as visibility, wind speed and temperature is not found straightforward so far. The increasing use of real-time data not only makes easier to identify the safety impact of traffic and weather characteristics, but most importantly makes possible the identification of their combined effect. The more systematic use of these real-time data may address several of the research gaps identified in this research. K. Meshram and H.S. Goliya (2013) were presented an analysis of accidents on small portion NH-3 Indore to Dhamnod. The data for analysis is collected for the period of 2009 to September 2011. More accidents occurred in Manpur region by faulty road geometry. The trend of accidents occurring in urban portion (Indore) is more than 35 % to rate of total accidents in each year.This may due to high speeds and more vehicular traffic. In the present study area the frequency of fatal accidents are 2 in a week and 6 for minor accidents in a week. More number of accident observed in 6 p.m. to 8 p.m. duration because in that time more buses are travels between villages and city. One fatal and five casualties are occurring per km per year in the study area. The volume of the trucks passing through study

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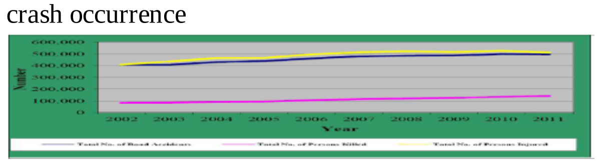
corridor is increasing by year. At Rajendra Nagar from 2000 onwards the traffic is reduced due to the construction of by passes in that area. RakeshMehar and Pradeep Kumar Agarwal (2013) were highlighted the deficiencies in the present state of the art and also presents some basic concepts so that systematic approach for formulation of a road safety improvement program in India can be developed. The study presents basic concepts to develop an accident record system, for ranking of Safety hazardous locations, for identification of safety improvement measures and to determine priorities of safety measures. It is expected that this study will provide a systematic approach for development of road safety improvement program in India and thus pave the way for improving safety on Indian roads E.S.Park et al (2012) studies the safety effect of wider edge lines was examined by analyzing crash frequency data for road segments with and without wider edge lines. The data

Fuzzy Logic Techniques: The fuzzy logic approach seems very suitable for dealing with uncertaintyphenomena; although the use of probabilistic techniques was higher than the use of fuzzy techniques for safety issues (Serrano, et al. 1999). Serrano et al (1999) recommended to the researchers to use the fuzzy set technologies if the study must deal with vague knowledge or needs to communicate with the user in a more human like way. In General, the fuzzy logic might be helpful for very complex processes, when there is no simple mathematical model for highly nonlinear processes. Fuzzy Logic is not needed whenever there is an analytical closed form model that, using a reasonable number of equations, can solve the given problem in a reasonable time, at the reasonable costs and with higher accuracy. The fuzzy approach requires a sufficient expert knowledge for the formulation of the rule base, the combination of the sets and the defuzzification

Black Spot Identification Methods: Accident prone locations on the roads are those places, where accidents often appear to cluster or concentrate. These stretches are termed as "Black Spots". Studies conducted in the developed countries show that identification and improvement of black spot locations reduces the occurrence of accident significantly. The broad techniques for the identification of black spot may be categorized as Statistical methods, bio-medical engineering methods, engineering methods, subjective assessment techniques, empirical bayes method.

A range of basic laws have been put forth to help explain the relationship between the occurrence of road crashes and potential risk factors, such as: the universal law of learning, which implies that the crash rate tends to decline as the number of kilometers travelled increases; the law of rare events, which states that rare events, such as environmental hazards, would have more effect on crash rates than regular events; and the law of complexity, which implies that the more complex the traffic situation road users encounter, the higher the probability of crash occurrence



A traffic accident may have many contributing factors, such as those related to driver behavior, road geometry, traffic volumes, vehicle, and environment. The influence of such variables on crash occurrence could significantly vary on a case-by-case basis, but in general, both behavioral factors related to the driver's errors, and non-behavioral factors related to

