STATISTICAL ANALYSIS OF URBAN CROSSING ACCIDENTS INVO LVING GRIP RESISTANCE

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ABSTRACT

Linear trend analysis, curvilinear trend analysis, secular trend analysis, and other forms of trend analysis are used to make predictions about the future based on existing trends. In this chapter, we utilized secular trend analysis to objectively forecast the likelihood of future accidents.

The trend component of a time series may often be removed by analyzing the secular trend of the time series. Long-term, consistent movement is what we mean when we talk about trends, not short-term fluctuations. Time series analysis approaches such as the auto regressive integrated moving average modelling approach and the dynamic forecasting model were used to time dependent data in the older literatures. Linear (or straight line) trends and non-linear trends are the two main kinds of trends. The long-term upward or downward trend in the data is what we call the secular trend. The analysis of secular trends is limited by the quality of the available information.The strength of a trend is often proportional to the length of time the data was collected for. In a short time, frame, secular trends are less likely to become apparent, and cyclical fluctuations may distort the series' overall trend. This would make it hard to distinguish between different time series variants. At the very least, two or three full cycles need to have passed before the trend can be calculated. (Bowerman et al 1993). It's also important to note that the direction of the trend does not have to be consistent across the whole time to draw conclusions about whether or not the data is indicating an upward or downward tendency.

KEYWORDS: *Road safety, Transportation and accidents*

I. INTRODUCTION

Mobilization and migration from one area to another have become obligatory to satisfy the necessities of existence, making a reliable transport system an essential asset of every modern civilization. Therefore, transportation for the poor and their inability to walk has become commonplace. Having a well-developed transportation network is crucial to a prosperous economy since it facilitates not just trade but also social cohesion.

The ability for people and things to move about freely and persistently is still an absolute requirement for any functioning society. It's common knowledge that a country's transportation infrastructure has a significant impact on its economic growth and cultural development. The term "transport" refers to moving items or people from one location to another, and it comes from the Latin phrase "Transport are," where "Trans" means "across", and "portage" means "to carry." Because of this, cross-cultural trade and business became far less cumbersome, enriching national cultures in the long run. The needs of our rapidly expanding, technologically advanced civilization have been met by our reliable and efficient transportation network.

One of the most rapidly growing countries, India, has a robust, self-sufficient transportation infrastructure that meets the demands of its people by air, water, and ground. The improvement of India's transportation infrastructure is a crucial aspect in the country's progress. The transportation networks inside and between states let people of different backgrounds, languages, and communities communicate with one another. India has been able to grow closer to other countries, particularly its neighbors, because to improvements in international transportation.

One of the most cost-effective options for getting about is to take use of the Indian Road transit services, which link most interstate and intrastate routes. State transport companies are responsible for the organization and efficiency of the country's road transportation system. The Tamil Nadu State Transport Corporation (TNSTC) is an important institution since it links all the state's rural communities with one another.

The state's transportation network is crucial to citizens' daily lives and, by extension, the state's economy. The rising number of automobiles is a global phenomenon, contributing to heavier than average traffic flows in almost every nation and state. Due to the high risk of injury or death caused by the constant flow of vehicles, safety measures must be put in place. We must immediately discuss precautions.

The dramatic increase in vehicle registrations over the last several decades has become the world's leading cause of road fatalities. These incidents place a strain on our society's economic fabric. Despite several legislation and regulations intended to improve road safety, the accident rate continues to climb. The driver's carelessness and disregard for traffic regulations causes the vast majority (90%) of all traffic accidents.

The worldwide status report provided by the World Health Organization in 2009 found that more persons were killed in road accidents in India than in any other country. The number of people killed in car accidents in India has been rising at a pace of 8 percent annually. Increases in both the frequency and severity of accidents occur annually as the number of cars on the road rises and the resulting dynamics of road width shift. Most of these fatalities occur on highways and roads that are currently under development. Many people each year are hurt or killed while working on roads or maintaining them. The World Health Organization reported that around 50 million people were wounded and approximately 1.2 million people were died in road accidents worldwide in 2012. Most of these deaths occurred in developing countries that are classified as either low- or middle-income. Most of the casualties were pedestrians, cyclists, and people on motorcycles. The World Health Organization predicts that by the year 2030, traffic accidents would rank as the fifth greatest cause of death worldwide. World Health Day was first celebrated in April of 2004 and was proclaimed the "Year of Road Safety" by the World Health Organization in response to the rising number of traffic accidents. As the global incidence of traffic accidents has risen steadily over the last several decades, road safety has emerged as a pressing global concern. It has been estimated that road accidents in India cost the country's economy 3% of GDP in terms of social and economic costs. To travel to their regular destinations—like workplaces, universities, and grocery stores—people rely heavily on highways.

The primary goal of a safety audit is to guarantee the public's protection by ensuring that the road system conforms to safe design standards.

II. REVIEW OF LITERATURE

The correlation between accident time and other parameters is also studied. Accident circumstances can include collision type, collision cause, accident location, and passenger reaction. The driver's actions, such as going too fast or otherwise behaving recklessly, were a contributing factor in several of the accidents. By categorizing accidents during rush hours and off-peak times, we were able to provide a broad representation of road-related elements.

