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Road Transportational Accident Analysis of Urban to Town Connecting Sectors

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Abstract: - Road safety is worlds safety; we used to leave our half of the life in road transport only. Without transportation we can't do anything. As per the analysis of world record of death rate 6-11 % of death is by road accident. Either riding, or walking or even standing in footpath, we can't miss accident. Our errors contribute to the world safety is of 68% help from human life to environment and world economic state balancing, keeping this in mind. This paper done with few analysis of urban connection and accident road ways. Road safety is not a small factor to neglect .It needs a thousand of alarm to avoid or not to see death as soon.

Keyword: *Road Traffic Collisions, Black Spots, Statistical Analysis Of Accidents, YOLO, Machine Learning*

1. Introduction

Accident or fortuity is common in the present day of increase in vehicles. Vehicles are more needed for the lifestyle and work pressure to maintain or balance the routine. Collisions or communication of vehicle to vehicle, vehicle to pedestrian or vehicle to road structure where no harm to any human kind. These collision is one of the cause of increase in the death rate 6-11% in the globe in few countries. But few countries follow strict rules in traffic maintenance. KABCO in us countries. Where they regularly monitor the traffic flow and root cause of the accidents. From very each incident they clear the spot to avoid further accident or delay in the traffic flow.to maintain the peace and smooth transport to the public, they build a remedial measure to overcome soon. From the history Mary ward [1] an Anglo-Irish scientist fell from a steam carriage and he was killed by his wheels reported in documents the very first accident fatality as death on august 31, 1869 in Ireland 's county Offaly.

Here we have a special category of the section where grabbing everyone's concentration namely dark spot or black spot. It's named by [2] Edward Douglas Scott Montagu in 1973 in a debate of house of lords.in road safety management the collisions are concentrated from history of periods. These may

occur in straight road section with sharp corner or hemp or steep road section or warning signs are concealed at cross section roads, which can't be identified by anyone. All these causes a huge loss to the society as well as layman life too. Its eradication process is started bit lately from 1900's, by researching and investigating deeply they started to recover the potholes, uneven road structures. Road disturbance due to weather condition likely. Etc., Taken as major consideration. Later, from 2000's investment starts from millions of dollars has been done to recover, but as of now, it become less in the thing because applying the KABCO, RSA to entire continent.

In the case of India improvement in the road safety structure and manual is rapid in speed now. From MORTH and state highway respectively to individual states considering its flow of traffic. As a major thing, **Mumbai and Delhi, Hyderabad** are 3 distinct places with very heavy traffic flow, but they with different pattern of traffic controlling system. In **Punjab** industrial area here, monitoring system was using **piconet c**oncept to track the heavy vehicle passage in the 24/7 road section with heavy loads transportation to Avoid accident, congestion and loss in economy state of the country. They used to collect accident details in the form of detailed collected data used for refined version of transportation management and started to collect the data of reformed method in detail to ensure the accident occurrence. data will be reported in the word format. Later, the dataset got its new mode in the form of statistical data mode. To decrease the accident rate to make then decision as every accident is not in fatal category. That too in particular places is measured in particular pattern. In this study the concentration is on Karnataka state traffic flow. And its iteration.

Karnataka one of the leading state in the globe from Bangalore that's well-known fact. compare to Bangalore other districts too having its own highlighted industry and enormous works attracting the employees from various places. In accident hit rate chart Bangalore city is the first one, Tumakuru, Bengaluru dist., Mandya, Hassan is in respective places in the list. Tumakuru is now named as smart city from video incident detection system (vids) from efkon India. Compare to other cities Mandya is in the list which is not with much industries, but connects to main major cities like Bangalore and Mysore nh-275, Bangalore and Mangalore nh-57. accident is highly critical point in highway transportation because of vehicular flow pattern in traffic condition like mild, heavy or normal. Which can't be stopped completely but with

precautions we can avoid or reduce the rate of fatality or death cases and ascertaining the safety to the public as well pedestrians in mixed traffic.