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road geometry, traffic flow conditions, vehicle, and environment are thought to significantly affect traffic crashes . Research has revealed that there are generally six major groups of risk factors affecting traffic crash occurrence

THE COSTS OF ROAD TRAFFIC ACCIDENTS

The highest cost of traffic crashes is in the loss of human lives; however, society also bears the consequences of many costs associated with motor vehicle crashes. Highway crashes currently cost the India about 69423.2 billion a year, approximately 5.0 percent higher than 2000. Total costs include both economic costs and societal harm . In the year 2016, 3.9 million people were injured and 32,999 killed in 13.6 million motor vehicle crashes in the India. The economic costs of these crashes totaled 15584.8 billion including lost productivity, medical costs, legal and court costs, emergency service costs, insurance administration costs, congestion costs, property damage, and workplace losses. The 15584.8 billion cost of motor vehicle crashes represents the equivalent of nearly 50789.6 for each person living in the United States, and 1.6 percent of the 963.424 trillion India. Gross Domestic Product for 2016 .When quality of life valuation is considered, the total value of societal harm from motor vehicle crashes in 2016 was 53838.0 billion, roughly three and a half times the value measured by economic impacts alone. Lost market and household productivity accounted for 4958.80 billion of the total 15584.8 billion economic costs, while property damage accounted for 4894.4 billion. Medical expenses totaled 1481.2 billion. Congestion caused by crashes, including travel delay, excess fuel consumption, greenhouse gases and criteria pollutants accounted for 1802.3 billion. Each fatality resulted in an average discounted lifetime cost of 90.6 million. Each critically injured survivor cost an average of 64.4 million The importance of accident prevention does not end with the accident investigation process. An accident analysis program is equally important in establishing trends and curbing future accidents. When accident investigation and accident analysis programs are rigorously applied together, identifying problem areas and decreasing risk becomes easier and more effective.

Case	Age	Restraint type	Seating position	MAIS (Body region)	PDOF/Δv (km/h)	Object hit
1	9	Adult seat belt	Rear nearside	2 (Head)	12/44	Car
2	10	Adult seat belt	Front seat	2 (Head)	12/Unknown	Car
3	7	Adult seat belt	Front seat	2 (Upper extremity)	12/47	Car
4	10	Adult seat belt	Rear offside	2 (Upper extremity)	1/32	Car
5	11	Adult seat belt	Rear nearside	2 (Upper extremity)	1/50	Car
6	12	Adult seat belt	Rear nearside	2 (Abdomen)	12/Severe	Car
7	11	Adult seat belt	Rear nearside	2 (Abdomen)	1/50	Car
8	7	Adult seat belt	Front seat	2 (Abdomen)	12/43	Car
9	10	Adult seat belt	Front seat	3 (Upper extremity, lower extremity)	12/Unknown	MPV or LGV
10	12	Adult seat belt	Front seat	3 (Thorax)	12/Unknown	Car
11	6	Adult seat belt	Rear nearside	3 (Abdomen)	1/53	Car
12	11	Adult seat belt	Front seat	3 (Abdomen)	12/79	Car
13	8	Booster cushion	Rear nearside	2 (Head)	12/31	Car
14	8	Booster cushion	Rear nearside	4 (Head)	12/Unknown	Car
15	7	Booster cushion	Rear nearside	4 (Neck)	12/Unknown	Wide object (>41cm)

Restraint type	Total	MAIS0		MAIS1		MAIS2		MAIS≥3		Unknown	
		n	%	n	%	n	%	n	%	n	%
Booster seat	7	1	14.3	5	71.4	0	0	0	0	1	14.3
Booster cushion	16	1	6.3	8	50	1	6.3	1	6.3	5	31.3
Adult seat belt	149	20	13.4	107	71.8	8	5.4	5	2.7	9	6
Other restrained	6	1	16.7	2	33.3	0	0	1	16.7	2	33.3
Unrestrained	29	6	20.7	15	51.7	4	13.8	3	10.3	1	3.4
Unknown	70	17	24.3	36	51.4	4	5.7	3	4.3	10	14.3
Total	**277**	**46**	**16.6**	**173**	**62.5**	**17**	**6.1**	**13**	**4.7**	**28**	**10.1**