Conditional probability is used to examine the factors that influence the timing of an accident and their impact on the subsequent sectionsSPSS is often used to address issues in both commercial and academic settings. While **Martha Hijar et al. (2004)** utilized the Statistical 6.0 software to analyze the data of rural accidents in Mexico and to estimate the difference in the proportions of variables and 2, we have instead used the SPSS package to analyze our data.

Survey and market research, direct marketing, academia, administrative research, human resources and resource planning, research in the medical, scientific, and social sciences, quality improvement, reporting, and ad hoc decision making are just some of the many places' SPSS finds use.

Parida, et al. (2004) Using Dehradun as an example, this article demonstrates how to use GIS to create a useful database of traffic fatalities. As technology develops, more and more cutting-edge automobile models become readily available to consumers. Using GIS technology has become essential for precise collision analysis. The location of Dehradun, India, will be studied in detail. About 72% of collisions lead to significant and fatal injuries, according to an analysis of police data spanning five years. Most accidents happen between 2 and 10 at night, and automobiles, jeeps, and vans are usually to blame.

According to research by **Parida et al. (2005),** the number of people killed in road traffic accidents (RTAs) is rising at a shocking pace worldwide. Low- and middle-income countries, which often have less traffic than developed ones, account for the lion's share of RTA fatalities. Due to the complex nature of road transportation in India, no one organisation or department has exclusive responsibility for the sector. The effectiveness of law enforcement and technological solutions relies on the participation of the general public.

According to **Mohan (2009),** during the last decade, the number of people killed in traffic-related incidents has increased by almost 8 percent annually. Since there may be certain nations where accident rates can be lowered, two illustrative models have projected the time period when there will be no accidents. If we decide to accept. Assuming the current annual growth rate of 8% drops down to 0% by 2030, then we may anticipate roughly 260,000 fatalities.

Singh (2016) aims to do a comprehensive study of traffic fatalities throughout India, from the federal level down to individual states and major cities. Death and injury rates from traffic accidents in India vary by gender, age group, month, and year, as is seen from the data. The largest demographic is made up of people aged 30–59, yet men have a higher rate of deaths and injuries than women do. Road accidents are also more likely to happen during peak traffic times and during periods of inclement weather.

Chavhan et al. (2019) suggested a traffic management system based on forecast data. To reduce costs, the suggested model factored in traffic factors (velocity and density) in addition to historical information and data with a spatial-temporal correlation.

Huetal (2015) proposes a coordinated collision avoidance technique for networked vehicles based on the relative kinetic energy density of approaching objects. Traditional systems only considered the downstream effects of downstream connectivity and vehicle-mounted sensors.

III. SERIOUS INCIDENTS DURING THE DAY AND NIGHT

When large daytime accidents are compared to major overnight ones, the former are about twice as common throughout the study period. Significant daytime accidents do not follow a periodic irregular pattern, whereas significant nighttime accidents do. It shows the slope seen when fitting the data with a trend line: 0.18, whereas it shows the slope observed when fitting the data with a trend line: 0.21.According to the statistics, the estimation error for all incidents is around 5%. That is, when looking at all twelve months at once, the anticipated values are 95% on target with the actual number of incidents that occurred in 2006. Based on the research presented in this thesis, various kinds of accidents are classified incorrectly between 7.5% and 18.5% of the time. This mistake rate varies from quarter to quarter. The tabulation also reveals that the estimations of total peak, total fatal, major peak, and major day accidents correspond with the actual accidents occurred within around 90% of the time. Overall, serious accidents occur between 7.5 and 10% of the time at night and during off-peak hours.

Table1Trendanalysisfortotalaccidents

Year	Quarter	Accidents	½x	x	xy	x^2	y*
2000	I	85	-13.5	-27	-2295.00	729	75.07
	II	55	-12.5	-25	-1375.00	625	77.21
	III	85	-11.5	-23	-1955.00	529	79.36
	IV	79	-10.5	-21	-1659.00	441	81.50
2001	I	83	-9.5	-19	-1577.00	361	83.65
	II	58	-8.5	-17	-986.00	289	85.80
	III	89	-7.5	-15	-1335.00	225	87.94
	IV	83	-6.5	-13	-1079.00	169	90.09
2002	I	112	-5.5	-11	-1232.00	121	92.23
	II	79	-4.5	-9	-711.00	81	94.38

	III	118	-3.5	-7	-826.00	49	96.53
	IV	106	-2.5	-5	-530.00	25	98.67
2003	I	126	-1.5	-3	-378.00	9	100.82
	II	87	-0.5	-1	-87.00	1	102.96
	III	136	0.5	1	136.00	1	105.11
	IV	113	1.5	3	339.00	9	107.25
2004	I	113	2.5	5	565.00	25	109.40
	II	78	3.5	7	546.00	49	111.55
	III	135	4.5	9	1215.00	81	113.69
	IV	104	5.5	11	1144.00	121	115.84
2005	I	124	6.5	13	1612.00	169	117.98
	II	95	7.5	15	1425.00	225	120.13
	III	145	8.5	17	2465.00	289	122.28
	IV	117	9.5	19	2223.00	361	124.42
2006	I	131	10.5	21	2751.00	441	126.57
	II	109	11.5	23	2507.00	529	128.71
	III	149	12.5	25	3725.00	625	130.86
	IV	119	13.5	27	3213.00	729	133.00

