RAJALAKSHMI INSTITUTE OF TECHNOLOGY
BELIEVE IN THE POSSIBILITIES
AN AUTONOMOUS INSTITUTION

ANNA UNIVERSITY
PROGRESS THROUGH KNOWLEDGE

INTEL UNNATI INSDUSTRIAL TRAINING SUMMER 2023

AD3512: SUMMER INTERNSHIP REPORT

Submitted by

KISHORE. M 211721243090

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

RAJALAKSHMI INSTITUTE OF TECHNOLOGY, CHENNAI

ANNA UNIVERSITY: CHENNAI 600 025

NOVEMBER 2023

BONAFIDE CERTIFICATE

Certified that this Summer Internship Report Intel Corporation is the Bonafede work of the candidate

Mr. Kishore .M (211721243090)

who carried out the Summer Internship.

COMPANY NAME: Intel Corporation

DURATION : 1 months

CO-ORDINATOR HEAD OF THE DEPARTMENT

Certified that the candidate was examined viva-voce in the examination held on 01.12.2023

EXAMINER

intel

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AICTE

Intel® Unnati Industrial Training – Summer 2023

This is to certify that

Kishore M

has successfully completed **Intel® Unnati Industrial Training – Summer 2023** from May 29 to July 15, 2023 in the field of

Accident Locations on Indian Roads

under the guidance of Dr G Sai Krishnan.

Sumeet Verma
Director. Strategy – Research and Growth Initiatives, Intel India

Dr G Sai Krishnan
Training & Placement Officer
Rajalakshmi Institute of Technology, Chennai

P154

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ACCIDENT LOCATIONS ON INDIAN ROADS

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ABSTRACT

This study makes an effort to evaluate road accidents in Tamil Nadu's "Black Spots" and gather year-by-year information. The study focuses on current accident rates and collects the death toll. Even though people are aware of them, there are more accidents on the roads every day. According to the Global Safety Report, more than 1.5 million people die in road accidents globally each year. Road accidents are one of the leading causes of death worldwide. Numerous variables, including the state of the road, its geometry, the car, the pavement, the weather, etc., affect the likelihood of an accident occurring. Each element plays a part in the likelihood of accidents, and there may be many additional situation-specific factors Data on road accidents on an Indian national highway was gathered and geocoded in order to determine the impact of several characteristics on accident occurrence.

Keywords: Blackspots, Geocoding, Fatalities.

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WEEKLY OVERVIEW

WEEK 1

Date	Day	Name of the Module/Topic Completed
19.06.2023	Monday	Define roles and establish communication channels
20.06.2023	Tuesday	Discuss project scope, goals and learning objectives
21.06.2023	Wednesday	Identify and collect accident data sources from government websites
22.06.2023	Thursday	Data cleaning and Organization in Excel
23.06.2023	Friday	Geocoding accident locations using Google Earth
24.06.2023	Saturday	Initiate basic analysis in Excel

WEEK 2

Date	Day	Name of the Module/Topic Completed
26.06.2023	Monday	Basic geospatial analysis using QGIS tool
27.06.2023	Tuesday	Map accident locations
28.06.2023	Wednesday	Identify initial trends and patterns
29.06.2023	Thursday	Identify potential blackspots
30.06.2023	Friday	Assess Severity
01.07.2023	Saturday	Analyze temporal trends

WEEK 3

Date	Day	Name of the Module/Topic Completed
03.07.2023	Monday	Start Predictive modeling using the data collected
04.07.2023	Tuesday	Start using Tableau to mark basic blackspots
05.07.2023	Wednesday	Start using Excel to predict the year of 2023
06.07.2023	Thursday	Analyze the predicted blackspots
07.07.2023	Friday	Assess accuracy
08.07.2023	Saturday	Refine the models

WEEK 4

Date	Day	Name of the Module/Topic Completed
10.07.2023	Monday	Begin drafting preliminary report
11.07.2023	Tuesday	Finalize accident analysis
12.07.2023	Wednesday	Confirm blackspots
13.07.2023	Thursday	Compile comprehensive Insights
14.07.2023	Friday	Prepare and polish the final representation
15.07.2023	Saturday	Review and finalize all project materials

INTERNSHIP OBJECTIVES

1. Understanding Data Collection and Processing:

Objective: Learn methodologies for collecting, organizing, and cleaning accident data from diverse sources such as police reports, hospital records, and traffic department information.

2. Predictive Modeling and Forecasting:

Objective: Learn to create predictive models to forecast potential accident-prone areas for proactive interventions and targeted road safety measures.

4. Reporting and Communication:

Objective: Enhance communication skills by preparing comprehensive reports and presentations summarizing accident analysis findings for stakeholders and authorities.

5. Collaboration and Stakeholder Engagement:

Objective: Engage in collaborative efforts with multidisciplinary stakeholders, fostering teamwork and effective communication to address road safety concerns using analyzed data.

6. Learning:

Objective: Embrace a mindset for continuous learning, adapt to new technologies, methodologies, and evolving trends in road safety analysis for ongoing improvement and professional growth.

7. Internship Provider:

Objective: Gain in workforce and social construct regarding the wellness of the society.

