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TO PREPARE ACCIDENT PREDICTION MODEL THROUGH BLACK SPOT ANALYSIS ON NH 48

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Abstract -India is a large country in terms of population. For it to expand, an excellent transit infrastructure is required. Road transport is a key component of the transport system that contributes to the economic and social development of our nation since it allows for door-to-door delivery and has a higher density and distribution over the whole nation. Accidents on these roadways hinder expansion since they result in significant financial damage and fatalities. Therefore, it's critical to identify these accident-prone areas and make the necessary corrections to reduce these incidents. The Mumbai– Bangalore Highway black spot identification used for this article. The National Highway Authority of India's weighted severity index and accidental data are used to analyses the accidental data to identify these "black spots."

Key Words: Transportation, Road traffic accidents, Accident Black Spots, National Highway.

1.INTRODUCTION

India has the second-largest road system in the world, with 4,865,000 km in total length. Motorways and highways are important for the growth of the nation, and state and federal public works departments are in charge of building and maintaining the nation's highway system. The central government created the National Highway Authority of India (NHAI) as a distinct entity to handle national highways. Despite recent improvements to road surfaces, accidents still happen when cars are travelling at higher speeds. Finding dangerous regions or "black spots" is essential for reducing accidents. This is accomplished through the Black Spot Identification procedure, which serves as the basis for all initiatives aimed at enhancing safety Depending on the area, many methods may be employed to find black patches. To guarantee that travel is accident-free, common accident causes are taken into account while constructing national roads. In order to pinpoint problem areas on national roads, accident data gathered from Sinhagad Police Station is studied using the Weighted Severity Index Method (WSI) and Accidental Density Method (ADM). The present study aims to identify accidental black spots on a 12 km stretch of National Highway – 48 (starting from Swaminarayan Temple to Right Bhusari Colony) by studying the accidental data provided by the officials of Sinhagad Police station database (Irad.parivahan.gov.in) during year 2018-2020. In this project, accident prediction model is been developed using computer languages like HTML, JavaScript, CSS have been used.

What is black spot?

Highways have areas known as Accidental Black Spots where accidents have traditionally been more common. These spots are located utilizing techniques created to locate the "black spots" using erroneous information supplied by the relevant authorities.

AREA OF STUDY

Study area Mumbai -Bangalore National highway, 4, Narhe Ambegaon Rd to Left Bhusari Colony is a controlled access highway with speed limit of 90 km/hr for present study has been selected.

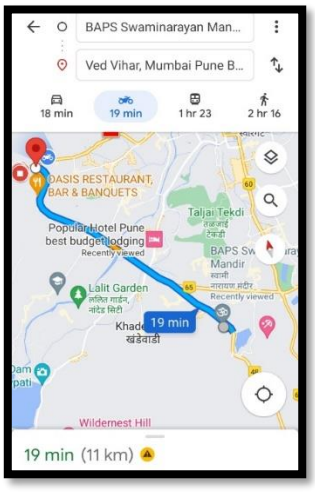

Image no 1 (Swaminarayan Temple to Left bhusari)

2. METHODOLOGY

The basic aim and objective of the study is to identify accidental black spots on National Highway (NH48). The first step includes collecting primary data provided by the NHAI (National Highway Authority of India) and Police records which was to be correlated with the data collected from

2.1. Accident Density Method

Sample Calculation

- The chainage ranges from 1 to 10 km.
- The total number of accidents that have happened in this chainage is then determined.
- The accidents happening for each kilometer (1000m) are independently determined and the accidental density is discovered using a unit length of 1000m.
- The ratio of the total number of incidents over the stretch's length determines the benchmark for accidental density.

For example: Here, the chainage is between 1 and 10 km, or 10 kilometers, and 24 incidents have been recorded.