Bicycles' Role In Road Accidents Cycling, as an active mode of transportation, have well-established health benefits. However, the safety of cyclists in traffic remains a major concern. In-depth studies of potential risk factors and safety outcomes are needed to ensure that the most appropriate actions are taken to improve safety. Bicycle accident analysis require to conduct an in-depth collision analysis and identify the collision causation and contributing factors in different types of collisions, including the role of the driver(s), cyclist, vehicle(s), road-way and the environment. The results of the accident reconstructions are useful in developing recommendations for making transport infrastructure and vehicles safer. This paper is concentrated on the cyclist-vehicle collision to identify the role of cyclist in accidents and technical reasons of accidents. A cyclist, as defined for the purpose of this article, is

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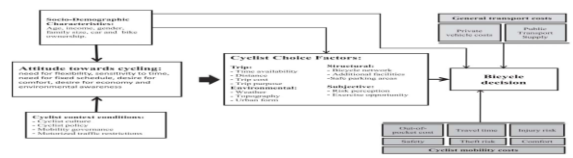
any person on bicycle, who is involved in a motor vehicle traffic crash.



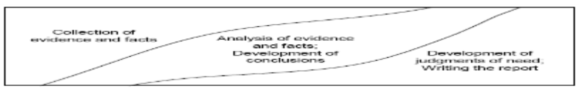
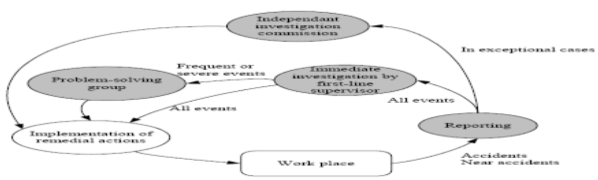
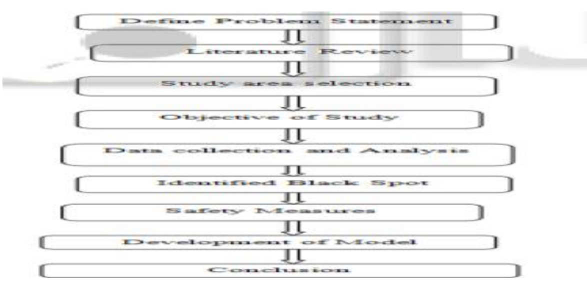


Figure 1. Three phases in an accident investigation.





The first step in methodology is to define problem statement; it covers the subject of work. The next is literature review, in this step the previous years' works on that subject are collected and has been studied carefully. The third step is to select study area for implementing thought of work and it should besuitable forthe objective. After the selection of study area the objectives of work should be decided. For achieving that goal the data collection and data analysis is going to be carried out. Once the data analyzed, on the bases of analysis results some remedial measure for road safety is going to be suggested. Last step is to give conclusion of this complete work done.

• The traffic accidents data used in this research was obtained from the police station of Miryalaguda for the year of 2012. There are total 16 police stations in Miryalaguda from where all
FIRs have been collected.

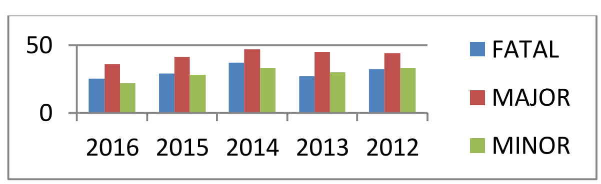
• All the details regarding accidents was filled in that accident recording form with proper coding for analysis. The information included were FIR number, Accident date and location, Collision type, Collision spot, Single vehicle accident, Hit & Run ,Number of occupant, number of fatality and injuries, vehicle type, and the data related to victim like age, sex, gender, injury etc.