CHAPTER 1- Introduction

WORK:

- According to the definition of a road traffic accident (RTA), it is "an event that occurs on a way or street open to public traffic; results in one or more people being injured or killed, where at least one moving vehicle is involved." In the current situation, everyone is aware of the fact that more than half of people have been involved in traffic accidents, have died, or have been hurt while traveling on the road. In a traffic accident, pedestrians are often affected in addition to those travelling in the vehicles. Today's globe has made roads and transportation a crucial component of a country's expansion and development. Everyone uses the roads in some capacity. Although the current transportation system has reduced travel time, it has also increased the chance of fatalities.
- Every traffic accident results in the death of thousands of people and the terrible injury of countless others. A total of 2 million kilometers of roads exists in India, of which 960,000 kilometers are surfaced and 1 million kilometers are of poor quality. Urban locations experience severe traffic congestion, whereas rural areas have unsurfaced roads. Over 100,000 people die on Indian roadways each year as a result of collisions. Young and elderly, drivers, pedestrians, bus passengers, two-wheelers, and fourwheelers are all among the deceased. Additionally, it takes into account bicyclists and those who are idling by the side of the road rather than actually traveling. If nothing is done, the future appears to be rather grim given that the population is growing daily and the number of vehicles entering the road system is increasing quickly.
- Accidents cannot be completely prevented, but their frequency and seriousness can be reduced via scientific study and appropriate engineering interventions. In order to investigate accident causes and implement preventive measures for design and control, traffic engineers must identify systematic accident investigations. Every accident must be examined individually, and accident records must be kept by zone. These are some of the main issues that Indian highways currently face. This is a really serious matter that needs to be dealt with properly using appropriate statistical techniques. In the modern world, where the number of people who travel by car is sharply rising, there is a desire for more and safer roads in order to have highways free from accidents. The government is taking a lot of initiative to address this problem, but further research is needed. In an effort to make roadways safer for drivers, this study was conducted.

COMPANY OVERVIEW:

Intel Corporation, founded in 1968 by Robert Noyce and Gordon Moore, is one of the world's leading semiconductor chip manufacturers. It's renowned for its dominance in the microprocessor market and has played a pivotal role in the evolution of personal computing.

PURPOSE-

- Intel put the silicon in Silicon Valley. For more than 50 years, Intel and our people have had a profound influence on the world, driving business and society forward by creating radical innovation that revolutionizes the way we live.
- Today we are applying our reach, scale, and resources to enable our customers to capitalize more fully on the power of digital technology. Inspired by Moore’s Law, we continuously work to advance the design and manufacturing of semiconductors to help address our customers’ greatest challenges.

VALUES-

Our values guide how we make decisions, treat each other, and serve our customers. They underpin how we achieve our purpose: We create world-changing technology that improves the life of every person on the planet. More than simply words, our values are the common thread that unites us.

CORE BUSINESS-

- **Semiconductor Manufacturing:** Intel primarily designs and manufactures semiconductor chips, including microprocessors, chipsets, and other integrated components for various computing devices.

- **Data-centric Businesses:** In recent years, Intel has been expanding into data-centric businesses like data centers, IoT (Internet of Things), memory, and FPGA (Field Programmable Gate Array) technology.

KEY PRODUCTS AND TECHNOLOGIES-

- **Microprocessors:** Intel's x86 architecture-based microprocessors are widely used in PCs, laptops, servers, and workstations. Their flagship product line includes Intel Core processors for consumer PCs, Intel Xeon processors for servers and workstations, and Intel Atom processors for low-power devices.
- **Data Center Products:** Intel provides a range of solutions for data centers, including processors optimized for server workloads, networking products, and storage solutions.
- **Memory and Storage:** Intel manufactures NAND flash memory and Optane SSDs (Solid State Drives), which are used in various computing and data storage applications.
- **Internet of Things (IoT):** Intel offers processors and platforms designed for IoT applications in various industries, such as healthcare, automotive, industrial, and retail.

RECENT DEVELOPMENTS AND CHALLENGES-

- **Transition in Leadership:** In 2021, Pat Gelsinger took over as CEO, aiming to revitalize Intel's innovation and manufacturing capabilities.
- **Chip Manufacturing Challenges:** Intel faced delays in its transition to smaller chip manufacturing nodes (e.g., 7nm), leading to increased competition from rival manufacturers like AMD and TSMC.
- **Investments in Manufacturing:** The company announced plans to invest significantly in expanding and modernizing its semiconductor manufacturing capacity in the US and globally.
- **Focus on Diversification:** Intel is striving to diversify its product portfolio beyond CPUs by emphasizing AI, autonomous vehicles, and edge computing.

IMPACT-

- **Technological Advancements:** Intel's innovations in semiconductor technology have significantly shaped the evolution of computing devices, enabling faster, more efficient, and powerful processors over the years.
- **Computing Revolution:** The company's x86 architecture-based microprocessors have been a driving force in personal computing, powering a wide array of devices such as PCs, laptops, servers, workstations, and more.
- **Data Center Solutions:** Intel's data-centric solutions, including server-grade processors, networking products, and storage solutions, play a crucial role in data centers worldwide, supporting cloud computing and handling massive data workloads.
- **Influence on Industry Standards:** Intel's technology standards and developments often set benchmarks for the semiconductor industry, influencing design trends and innovations across the board.