2. PROCESSING METHODS

Considering Karnataka state road transportation, we can draw many factors which affecting the civil transportation grounds. Data collected from the police department and Karnataka state highway patrol system and MORTH. to get to know the knowledge of how to calculate the accident rate and to identify and mark dark spot. Every accident is not severe one. Hence, they divide those to mainly fatal, non-fatal and injury. later divide and conquer rule is applied to decide and categorize the accident pattern and to which section we need to fix the case. There is a huge list of data to be collected for in detail of occurrence.

As an example of from2018-2022 means 5yr accident case in Karnataka state is collected. hence its of huge data only its graph is used in the paper for the reference below.it keep on increasing as divided it as rural and urban section data. Hence of increase in the vehicle increase in the accident cases. Maily the use of road structure and awareness of the traffic signs is the basic. later one way, round around circle pattern, here, which roads leads to or connects to which path is to be known. For the current road upgradation model. Is the basic thing should be known to every common man.

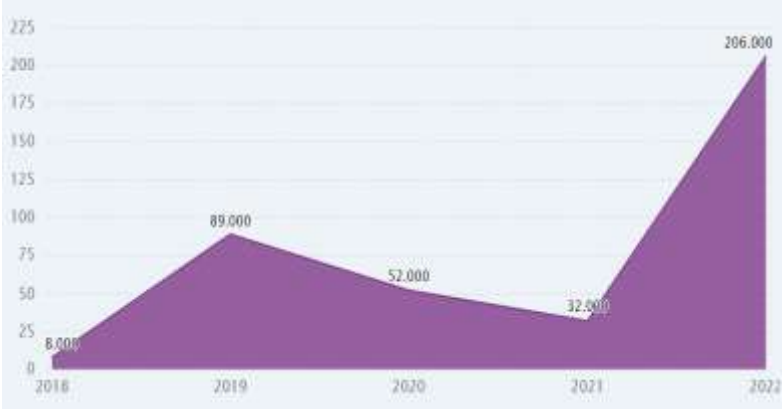

Fig.1. Karnataka 5 yr accident vehicle involved in accident data plot.

Next level process is how to declare the areas or road or the circle as namely dark spot or black spot. To declare the particular geography as dark spot there is an analysis method to be used. Namely

- Ranking method
- Method of severity Index
- Method of accident density
- Method of weighted severity index

On this basis the total accident hazard is expressed as the number of accidents of all types per km of each highway and street classification.

$$R = \frac{A}{L}$$

where, R = total accident rate per km for one year, A = total number of accident occurring in one year, L = length of control section in kms

for every 500 m to 1 km stretch depends on the urban or town section, road type. repeated accident occurrence in the same spot is named as dark spot or black spot. based on the analysis.

Another case study on taluks of Mandya district made. Road accidents in Karnataka's Mandya district increased significantly in 2023. Here are some important specifics:

• Total Fatalities: Compared to 488 in 2022 and 412 in 2021, Mandya recorded over 538 road accident deaths in 2023.

• Majority of Victims: Two-wheeler riders were responsible for approximately 85% of these fatalities.

• National Highways: Mandya is traversed by three national highways (NH 766, NH 948, and NH 181). In 2023, there were 93 fatalities on these highways, compared to 106 in 2022.

• Black Spots: In the district where accidents were common, police found 34 black spots. Black people were most prevalent in Mandya taluk. Dark spots with eight, and then the taluks of Maddur, Pandavapura, and Srirangapatna, each with seven BLACK SPOTS.

Causes of Accidents: The three main causes were found to be speeding, drunk driving, and reckless driving2. In order to increase road safety, the local government has been working on initiatives like cracking down on drunk driving and requiring helmets for two-wheeler riders.