• In all, 192 pedestrian crashes and 62 bicyclist crashes in the year 2012.

The intent of this study is to explain the procedure which was adopted in the present study.

DATA COLLECTION AND PRELIMINARY ANALYSIS

Guntur consists of all the outskirts and semi urban areas of the Hyderabad city in Telangana State. The various places covers under this area such as Madhapur, Kondapur, Gachibowli, Uppal, Medchal and Shamshabad etc. come under Guntur. Guntur is surrounded the Hyderabad City on all sides. In other words, the area around the Hyderabad that has been developing lately is called as Guntur. With the aggressive promotion of some areas of Guntur, there have been extensive investments in luxurious residential townships, technological infrastructure such as Hitech city and many other IT and ITES companies. Area and Population of Guntur is approximately 3600 sq.km and 7 million. As per Telangana State statistical records, Guntur registered highest number of road accident cases followed by Hyderabad cit. The seven years accident data district wise is presented in Table 1.



STUDY AREA: National Highway 65 (NH 65) is a National Highway in western India. NH-65 is connected GUNTUR to HYDERABAD. It runs for a distance of 270.9 km of which 200 km is in GUNTUR and 40 km is in HYDERABAD.. Study

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area is selected from PIDUGURALLU to MIRYALAGUDA section of N.H.65. It is located in TELANGANA state. It is a two lane undivided rural highway. Length of this highway section is 32 km. The study area is surrounded by villages, industries, market, colleges etc. It is unsafe from safety point of view. The main reason is local traffic has direct access to the National Highway, which results in congestion and accidents.

Miryalaguda is a city in Nalgonda district of the Indian state of Telangana. Total, 28.36 km^2 (10.95 sq mi). Population (2011). • Total, 104,891according to 2016 census.

GEOGRAPHY

Miryalguda or Miryalaguda is located at 16.8667°N 79.5833°E.[6] It has an average elevation of 105 metres (344 ft). It is around 140 km from Hyderabad/160 km from Vijayawada,120 km from guntur,180 km from Warangal.

DEMOGRAPHICS

As of 2011 census, Miryalaguda had a population of 109,891. The total population constitute, 55,136 males and 54,755 females —a sex ratio of 995 females per 1000 males. 10,435 children are in the age group of 0–6 years. The average literacy rate stands at 82.09% with 76,693 literates, significantly higher than the district average of 64.20%.[3][7]

CULTURE

TYPES OF ACCIDENT

STRUCK-BY:-. A person is forcefully struck by an object. The force of contact is provided by the object. Example – a pedestrian is truck by a moving vehicle.

STRUCK-AGAINST:-. A person forcefully strikes an object. The person provides the force.
Example -- a person strikes a leg on a protruding beam.

CONTACT-BY.:-Contact by a substance or material that by its very nature is harmful and causes injury.
Example -- a person is contacted by steam escaping from a pipe.

CONTACT-WITH:-.A person comes in contact with a harmful material. The person initiates the contact. Example – a person touches the hot surface of a boiler.

CAUGHT-ON:-. A person or part of his/her clothing or equipment is caught on an object that is either moving or stationary. This may cause the person to lose his/her balance and fall, be pulled into a machine, or suffer some other harm.
Example -- a person snags a sleeve on the end of a hand rail.

CAUGHT-IN. :-A person or part of him/her is trapped, stuck, or otherwise caught in an opening or enclosure.
Example – a person's foot is caught in a hole in the floor.

CAUGHT-BETWEEN.:-A person is crushed, pinched or otherwise caught between either a moving object and stationary object or between two moving objects.
Example -- a person's finger is caught between a door and its casing.

FALL TO SURFACE:-. A person slips or trips and falls to the surface he/she is standing or walking on.
Example – a person trips on debris in the walkway and falls.