CHAPTER 2- Analysis

EXISTING SYSTEMS:

- The issue of accident locations on Indian roads has been addressed in a number of related studies, and these works have developed solutions using QGIS tools to map these places and anticipate future accidents. Geospatial data and machine learning methods were used in a major work by Gupta et al. (2019) to pinpoint accident-prone regions in Delhi. They merged numerous geographical layers, including road networks, traffic volumes, and land use patterns, with accident data that was gathered from a number of different sources. They were able to identify high-risk areas by using clustering techniques and spatial analysis, and they produced heat maps to show the results. Sharma et al. (2020) conducted another study that combined historical accident data with information on the weather, road features, and traffic to examine the potential of QGIS in accident prediction modeling. According to their findings, spatial analytic approaches based on QGIS may accurately forecast accident-prone regions and support the creation of preventive measures. These connected works show the value of QGIS tools in mapping accident sites on Indian roads and predicting upcoming incidents, helping to improve road safety measures across the nation. Additionally, the Indian government has acknowledged the value of using geospatial tools to improve road safety. Organizations like the Ministry of Road Transport and Highways have undertaken initiatives like the integration of accident data with GIS platforms and the establishment of geospatial databases for accident analysis. There are many more research papers which have a detailed view on this topic. There have also been a lot of topics covered in this particular area of interest by the non-government organizations as a view of welfare for the people of India.

DISADVANTAGES:

Inadequate Infras+tructure-

- **Poor Road Maintenance:** Substandard road conditions, including potholes, lack of proper markings, and inadequate lighting, significantly contribute to accidents.
- **Insufficient Safety Measures:** Absence of proper signage, pedestrian crossings, and safety barriers further escalate the risk of accidents.

Traffic Congestion Challenges-

- **Urban Traffic Bottlenecks:** Overcrowded roads and inadequate traffic management in urban areas lead to congestion, resulting in increased accidents due to erratic driving behavior and impatience.
- **Highway Safety Concerns:** Highways witnessing heavy traffic often lack proper design elements, leading to accidents caused by overtaking and speeding.

Unsafe Driving Practices-

- **Reckless Driving Habits:** Rampant over speeding, disregard for traffic rules, and lack of lane discipline contribute significantly to accidents.
- **Driver Skill and Training:** Inadequate driver training and licensing procedures result in drivers lacking the necessary skills for safe driving.

Vehicle-related Factors-

- **Poor Vehicle Maintenance:** Many vehicles on the roads are poorly maintained, leading to mechanical failures and increasing the likelihood of accidents.
- **Lack of Updated Safety Features:** Some vehicles lack essential safety features or adhere to outdated safety standards, compromising road safety.

Enforcement and Legal Challenges-

- **Inconsistent Law Enforcement:** Ineffective implementation of traffic regulations, coupled with insufficient penalties for violations, fails to deter unsafe driving practices.
- **Legal Procedural Delays:** Lengthy legal processes lead to delayed justice for victims and their families, further exacerbating the consequences of accidents.

Limited Emergency Services and Medical Aid-

- **Response Time and Medical Facilities:** Delayed response times from emergency services and inadequate medical infrastructure worsen the outcomes of accidents.

Data Collection and Analysis Gaps-

- **Incomplete Reporting:** Inaccurate or incomplete reporting of accidents hampers the accurate analysis needed to formulate effective preventive strategies.

These are the disadvantages which we faced while creating this report. These disadvantages aren't mainly obstructing the whole view of the report since most of them have already been resolved.

PROPOSED METHOD:

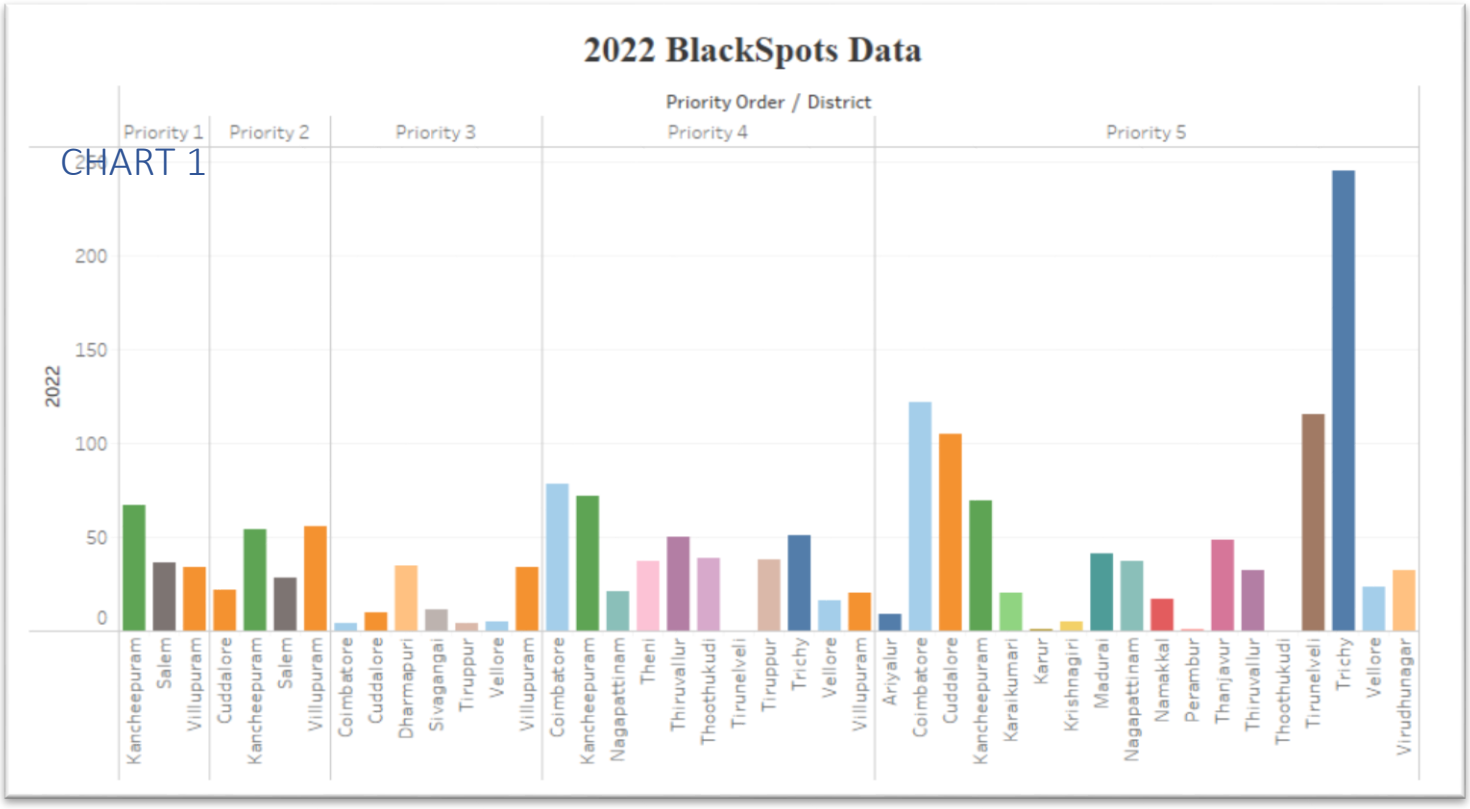
Blackspots in Tamil Nadu-

- We have chosen Tamil Nadu's Blackspots and explored 11 years' worth of data. During this process we have gathered the data for 100 main blackspot regions in Tamil Nadu during the years 2011 – 2013, then using the synthetic data creation AI tool called Gretel and created approximate data for the next 9 years 2014 – 2022.
- We have then combined these data into a table and have input the resultant table into the QGIS application from where we have marked the blackspots across the State of Tamil Nadu. After attaining the suitable data sets, we have analyzed all these spots and the reasons for why these accidents occur using the Tableau software.

Analysis-

- After acquiring the data, we have used the Tableau Software to analyze and create graphs which provide a visual representation of the data acquired. We at first created a bar graph for the year 2022 and we have categorized the chart priority wise where the priority increases with the decrease in number. Similar to the displayed visual in Chart 1, we have created charts for all the 11 years.
- From the total of 100 blackspots, we have shown the common 24 districts containing those major blackspots in here, we can see that there are multiple districts repeated in each priority, these are divided by the blackspots with different priorities in each district, we can see that the bars in priority 5 is high and gets depleted in each consecutive priority. This is due to the fact that priorities increase with decrease in number in the graphs given. This is common to all the graphs given. We have created a predictive graph for the year 2023 as shown in the Chart 2 by using "=FORECAST.LINEAR(x, known_ys, known_xs)" formula in excel, we were able to predict the accident data for 2023, this prediction is based on the past 11 years of data, from 2011 – 2012. After collecting the data and creating an excel, we have input the data into the QGIS tool and have plotted the blackspots in the Tamil Nadu region. Then we have used the Tableau Data Visualization tool and created a visual display of the points.