Accidental density benchmarks= (24/10)

Distance from start-end	No. Of Accident	Accidental density at 1000m chainage
1.4	1	
1.5	1	5
1.9		
1.9	3	
1.9		
2.2		
2.2	3	
2.2		
2.6		5
2.6	3	
2.6		
2.8	1	
2.9	1	
3		
3	3	
3		
3.2	1	6
3.3	1	
3.6	1	
4.4	1	
4.9	1	3
5.1	1	
6	0	0
7	0	0
8	0	0
9	0	0
10	1	1

Table- 1: Accident Density Method

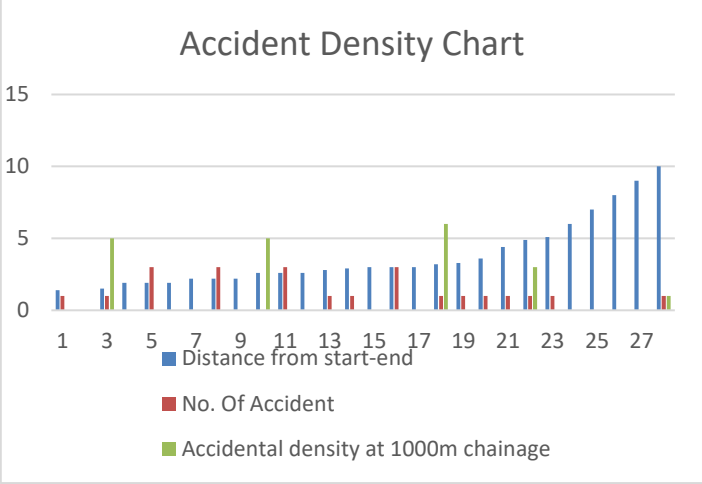

Chart No:2

2.2 Weighted Severity Index

According on the quantity and severity of accidents at that specific place, points are given to them using this technique.

- Severity of that accident is classified as Grievous Injury (GI), Fatal (F) and Minor Injuries (MI).
- WSI is calculated by the following formula

  WSI = (41 x F) + (4 x GI) + (1 x MI)
- Accidental black dots are places with WSI values greater than 40.

Sample Calculation

WSI = (41 x 1) + (4 x 0) + (1 x 0) = 41

Fatal	Grievous Injury	Minor	None	WSI
0	1	0	0	4
1	0	0	0	41
	1			4
			1	0
	1			4
2	3			94
	1			4
1	4			57
			1	0
	1			4
	2			8
		2		2
1	2			49
4				164
4	4	2		182
2	2			90
2				82
	2			8
6	1			250
	2			8
1	1			45
BENCHMARK 41				

Table-2: Weighted Severity Method
Values above 41 to be termed as black spot

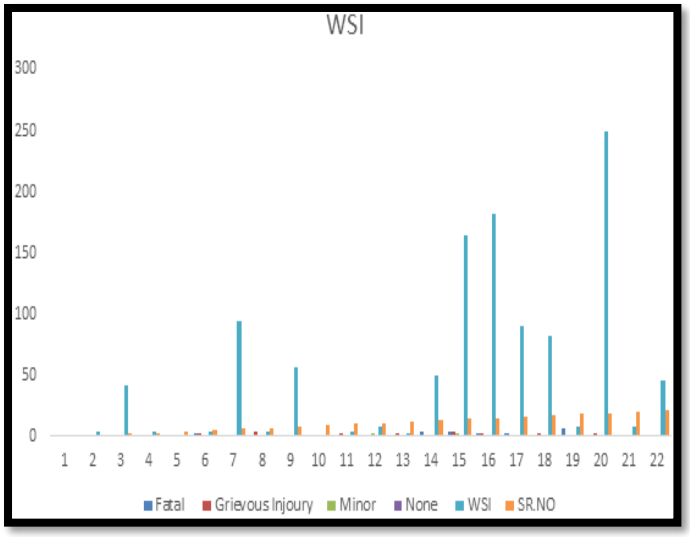

Chart No:2

[More than 41 on the Y-axis says that it is a black spot]

2.2.1. Accident Prediction Model

After identification of black spots and suggesting remedial measures, we've used above data to prepare an Accident Prediction Model through use of algorithms and programming languages such as TypeScript, HTML, JavaScript and CSS.