FALL-TO-BELOW. :-A person slips or trips and falls to a surface level below the one he/she was walking or standing on.
Example -- a person trips on a stairway and falls to the floor below.

EXERTION.:-Someone over-exerts or strains him or herself while doing a job.
Examples -- a person lifts a heavy object; repeatedly flexes the wrist to move materials, and; a person twists the torso to place materials on a table. Interaction with objects, materials, etc., is involved.

BODILY REACTION.:-Caused solely from stress imposed by free movement of the body or assumption of a strained or unnatural body position. A leading source of injury.

Example - a person bends or twists to reach a valve and strains back.

EXPOSURE.:-Over a period of time, someone is exposed to harmful conditions.

Example -- a person is exposed to levels of noise in excess of 90 dba for 8 hours.

ATA DESCRIPTION

A 5-year monitoring period extending from 1999 to 2003 was carried out on a four-lane median-divided motorway. This infrastructure was 46.6 km long, and the horizontal alignment contained tangents and circular curves without any transition curves. Vertical alignment consisted of gradients and circular curves. During the period of observation, crash data, traffic flow pavement surface conditions and rainfall data were collated. Accident data were extracted from the official reports of the Motorway Management Agency (MMA). For each accident a variety of details was recorded, including date and location of accident, horizontal alignment (tangent or curve), vertical alignment (upgrade or downgrade), weather and pavement surface conditions (dry or wet), type and severity of accidents, number of vehicles and persons involved, and a short description of the accident dynamics. Some 1916 accidents were considered in this study, 21 of which were fatal and 594 were injury accidents. Since fatalities appear to be too few to be analysed alone, fatal and injury crashes were considered collectively and are referred to as "severe" crashes hereinafter. 31.1% of all crashes and 33.4% of severe crashes occurred on curves, which represent 29.7% of the total length of the motorway. Accident count data observed during the 5-year monitoring period.

Summary statistics of rain data: day counts for all road segments from 1999 to 2003

	Wet pavement	Dry pavement	Row total
With 0 crashes	32,073	449,919	481,992
With at least 1 crash	270	1,628	1,898
Column total	32,343	451,547	483,890

MODELLING ACCIDENT COUNTS

A somewhat natural way for describing the fluctuation of accident counts, say Yi, which occur on a road section i during given time intervals (e.g. different years), is to assume that Yi is
a random variable (r.v.) with the Poisson probability law. Let λibe the expected number of accidents per unit of time on section i. It is well known that a Poisson r.v. Yi has Var{Yi} = E{Yi} = λi.In many situations, however, it has been observed that accident counts appear to be "over dispersed" with respect to the theoretical variability consistent with the Poisson model. In order to account for this over dispersion, it is often assumed that the expected number of accidents per unit of time in the Poisson model is a r.v., λiθ say, where θ is assumed to be a Gamma variate with $E\{\theta\} = 1$ and $Var\{\theta\}=1/\phi$. Under this assumption, it can be readily shown that Yi is a Negative Binomial (NB) r.v.with $E\{Yi\} = \lambda i$ and $Var\{Yi\} = \lambda i(1 + \lambda i/\phi)$, thus allowing for the variance of accident counts to be greater than the mean, provided that $1/\phi > 0$. For this reason $1/\phi$ (or ϕ itself) is often called the "over dispersion parameter". Road sections do not have only accident counts, however, but also traits such as length, traffic flow, geometric design variables, environmental conditions, etc. Thus, the objective of statistical road modelling is to estimate the expected number of accidents on a given section as a function of its traits.