CHART 1



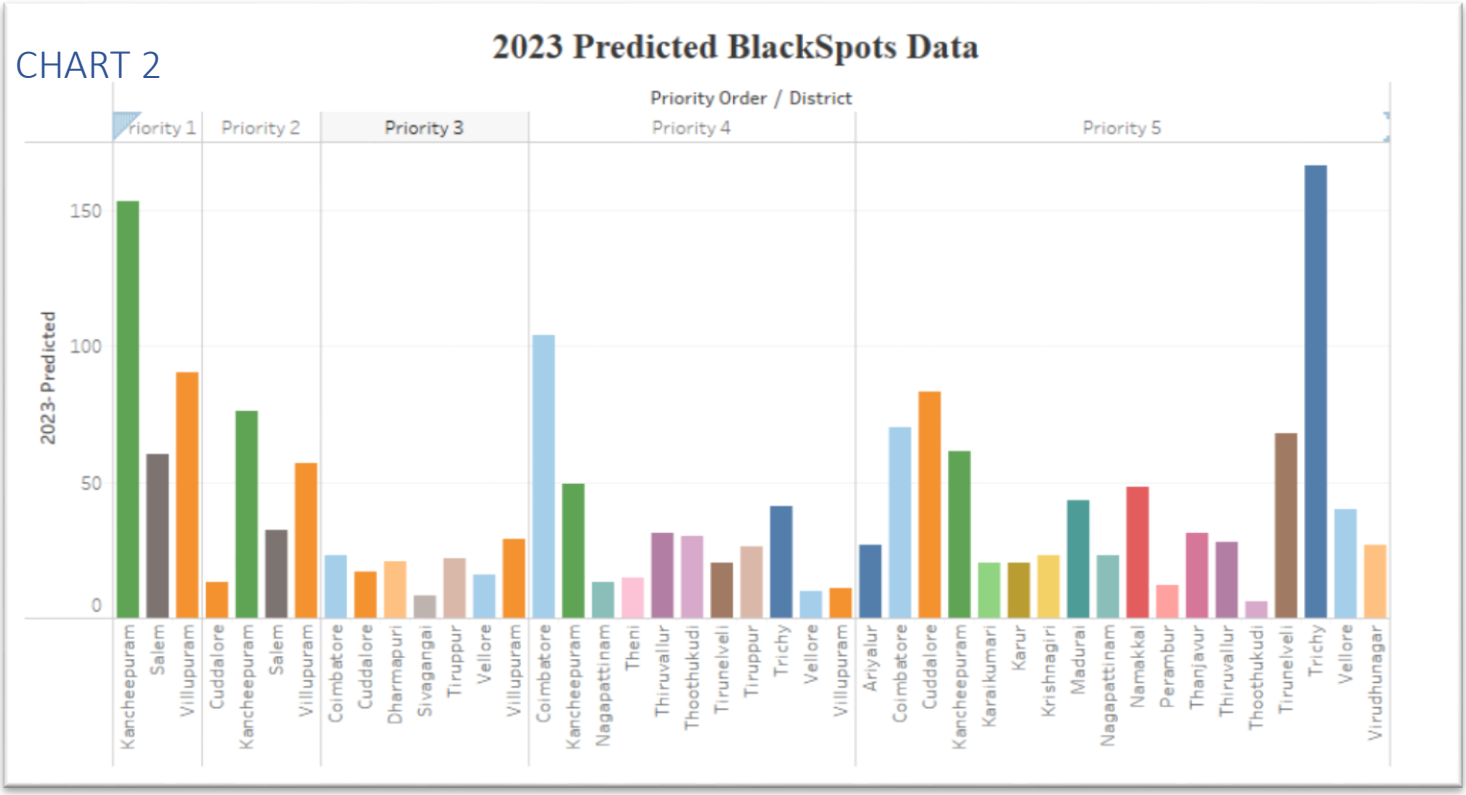
The above provided chart is the detailed view of the blackspot data we have found for the year 2022 and these data are spilt into priority wise. Now let us see some of the important key findings we have found from this chart.

Key Findings-

- **Identification of Blackspots:** The analysis identified and mapped specific areas within Tamil Nadu characterized by a notably higher incidence of road accidents called "Priorities".
- **Severity Analysis:** The chart categorized blackspots based on the severity of accidents, highlighting areas with a higher rate of severe or fatal incidents.
- **Temporal Trends:** Trends in accident occurrences over different areas were observed, providing insights into area wise variations in these blackspots.
- **Contributing Factors:** Preliminary insights into potential contributing factors, such as road conditions, infrastructure, traffic density, or driver behavior, were identified for further investigation.

This skeletal summary encapsulates the essential aspects of the Blackspot Chart Analysis for 2022, offering a foundational understanding of the identified high-risk areas in Tamil Nadu. Further in-depth analysis and collaborative efforts are recommended to address the underlying causes and implement preventive measures, ultimately enhancing road safety across the region.

CHART 2



The above provided chart is the detailed view of the blackspot data we have created for the year 2023 and these data are spilt into priority wise. Now let us see some of the important key findings we have found from this chart.

Key Findings-

- **Identified Potential Blackspots:** The analysis forecasted and mapped areas expected to become blackspots in 2023 based on predictive models.
- **Severity Projection:** Projections regarding the severity of accidents in these potential blackspots, encompassing an estimation of severe or fatal incidents.
- **Temporal Projections:** Anticipated temporal trends in accident occurrences, aiding in foreseeing seasonal variations or time-of-day patterns in the predicted blackspots.
- **Potential Contributing Factors:** Preliminary insights into potential contributing factors, such as infrastructure changes, traffic density variations, or emerging trends, were highlighted for further investigation.

This skeletal summary provides a glimpse into the anticipated high-risk areas projected to become blackspots in Tamil Nadu for the year 2023. Further comprehensive analysis and collaborative efforts are recommended to validate predictions, identify causative factors, and implement preemptive strategies to mitigate road accidents and enhance overall road safety in the region.

CHAPTER 3- Software/Hardware Requirements

SOFTWARE REQUIREMENTS:

QGIS-

- QGIS (Quantum GIS) emerges as a critical component in the software requirements for analyzing accident locations on roads in Tamil Nadu, India. As an open-source Geographic Information System (GIS) software, QGIS offers a versatile platform essential for the comprehensive understanding and effective management of road incidents.
- Its robust capabilities enable the integration of diverse data layers, allowing accident data to be overlaid onto detailed geographic maps of Tamil Nadu. This integration facilitates the identification and visualization of accident-prone areas and patterns, empowering authorities to pinpoint specific locations with higher incidents and severity rates.

