Data-Driven Analysis of Road Safety based on Blackspots and Weather report for Safer Transportation

Team name :Dev Spirits Mentor name: Mr.M.Ashok Team members: Balaji V
Hemavathy R
Jayavarshini

Date:09-09-2023 college: Rajalakshmi Institute of Technology

Abstract

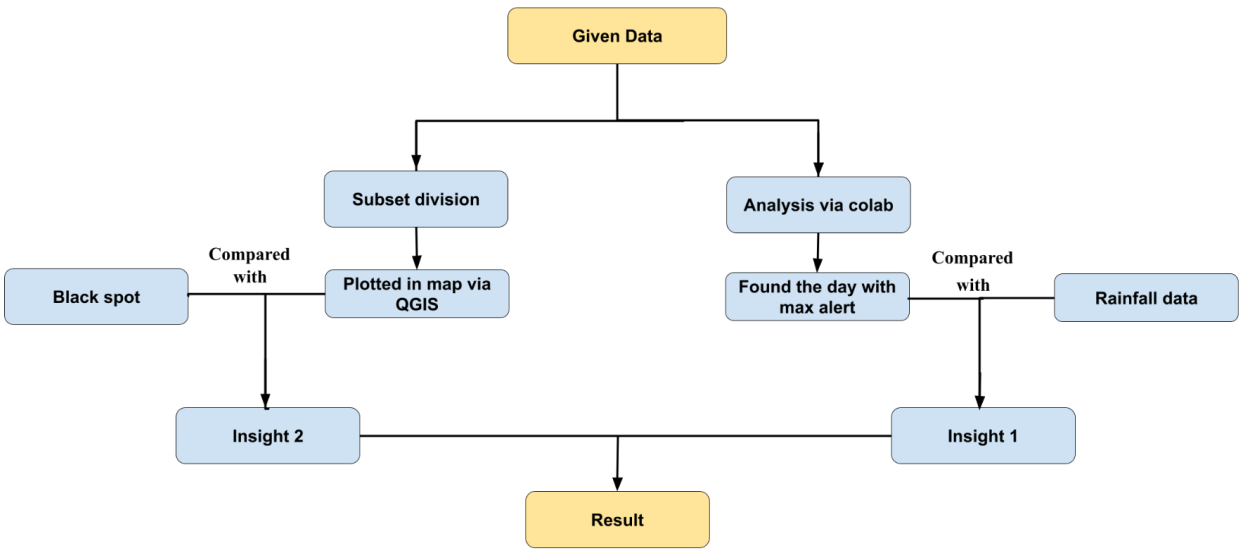
This project report presents a comprehensive analysis of road safety using a rich dataset gathered from AI-based Advanced Driver Assistance Systems (ADAS) devices installed in vehicles. The dataset encompasses a diverse range of road conditions, covering city roads and national highways, over a two-month period, spanning approximately 35,000 kilometers. It includes critical information such as alert types (cas_ldw, cas_hmw, cas_fcw, cas_pcw), date, time, latitude, longitude, vehicle numbers, speed, weather conditions, and regions designated as potential "black spots."

Motivation

- The paramount motivation behind this analysis is the urgent need to enhance road safety in an era of increasing traffic and technological advancements.
- By delving into the patterns of alerts, weather conditions, and alert relationships, we aim to provide actionable insights that can inform effective safety measures, ultimately reducing accidents and their associated human and economic costs.
- This project strives to make a tangible contribution to safer roadways and improved public welfare.