Based on the analysis and spot inspection the patrol system, state govt., authority and central ministry marked few places as dark spot in Mandya for the regular interval of accident occurrence. Mandya is with 7 talukas, here we highlighting only one position as a dark spot place, which connects 3 major cities or towns, and with staggered route connection in picture The black spots in Nagamangala taluk, where road accidents frequently occur, include:

1. Anche Chittanahalli Double Road
2. Uppar Halli Gate
3. Mariyappa Circle
4. Near Belluru Cross
5. Iron Bridge near Belluru Cross
6. Srirangapatna-Bidar Road
7. Near KSRTC Bus Stand
8. Brindavan Gardens Junction

These areas have been identified as high-risk zones due to the frequent accidents occurring there. Local authorities are working on measures to improve safety and reduce accidents in these spots. The list is
collected in the internet the transport ministry designed a traffic accident-avoidance method in major spots in the list, but, due to staggered route position where single point connects to 6-7 ways, mainly which connects the path to villages, town like Tumakuru, highway, Bengaluru highway, Mandya highway, Mangalore highway. and remote villages nearby.

3. Results

Here is the Karnataka state top rank in accident places. among 38 districts these are highly ranked top 5 places of vehicle accident. below table describes only 2022-2023 data set which is available in many sources of govt. of Karnataka district sites with permission, we can access those

Fig.2.google map of Nagamangala Belluru cross as an of study area example.

Nagamangala as a base case study example to start the process of analysis of traffic accident of Belluru cross of Mandya district. The process started and as follows.

Table 1. top 5 rank places of Karnataka state vehicle accident rate of 2022 and 2023

sl.no	Units	2022	2023	%age share	Rank in 2022	Rank in 2023
1	Bengaluru City	3822	4974	11.45	1	1
2	Tumakuru	2257	2601	5.99	2	2
3	Bengaluru Dist.	2129	2451	5.64	3	3
4	Mandya	1978	2160	4.97	4	4
5	Hassan	1975	2138	4.92	5	5

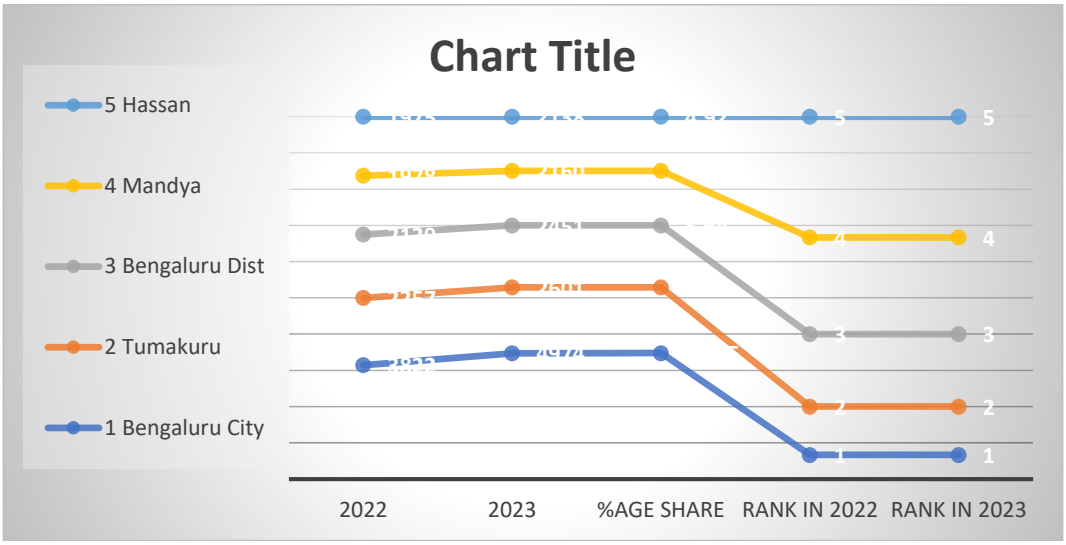

Fig.3.representing top 5 places of Karnataka vehicular accident data. as per the table.

For the clarity of the process, we need to dig in depth. Here one thing we need to observe is Bengaluru city, Bengaluru dist., Tumakuru, Hassan are big cities with industries and highly connecting places to major cities. but Mandya is not a big city compare to the geography of other cities. it is in 4th place.
In the spot inspection, due to lack of the barriers and sign bords to indicate the turning and heavy vehicle cutting edge point indications. There usual cause of more accident. no signal light installed in the Belluru highway roads. They have a very nice road structure but lack of proper road ways its noted as top 3 black spot in the list. Next is based on timings we have very good data access of accident rate. the below graph shows in details.