  QGIS's advanced geoprocessing tools enable in-depth spatial analysis, including proximity analysis. This feature is instrumental in examining the relationships between accidents and various geographic elements like road infrastructure, traffic density, and terrain characteristics. Such analyses provide valuable insights into the underlying factors contributing to accidents, aiding in the formulation of targeted intervention strategies.
- The software's adaptability to handle multiple data formats ensures seamless integration with various accident-related datasets, such as police reports, hospital records, and traffic department information. This comprehensive approach enables a holistic view of accidents, fostering a deeper understanding of their spatial context and contributing factors.
- Furthermore, QGIS's proficiency in generating visually compelling maps and conducting intricate spatial queries enhances reporting capabilities. These reports offer clear and detailed insights into accident distributions, trends, and correlations with geographical features. Such information equips stakeholders, policymakers, and traffic authorities with data-driven decision-making tools to prioritize resources and implement tailored road safety measures effectively.
- QGIS offers a high degree of customization, allowing users to develop specialized plugins and scripts tailored to specific accident analysis requirements. This flexibility enables the creation of custom tools for analyzing accident clusters, identifying contributing factors unique to Tamil Nadu's roads, and predicting potential high-risk areas based on historical data. Such tailored analyses enhance the precision of accident prevention strategies and resource allocation for road safety improvements.
- In this particular project, we have used the QGIS tool to identify the various blackspots around the state of Tamil Nadu. We have moreover used the tool to also visualize the whole dataset we have created on the basis of this project.
- Hence, this software application has played a major role in creating broad geospatial images for the datasets achieved.

TABLEAU-

- Tableau's strength in transforming complex datasets into visualizations significantly contributes to analyzing accident locations. It can compile various accident-related data points, such as location coordinates, severity, vehicle types, and time of occurrence, into interactive dashboards and charts. This visual representation offers a comprehensive overview of the accidents, aiding in identifying patterns and trends.
- With Tableau's mapping capabilities, accident locations can be precisely plotted on geographical maps of Tamil Nadu. These maps provide a clear visualization of accident hotspots and clusters, allowing authorities to identify specific regions with higher incidents. Geospatial analysis through Tableau assists in understanding the spatial distribution of accidents, aiding in targeted interventions.
- Tableau's time-series analysis tools facilitate the examination of accident trends over time. By creating dynamic visualizations, stakeholders can identify patterns based on different timeframes, such as seasonal variations or time-of-day trends. This temporal analysis enables the formulation of targeted interventions and resource allocation during specific periods.
- The drill-down functionality in Tableau enables stakeholders to delve deeper into accident data. Users can zoom in from a state-level overview to district or city levels, facilitating more granular analysis. This capability provides insights into localized issues, aiding in region-specific strategies for road safety improvement.
- Tableau's seamless integration with diverse data sources, including spreadsheets, databases, and geospatial files, enriches accident analysis. It allows for the inclusion of supplementary datasets such as traffic flow, weather conditions, and road infrastructure details. This integrated approach enhances the depth and accuracy of accident location analysis.
- Using Tableau's predictive analytics capabilities, stakeholders can develop models to forecast potential accident-prone areas based on historical data patterns. This proactive approach assists in identifying and addressing potential risk zones, allowing for preemptive measures to prevent accidents.
- Tableau enables the creation of customized dashboards tailored to the needs of different stakeholders. These dashboards can present relevant insights, key performance indicators (KPIs), and geographical representations of accidents in a user-friendly format, aiding stakeholders in making informed decisions.
- Tableau's capabilities in creating interactive reports and presentations help in effectively communicating accident analysis findings. The visualizations generated can be shared across departments or presented to the public, promoting awareness and advocating for road safety measures.
- In our project we have used the Tableau software to visualize the data and create graphs with infer to the time period which we have previously collected from various databases.
- The Tableau Software plays a vital role in the data visualization part in out project.
- We have created in total of 13 bar graphs and some pie charts to visualize the blackspots all over Tamil Nadu and further more we have used these charts to perform a priority wise data analysis for all the blackspots all over Chennai.

GOOGLE EARTH-

- Google Earth's primary strength lies in its ability to provide accurate and detailed geospatial visualization. It enables the precise plotting of accident locations on interactive and high-resolution satellite imagery maps of Tamil Nadu. This feature allows for a clear and intuitive representation of accident hotspots and patterns across different regions.
- Utilizing Google Earth's mapping capabilities, accident data can be superimposed onto geographical maps. This integration assists in identifying clusters and concentrations of accidents, offering insights into specific areas requiring targeted interventions for road safety improvement.
- Google Earth's historical imagery feature allows for time-based analysis. By comparing historical satellite images, stakeholders can observe changes in road infrastructure, traffic density, and urban development, providing context for accident occurrences over time.
- The 3D visualization feature in Google Earth offers a unique perspective by rendering geographical landscapes and infrastructure in three dimensions. This aids in visualizing accident-prone areas from different angles, providing a more comprehensive understanding of the terrain's influence on road safety.
- Google Earth can integrate with GIS data, offering compatibility with various geographic datasets. This integration enhances the analysis by combining accident data with additional information such as road networks, traffic flow, and topographical details.
- Google Earth Engine, the platform's cloud-based geospatial analysis tool, allows for real-time monitoring of geographical data. It facilitates collaboration among stakeholders by providing a shared platform to access, analyze, and visualize accident-related spatial information.
- Google Earth's user-friendly interface allows for the creation of interactive maps and visualizations. These can be shared with the public, raising awareness about accident-prone areas, advocating for road safety measures, and encouraging community engagement in addressing safety concerns.
- Google Earth offers customization options to tailor maps and visualizations based on specific requirements. These customizable features enable the creation of detailed reports and presentations, effectively communicating accident analysis findings to relevant authorities and the public.
- We have further more used the google earth to identify the latitude and longitude of various blackspots and to cross check the data we have received from the data warehouses.
- Google Earth plays an important role in finding and categorizing the Latitude and Longitude of all the places considered blackspots.
- We have also used this software to analyze the spatial data we received from various other software like QGIS, etc.