Domain of our website is https://accident-prediction-model.vercel.app

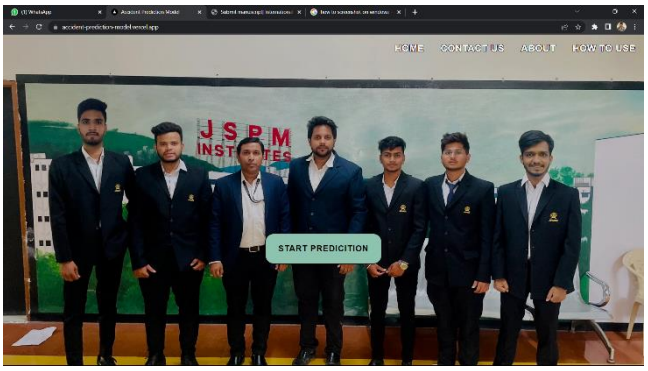

Image-2

(Homepage of our model)

2.3. CONCLUSIONS

By considering all the parameters of **Accidental Density Method (ADM)** black spots are found at chainage 1.900 km, 2.200 km, 2.600 km & 3.000 km.

By considering all the parameters of **Weighted Severity Index (WSI)** black spots are found at Lat: 18.452011, Long:73.829791, Lat: 18.459258, Long:73.823597, Lat: 18.453996, Long:73.827251, Lat: 18.463449 long: 73.819123, Lat: 18.452562 long 73.828921, Lat 18.460630 long 73.822867, Lat:18.461316 Long:73.821298, Lat 18.463951 long 73.819222, Lat:18.459185 long:73.823833 & Lat:18.452097 Long:73.82934.

All these locations are black spots which are accurate on Google Map and can be accessible through our prediction model.

REFERENCES

1. R.R.Sorate , R.P. Kulkarni , S.U. Bobade , M.S. Patil , A.M. Talathi , I.Y. Sayyad , S.V.ApteIdentification of Accident Black Spots on National Highway 4 (New Katraj

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2. Pavan r vyas, madan l. honnappanavar, h. b. balakrishna Identification of black spots for safe commuting using weighted severity index and GIS Department of Civil Engineering, Bangalore Institute of Technology, Karnataka, India
3. Raghav PR, Prasad NB2, Dholakia M.3 A study of road traffic accidents and road safety behavior in Pune: a mixed- method approach 1 Prof. & Head, Dept. of Community Medicine & Family Medicine AIIMS, Jodhpur,2 Associate Prof., Dept of Physiology, Dr. D. Y. Patil, Medical College, Hospital and Research Center, 3 MBBS Student, Dr. D. Y. Patil, Medical College, Hospital and Research Center, DPU Pune.
4. L VOGEL and UC J BESTER A RELATIONSHIP BETWEEN ACCIDENT TYPES AND CAUSES Department of Civil Engineering, University of Stellenbosch, Private Bag X1 MATIELAND 7602
5. Prof. Mayura Yeole 1, Godavari Mane2, Mukta Nisal3, Prajakta Sawant4, Simran Shaikh5 and Akshada Kadam6 Accident Cause Model for Talawade, Pune, Maharashtra.
6. Fang Zong, Hongguo Xu, and Huiyong Zhang Prediction for Traffic Accident Severity: Comparing the Bayesian Network and Regression Models College of Transportation, Jilin University, 5988 Renmin Street, Changchun, Jilin 130022, China
7. Pablo Martinez1; Emad Mohamed2; Osama Mohsen3; and Yasser Mohamed, Ph.D, M.ASCE4 Comparative Study of Data Mining Models for Prediction of Bridge Future Conditions

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