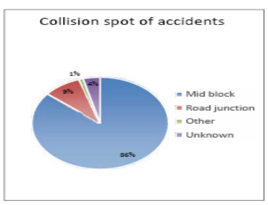
RESULTS AND DISCUSSION

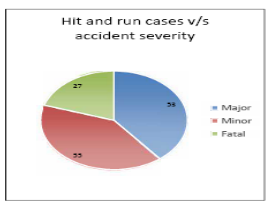
• Total 764 road accident occurred during the year of 2012 in Miryalaguda metropolitan . The biggest victim type is M2W that is 40% of total crashes and pedestrian is the second biggest victim type in road accidents having share of 28% of total road accidents and bicyclist having share of 9% of total road accident. Hence the safety of the vulnerable road user is to be given prime importance.

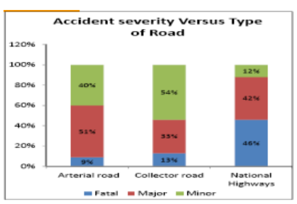
• In Miryalaguda motorized two-wheeler is the primary mode of travel and they grow up as to be the impacting vehicle for 50% of pedestrian and 66% of bicycle crashes. Hence, it is now very much necessary to encourage the public transportation system by enforcing Very high paid parking policies so that motorized two wheelers may shift to public transportation.

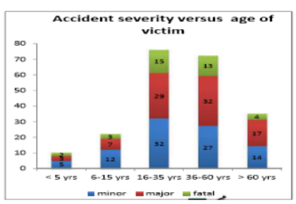
• The maximum pedestrian accident occurs on Wednesday and Thursday (i.e. 32 crashes) The minimum pedestrian accident recorded on Tuesday (20 crashes). Therefore we can say that there is no any trend observed in pedestrian accident on weekend and on week days.

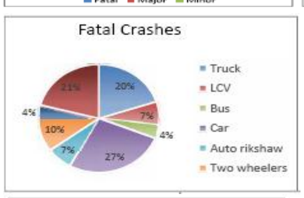
- The maximum number of pedestrian accidents occurred between 6:00 pm to 9:00 pm. The number of pedestrian accidents occurs during this time is 46, out of which 40 pedestrian accidents are severe injury crashes and 6 pedestrian accidents are fatal crashes. It is thus very much important to check the lighting scheme at regular intervals and proper maintenance of the Street lights and other lighting sources should be done.
- The maximum number of pedestrian accidents occurred while crossing the roads. Proper regulations and enforcement should be made to fill the gaps between the pedestrian psychology of crossing and the person's behavior while driving the vehicle.