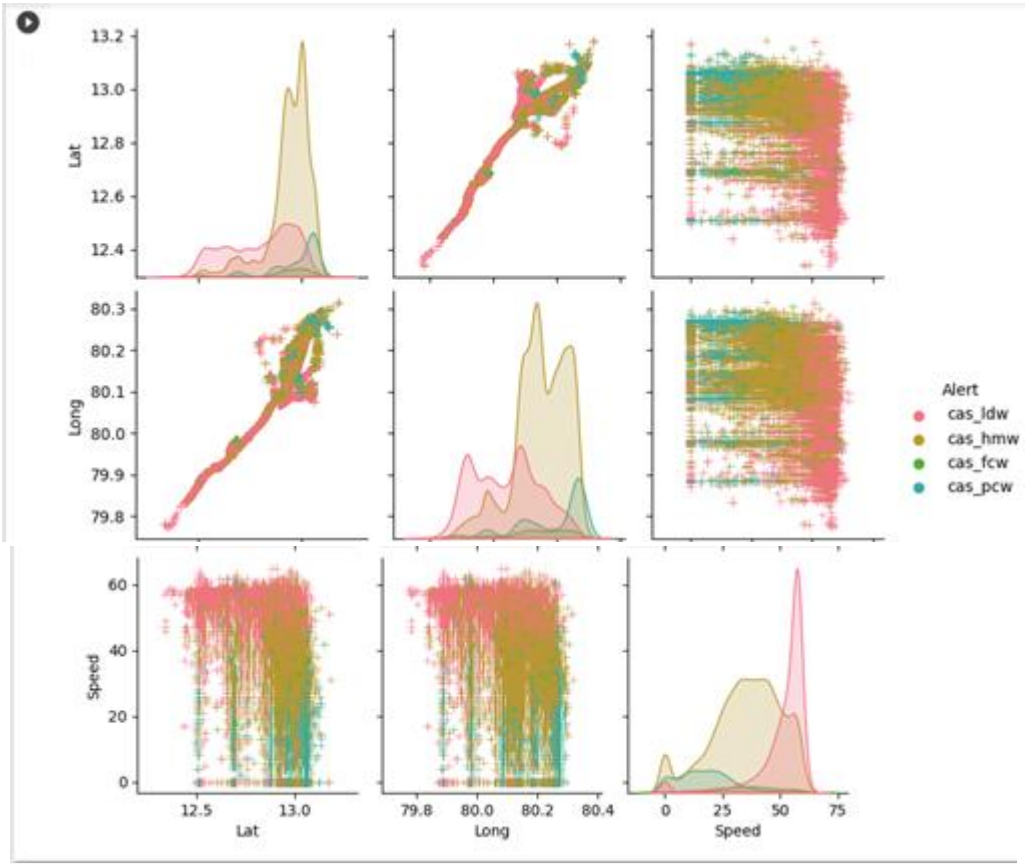
Related works(Methodology)

Tools used are QGIS,Python(colab),Ms Excel.



	Types of Alerts				
Vehicle category	cas_fcw	cas_hmw	cas_idw	cas_pcw	Total types of alert
805	159	4227	2051	438	6437
2846	145	2409	2741	391	5295
5339	204	4117	754	767	5075
3143	82	1567	876	379	2525
1995	1	8	8	1	17
	TOTAL NUMBER OF ROWS			21325	

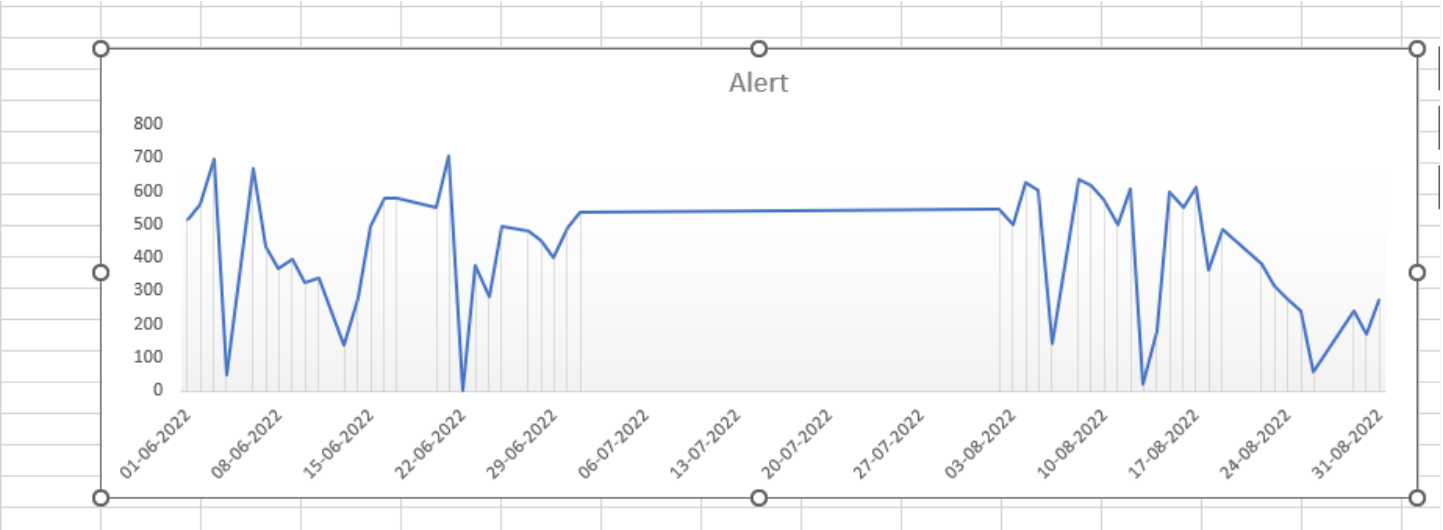
Relation between Alert, Latitude, Longitude and Speed