MS EXCEL-

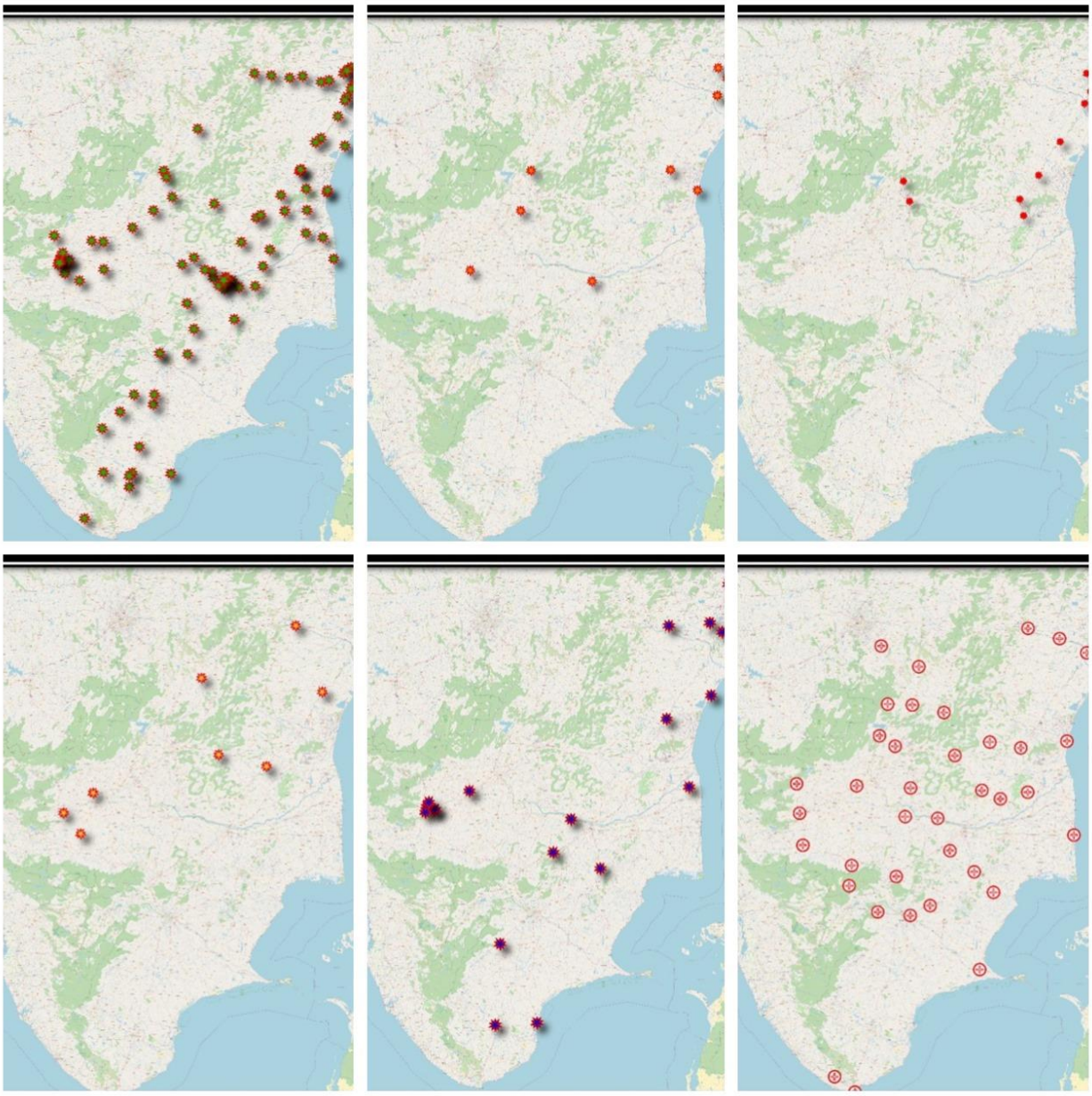
- Excel's spreadsheet functionality enables the compilation and organization of accident data obtained from various sources such as police reports, hospital records, and traffic department information. It allows for structured data entry, categorization, and sorting based on accident location, time, severity, and other relevant parameters.
- While not inherently designed for geospatial analysis, Excel's functionalities can facilitate basic spatial analysis. By using location coordinates or addresses, users can generate simple maps and charts within Excel to visualize accident locations across Tamil Nadu.

  Excel's built-in functions and tools for statistical analysis aid in identifying accident trends. Users can perform calculations, create pivot tables, and generate graphs to analyze patterns in accidents over time, by region, or based on specific variables like vehicle types or road conditions.

  Excel's charting capabilities allow for the creation of basic visual representations of accident data. Bar graphs, pie charts, and line graphs can display accident frequency, severity, and other pertinent information, providing a straightforward visualization of trends and patterns.
- Excel supports certain add-ins or plugins that enable geocoding of addresses or coordinates. Although not as comprehensive as dedicated mapping software, these add-ins can assist in plotting accident locations on maps within Excel, offering a basic spatial representation.
- Excel facilitates collaboration among stakeholders by enabling the sharing of spreadsheets and reports. Users can create summary reports and share the analyzed accident data with relevant authorities, traffic departments, or researchers for further analysis or action.