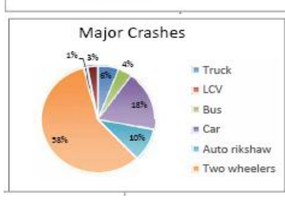


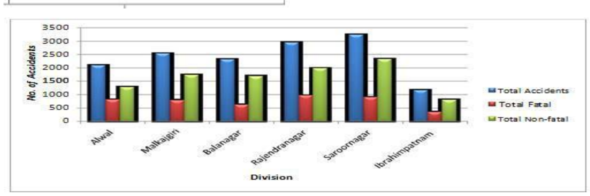




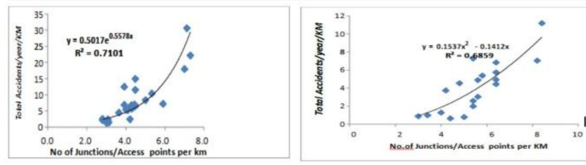




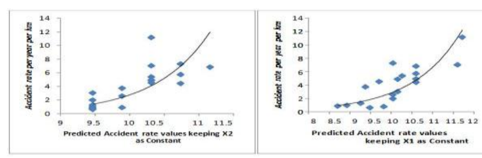


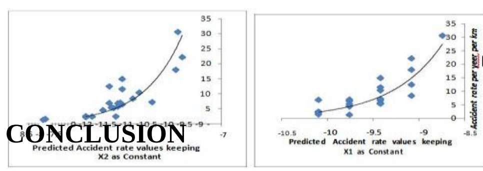


Impact Vehicle	Minor accident	Major accident	Fatal accident	Total accident
Truck	3 (4.84%)	2 (3.23%)	0	5 (8.06%)
LCV	0	0	1 (1.61%)	1 (1.61%)
Bus	1 (1.61%)	0	0	1(1.61%)
Car	6 (9.68%)	5 (8.06%)	0	11 (17.74%)
Auto rickshaw	1 (1.61%)	1 (1.61%)	0	2 (3.23%)
Two wheeler	28 (45.16%)	12 (19.35%)	1 (1.61%)	41 (66.13%)
Unknown	0	1 (1.61%)	0	1 (1.61%)
Total	39 (62.9%)	21 (33.87%)	2 (3.22%)	63 (100%)



Model	Variables Included	Coefficient	R^2	Std. Error of the Estimate	t value	Significance
A	(Constant)	-12.516	0.725	3.77401	-4.544	0
	No of Junctions/Access Points per KM	0.859			7.853	0
B	(Constant)	-8.65	0.666	4.16036	-3.313	0.003
	No of Horizantal Curves	0.825			6.845	0
C	(Constant)	-13.201	0.773	3.42804	-5.186	0
	No of Junctions/Access Points per KM	0.551			3.377	0.003
	No of Horizantal Curves	0.338			2.38	0.027





CONCLUSION

Traffic crash prediction models are very useful tools in road safety programs used by transportation agencies, police, health departments, education institutions that oversee road safety, vehicles, and the driver's education. They can be used to predict both the frequency of crash occurrence and the contributing factors that could then be addressed by transportation policies. According to the world health organization (WHO), road crashes are ranked as the ninth most serious cause of death in the world, and present the world's leading cause of death for individuals between the ages of one and twenty-nine. Each year, traffic accidents are responsible for killing about 1.25 million people and injuring approximately 50 million more. Following current trends, about two million people could be expected to be killed in motor vehicle crashes each year by 2030. The World Bank estimates that road traffic injuries cost 2.0 percent to 3.0 percent of the Gross National Product of developing countries. Given a such trend, this paper presented different types of traffic crash prediction models to gain a better understanding of the techniques used to predict road accidents and their contributing risk factors. A wide range of statistical approaches were presented including, Poisson regression, Negative Binomial regression, Zero-Inflated models, logit and probit models, and machine learning methods.The current project adds to the safety literature, not only in providing a rare case study on safety culture intervention, but also by showing some evidence for the link between leadership, safety climate, and culture. The study shows that the HSO can improve company safety culture by creating more and better safety-related interactions both within the HSO and between HSO members and the shop-floor. Results indicated a marked improvement in HSO performance, interaction patterns concerning safety, safety culture indicators, and a changed trend in injury rates. These improvements are interpreted as cultural change because an organizational double-loop learning process leading to modification of the basic assumptions could be identified. However, due to the single case design of the study it is not possible to infer causality. In this study, various factors influencing road accidents on urban roads are identified. Factor analysis has been carried out using maximum likelihood extraction method and vari max rotation method in order to find the strong correlations between the identified variables. After analysis, eight observed variables are reduced to four factors such as road/traffic factor, shoulder factor, access factor and speed factor. The study suggests that safety management can be achieved by properly studying the impact of reduced factors on road accidents. Comparable evaluation of road safety audit, Road safety Inspection and Roads safety impact assessment were the traditional methods for the road safety. Even scenario analysis is also used as an approach for the road safety. Cost and time required are the main disadvantages. In this paper we have discussed about three methods which are economic and having a better time management with a proper data provided.It is concluded that to not all the data required for the development of a crash prediction model for cyclists in Brisbane or other locations in Queensland is available and the data gaps appear to be significant and supplementary data from a range of potential data sources will be required to determine whether a crash prediction model for cyclists can be developed more work is required to obtain and utilise information and data from other sources. In this research the crash-prediction models for the three urban arterial highways in Tehran were set up on the basis of accident data observed during a 3-year monitoring period extending between 2005 and 2008. These statistics contain separate data of crash occurrences for each tangent and curve sections of highways. For each accident, a variety of details was recorded, including location of accident, horizontal alignment (tangent or curve), vertical alignment (upgrade or downgrade), weather and pavement surface conditions (dry or wet), type and severity of accidents. Finally, the parameters which are screened to study accidents quantitatively are: crash occurred count (ACC), section length (L), peak hour volume (PHV), longitudinal slope (L.s), and curvature (1/R). However, the accidents can be prevented by separating the traffic, lane separation in heavy traffic areas. Shoulder width can be increased since it gives extra support for vehicle or pedestrian movement. Proper parking facilities can be provided on the roadside and access from minor roads can be regulated. The accidents can be further prevented by imposing speed limits in the urban roads.