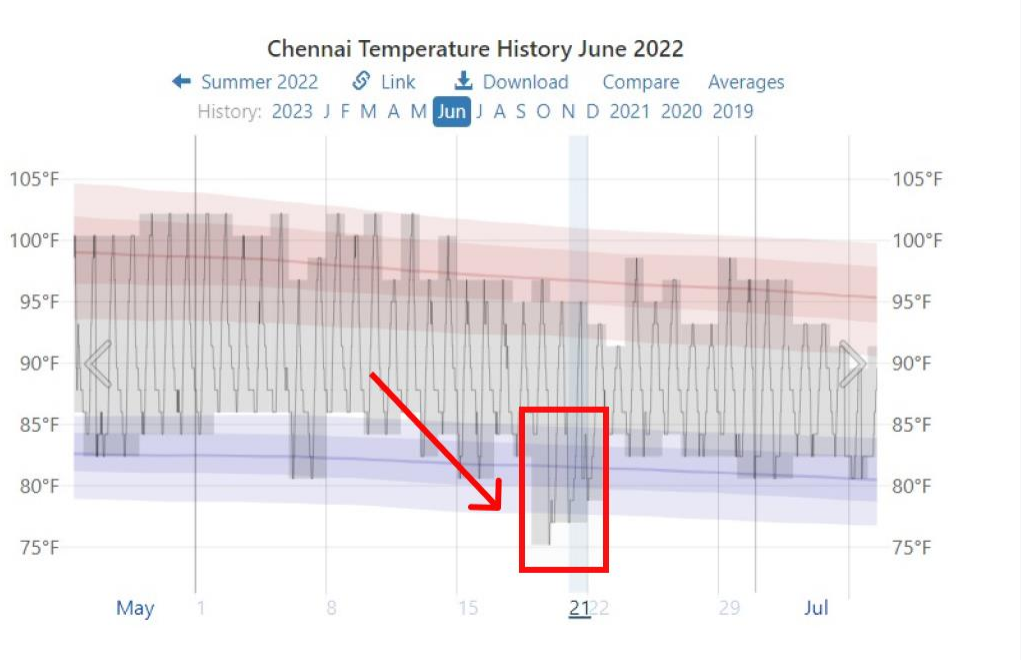


Analysis

We dissected alert frequencies, pinpointed black spots, and scrutinized the influence of weather conditions on alert occurrences. Our exploration of alert category relationships uncovered intricate patterns and dependencies.

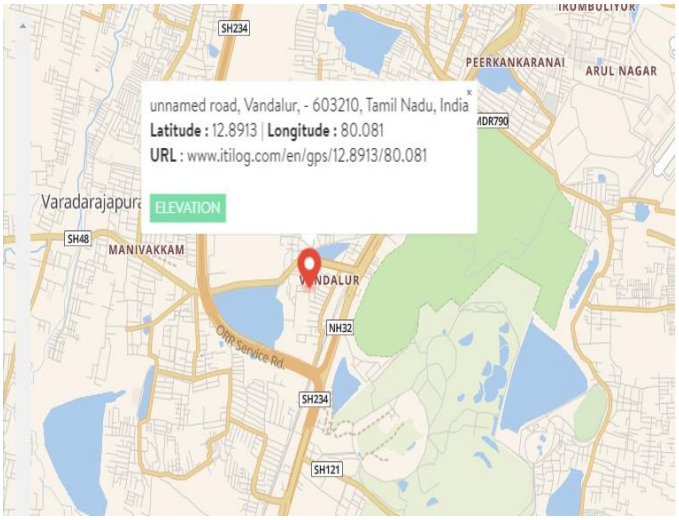
1.Rain data analysis:

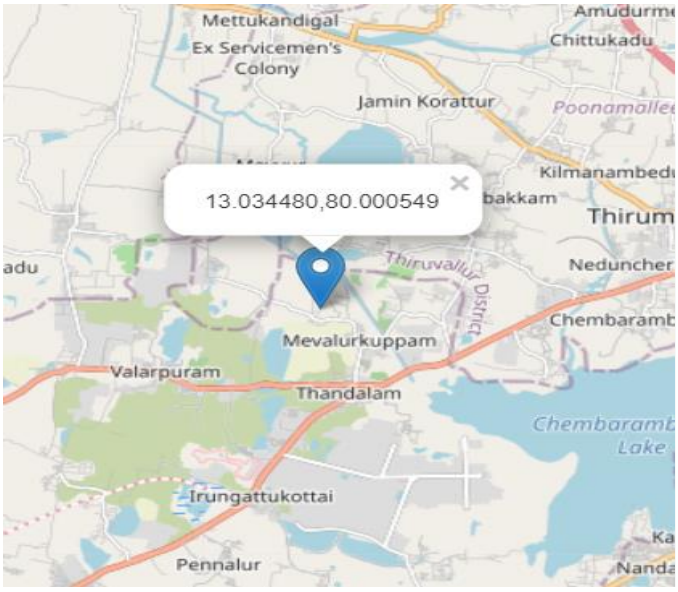




- Our analysis of rain data revealed a noteworthy trend: **on June 21, 2022, the number of alerts are higher, this may be due to road blockages or damages.** And there was also a heavy rain with thunderstorm.
- This was closely **linked to adverse weather conditions that occurred on June 19, 2022.** The data clearly indicates that inclement weather from two days prior played a significant role in triggering a higher frequency of alerts on June 21, 2022.
- This correlation underscores the impact of weather conditions on road safety, emphasizing the need for **weather-sensitive safety measures** and driver awareness during such weather events.

2) Blackspot analysis :





- Our analysis of black spot data, sourced from the Ministry of Road Transport & Highways website, revealed compelling insights.
- We identified **two specific black spot** regions, namely **"Mevalurkuppam Irungattukottai Pennalore Mambakkam, between 3.5 KM" and "Vandalur Sign & New Bridge, 4 Km,"** which closely aligned with our findings as vulnerable zones.
- These regions consistently exhibited a higher frequency of alerts, indicating a heightened risk of road safety incidents. This alignment underscores the reliability of our analysis and highlights the critical importance of addressing **safety concerns in these identified black spot areas through targeted interventions and infrastructure improvements.**

Solution

1.Manhole detection and alerting using artificial intelligence.
2.obstacle detection using vehicle sensors such as VANETS and RADAR.

Conclusion

In conclusion, our analysis yields critical insights, highlighting data's pivotal role in road safety. We identify high-risk black spot regions, validate findings, and link adverse weather to alerts. This foundation supports proactive safety measures and our shared goal of safer roads.

References

Colab links 1:https://colab.research.google.com/drive/1xMSBr09A5o0yJGnvxYtRwFF_wCcXPoLi?usp=sharing
Colab links 2:https://colab.research.google.com/drive/1VvU5SsPEd2FHxIbD6gCh491xMl6jYHW5?usp=sharing
Source 1 :https://morth.nic.in/black-spot
Source 2 :https://weatherspark.com/h/m/110123/2022/6/Historical-Weather-in-June-2022-in-Chennai-India
Workdone:https://drive.google.com/drive/folders/1YGAK4d2gUJ97KP2TG51OE7XyRKjbMqz_?usp=sharing