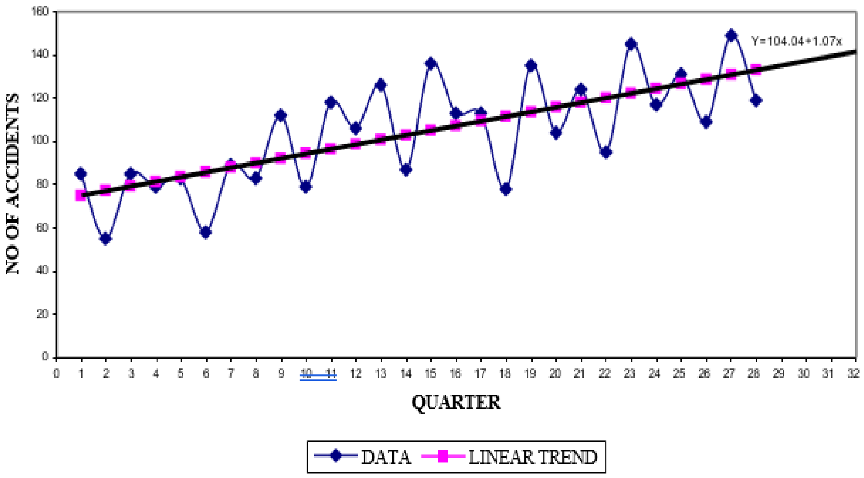

Figure1 Trendanalysisfortotalaccidents

Accidentsclassification	Quarters							
	I	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**
Total	128.7	130.98	133.26	135.54	131	109	149	119
Totalpeak	46.79	47.55	48.31	49.07	42	40	48	37
Totaloff-peak	31.08	31.48	31.88	32.28	31	26	31	26

Fataltotal	34.12	34.84	35.56	36.28	39	31	45	33
Fatalpeak	10.54	10.68	10.82	10.96	13	14	14	10
Fataloff-peak	8.16	8.28	8.40	8.52	11	9	9	6
Fatalday	18.70	18.96	19.22	19.48	24	23	23	16
Fatalnight	14.25	14.49	14.73	14.97	22	13	23	18
Majortotal	34.79	35.35	35.91	36.47	48	32	50	38
Majorpeak	12.25	12.45	12.65	12.85	15	11	17	12
Majoroff-peak	8.25	8.37	8.49	8.61	11	8	10	8
Majorday	20.50	20.82	21.14	21.46	26	19	27	20
Majornight	15.16	15.60	16.04	16.48	17	18	16	11

Table2 Comparativeestimate predictionandactualnumberofaccidents

Accidentsclassification	**Quarters**			
	I	**II**	**III**	**III**
Total	0.04	0.04	0.04	0.04
Totalpeak	(-)3.41	(-)6.72	(-)9.93	(-)0.01
Totaloff-peak	(-)9.65	(-)0.01	(-)0.01	(-)0.01
Fataltotal	0.10	0.10	0.10	0.10
Fatalpeak	0.16	0.16	0.17	0.17
Fataloff-peak	0.06	0.06	0.06	0.06
Fatalday	0.12	0.12	0.12	0.12
Fatalnight	0.23	0.23	0.24	0.24
Majortotal	0.15	0.15	0.16	0.16
Majorpeak	0.10	0.10	0.10	0.10
Majoroff-peak	0.10	0.10	0.10	0.11
Majorday	0.10	0.10	0.10	0.10
Majornight	0.09	0.09	0.08	0.08

Secular trend analysis is used to look at accidents that have occurred over the last seven years, from 2000 to 2006. The future may be predicted by either calculating the slope and intercept of the trend line using the least square approach or extrapolating the current slope and intercept. Least square assessment is applied to data on total, fatal, and major accidents, and the result of the study is a forecast of the expected number of accidents soon. According to data collected over the previous seven years, the incidence of accidents is not constant but rather fluctuates from one year to the next. In such a scenario, the deadly has the upper hand in terms of velocity, while the major has the lower. Accidents may be better predicted statistically into the future if they are broken down by peak, off-peak, day, and night for the Total, Fatal, and Major categories. This also aids progress towards the goal of reducing accidents in the right direction.

Due to the tragic human cost, fatal incidents are treated very seriously.

CONCLUSION

This research also indicates that accidents may become more common soon. The issue of safety will be much simpler to solve if deadly accidents can be reduced to a minimum. Therefore, this method not only emphasizes the effort that may be performed to reduce the number of accidents but also offers the rate of rise of accidents that may occur soon.According to the results of the calculations, the estimate deviates from the actual number of accidents by just around 5%, with the calculated numbers agreeing with the actual accidents reported in 2006 by approximately 95%. It's likely that the actual number of accidents in 2007 will rise proportionally to the forecasted number of accidents for the year. There is just a ten percent difference between the 2006 and 2007 estimates.

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