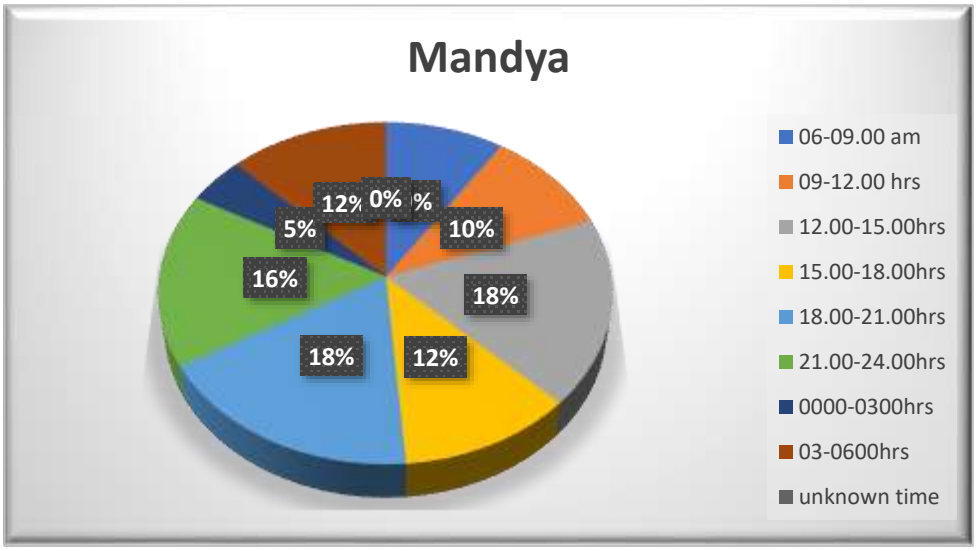

Fig.4. graph of vehicle accident involved in a day with time stamp

The graph shows in a day of time stamps, the accident percentage of occurrence is likely to be more in after noon 3.00-6.00 pm. were peak traffic of school and office, college leaving time. as of 12% and 18% in early morning same 6.00-9.00 am, to reach offices and school, college and at lunch break too catches our interest, likely to be more. so, rest of the time it's of 5-8%. means within the limits, from the above considerations sometimes we can't come to accurate decision hence of more

Table 2. Mandya vehicle accident data based on timings in a day.

Unit Name	06-09.00 am	09-12.00 hrs	12.00-15.00hrs	15.00-18.00hrs	18.00-21.00hrs	21.00-24.00hrs	0000-0300hrs	03-0600hrs	unknown time	total accidents
Mandya	201	219	384	248	387	355	97	269	0	2160

detailed note with less accuracy. this has been iterated by machine learning algorithm using logistic regression [6], decision tree, deep learning. later it came into image processing's the mode of operations changed a lot to get accurate result.

3.1 Reason and calculation from excel or statistics of accidents

In the present case without any other choice the process started with excel sheet data to check the accuracy and prediction of accident. We got the accurate result of 87% of matched cases in the process from collecting the data then applying the algorithm and calculation to map the value. reached the goal.

At the corner we felt on spot inspection, avoiding 5-6 corners connecting single point to cross or take turn is making the traffic more congested and delay, with accident prone areas. Weather condition is not bad as of north India, except in the time of rainy and winter season but as of now making the clear pathway to the vehicles passage easier way will make avoidance of death rate using barricade or plantation avoid cross over, installing sign board and signal light at needed point.

4. Conclusions

Some the above cases study we iterated with only few places, mainly this work concentrated to urban to town connecting plan, with very good response and result. but extending the study to town to town and town to village is needed. Implementing same plan to all the place make almost less number in accident. but only text data is not enough, as of now we are dealing with digital era. we can extend it to images in series as well. Thinking as smart city or smart villages

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