Limitations of the Study

The effect of traffic composition on the road is also an important factor for accident occurrence. Since the study is focusing on road geometry only, the traffic factors have not been considered.

In this study, two road geometric parameters have considered which are number of junctions/access points per km and number of horizontal curves per km.

REFERENCES

[1] Desai MM, Patel AK (2011) Road Accidents Study Based On Regression Model: A Case Study of Ahmedabad City.

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[2] Chakra borty S, Roy SK (2005) Traffic accident characteristics of Kolkata. Transport and Communications Bulletin for Asia and the Pacific 74: 75-86.
[3] Turner S (1996) Estimating Accidents in a Road network. PhD Thesis, University of Canterbury, New Zealand, pp. 6-7.
[4] E. Hollnagel, Barriers and Accident Prevention. Ashgate Publishing Ltd., 2004.
[5] N. Leveson, ―A new accident model for engineering safer systems,‖ Safety Science, vol. 42, no. 4, pp. 237-270, 2004.
[6] F. Manuele, On the practice of safety, 3rd ed. Hoboken, NJ: John Wiley & Sons, 2003.
[7] N. Leveson, Safeware: System Safety and Computers. Addison-Wesley Publishing A Company, 1995.
[8] Mohan, D. (2002) Road Safety in Less-Motorized Environments: Future Concerns.
[9] International Journal of Epidemiology, 31, 527-532
[10] Elvik, R. (2006) Laws of Accident Causation. Accident Analysis and Prevention,38, 742-747.
[11] Sawalha, Z., &Sayed, T. (2001). Evaluating safety of urban arterial road ways .Journal of
[12] a Transportation Engineering, 127 (2), 151-158.

[13] Wah, Y, B., Nasaruddin, N., Voon, W, S., &Lazim, M, A. (2012). Decision tree model for count data.Proceedings of the World Congress on Engineering, Vol. I.
[14] Zeng, Q., & Huang, H. (2014). Bayesian spatial joint modelling of traffic crashes on an urban road network. Accident Analysis and Prevention, 67, 105-112.
[15] Anjana, S &Anjaneyulu, M, V, L, R. (2014). Safety Analysis and Evaluation of Urban
[16] Single Carriageway Roads in Kerala.Journal of the Indian Road Congress,Vol.74-4, April-June:136-145.
[17] Couto, A., & Ferreira, S. (2011). A note on modelling road accident frequency: A flexible elasticity model. Accident Analysis and Prevention, 43, 2104-2111.
[18] El-Basyouny, K., &Sayed, T. (2009). Accident prediction models with random corridor parameters. Accident Analysis and Prevention, 41, 1118-1123.
[19] Lakshmi, M, D., &Sreelatha, T. (2013). Accident Prediction Models for Urban Unsignalized Intersections. International Journal of innovative Research in Science, Engineering and Technology, Vol. 2. 149-153.
[20] OECD, 2009. European Transport Safety Commission (ETSC).
[21] Shinar, D., 2007. Traffic Safety and Human Behaviour. Elsevier, Oxford.
[22] WHO, 2009. Global Status Report on Road Safety: Time for Action. World Health Organization, Geneva.

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