  While it may not be the primary tool for in-depth geospatial analysis, Excel serves as a supplementary tool for initial data exploration and preliminary insights. Its user-friendly interface allows stakeholders with varying technical expertise to interact with accident data.
- Excel provides the capability to export data to other software platforms. Analyzed accident data can be exported to specialized geospatial tools or databases for more in-depth geospatial analysis and visualization.
- Excel's functionalities facilitate data cleaning and quality assurance processes. Users can identify and rectify inconsistencies, errors, or missing information in accident datasets. This ensures data accuracy and reliability before further analysis or visualization, contributing to more robust analytical outcomes.
- As a widely available and cost-effective software, Excel serves as an accessible tool for preliminary accident data analysis. Its widespread familiarity among users allows for quick adoption and utilization without the need for extensive training or additional software investment. This accessibility makes it an initial starting point for assessing accident locations before employing more specialized geospatial tools.
- Furthermore, here we have used the MS Excel to perform logistic regression analysis which was then used to predict the blackspots for the year of 2023.
- MS Excel plays a vital role in the prediction process which we have then included in this report.
- MS Excel was also used to display the datasets created and observed hence giving us a clear view of all the data used in this project.

CHAPTER 4 – OUTCOMES



- The first map indicates The Priority 1, which is the highest priority spot with the greatest number of fatalities. We can see that the Blackspots are relatively less in this Priority when compared to the other Priorities. When we look at the linear representation of spots, we can see that the highway NH32 has the most blackspots. NH32 is the highway which connects Tambaram with Maduravoyal, it also does not have streetlights for 13 years until the 32km stretch was laid. Around 30 accidents were reported on this highway every year almost 40% of them happened between 6pm and 6am, says official data.

- The second map indicates the high rate of accidents which was occurred in Tamilnadu. While comparing to priority 2 to the priority 1 the accident rates are closely similar but slightly lesser. There is a large number of fatalities in these regions. However, it can be reduced by undergoing a very effective measures to avoid the accidents. Most of the accidents were occurred in the busier roads in the peak hours. These locations need an immediate action to ensure the public safety. Most of the fatalities occurs near the highways and workplaces where people are in

- rush. Kancheepuram, Salem, Nagapattinam, Tiruppur, Trichy are the districts of Tamilnadu that comes under Priority 2.
- The third map indicates the Blackspots which is having moderate accident rate. The frequency of fatalities is in the manner of up and down. However, it can also be suppressed by initiating the safety protocol measures for better survival. The total rate of occurrence of accidents and fatalities are lesser in priority 3 than the priority 1 and priority 2. Vellore, Ariyalur, Tiruppur, Tiruvannamalai were Blackspot districts that are having Priority 3 Blackspots locations. These areas have accidents occurring at a point where it is in the middle of the priority stream.
- The fourth map indicates the Priority 4, which is the second last Priorities with fatalities. We can see that many blackspots fall under the Coimbatore region, while the others are scattered all around the State of TamilNadu, this is mostly due to the fact that Priority 4 is normally confused with the other priorities since its close fatality rate to Priority 3 and 5. In this Priority, the fatality rates are relatively higher in the years with less fatalities due to the fact that, this category normally falls under both high and low and moderate in the category.
- The fifth map indicates the locations which have very low number of accidents. It is identified using the incidents that have occurred in past few years and the severity of the accidents. These places also have very little Fatalities. Here, the accidents are due to the drivers' error, speeding, mechanical problems, animals and bad weather. To avoid these accidents several measures should be taken, these includes preparing for the bad weather, regular maintenance of the vehicle, obeying traffic rules, etc. The benefits of reducing the occurrence of these accidents such as saving lifesaving money, less injury etc.
- The emergency map shows the areas which are established near the accident sites or locations. It is used to ensure the victims safety and emergency operations to save the life. These places are neighboring police stations, fire service and emergency hospitals. The size of the emergency zones varies according the priority level, that is greater the priority greater the service. The identification of the emergency zones is marked using the sign boards and flares. With the help of the data from traffic police FIRs EMRI (Emergency Management Research Institute) increased the number of ambulances and hospitals near the accident-prone zones.

CHAPTER 5 – CONCLUSION

In conclusion on regarding to the topic, we were able to analyze the 100 blackspots from 24 districts where the fatalities have been given for each year with those blackspots respectively. We can see that there are a total of 15 blackspots in Kancheepuram, while there is only 1 blackspot in Dharmapuri which directly coincides to the total population of those two districts where there are totally 5,557,571 people in Kancheepuram (estimates as per Aadhar uidai.gov.in Dec 2023 data) while there are only 1,750,000 people in Dharmapuri. This can be used as an Indication as of how the population plays a vital role in the accident rates in specific areas.

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total	1053	1458	1455	2058	2009	1489	2017	2078	1658	1811	2218	1744

From the above table taken from our dataset, we can see that there is a huge difference between years in total. If we take the economics and the factors like covid and the manufacturing rates, we can see that those factors affect year-wise. This is also seen by the depletion in the fatalities in the year 2019 and 2020 while the years like 2021 are more since the gap in the driving ventures.