

**TRAVEL SENTINEL: EMPOWERING SAFEJOURNEYS
WITH REAL-TIME ACCIDENT UPDATES,WEATHER
ALERTS**

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Computer Science and
Engineering

by

CHEEDELLA JASWANTH PAVAN KUMAR (Reg.No - 40110247)

CHILLA JAYA SANKAR NAIDU (Reg.No-40110261)



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHOOL OF COMPUTING

SATHYABAMA

**INSTITUTE OF SCIENCE AND
TECHNOLOGY (DEEMED TO BE
UNIVERSITY)**

Category-1 University by UGC

**Accredited with Grade "A++" by NAAC | 12B Status by UGC | Approved by AICTE
JEPPIAAR NAGAR, RAJIV GANDHI SALAI,
CHENNAI - 600119**

APRIL - 2024



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Category - I University by UGC

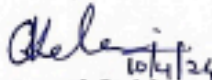
Accredited "A++" by NAAC | Approved by AICTE

www.sathyabama.ac.in

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of CHEEDELLA JASWANTH PAVAN KUMAR (Reg.No - 40110247) and CHILLA JAYA SANKAR NAIDU (Reg.No - 40110261) who carried out the Project entitled "Travel Sentinel: Empowering Safe Journeys With Real-Time Accident Updates, Weather Alerts" under my supervision from November 2023 to April 2024.


10/4/24
Internal Guide

Dr. G. KALAIARASI M.E., Ph.D.,


Head of the Department

Dr. HEAD OF THE DEPARTMENT M.E., Ph.D.,

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SATHYABAMA

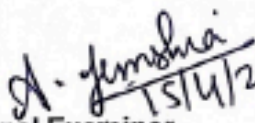
INSTITUTE OF SCIENCE AND TECHNOLOGY

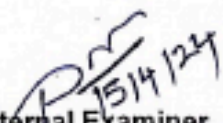
(DEEMED TO BE UNIVERSITY)

Jeppiaar Nagar, Rajiv Gandhi Salai,

Chennai - 600 119.

Submitted for Viva voce Examination held on 15-04-2024


15/4/24
Internal Examiner

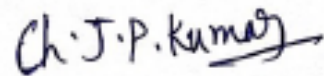

15/4/24
External Examiner

DECLARATION

I, CHEEDELLA JASWANTH PAVAN KUMAR (Reg.No - 40110247), hereby declare that the Project Report entitled **Travel Sentinel: Empowering Safe Journeys With Real-Time Accident Updates, Weather Alerts** done by me under the guidance of Dr. G. Kalaiarasi M.E., Ph.D., is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

DATE: 15-04-2024

PLACE: Chennai



SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **The Board of Management of Sathyabama Institute of Science and Technology** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E., Ph. D, Dean**, School of Computing, **Dr. L. Lakshmanan M.E., Ph.D.**, Head of the Department of Computer Science and Engineering for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. G. Kalaiarasi M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Computer Science and Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

Road accidents remain a significant concern globally, contributing to a substantial number of fatalities, disabilities, and hospitalizations. In response to this pressing issue, various models have been developed to predict accident risks, ranging from traditional statistical methods to advanced machine learning techniques. This study conducts a comprehensive comparative analysis of these models to ascertain an effective approach for traffic accident risk prediction. The primary objective is to empower drivers with insights that can aid in minimizing accidents and ultimately save lives. The study focuses on factors that drivers can anticipate, such as vehicle type, age, sex, time of day, and weather conditions, to provide actionable predictions. It explores the efficacy of three distinct predictive models: Optimal Classification Trees, Random Forest, and Logistic Regression. These models are chosen for their ability to generate results that align with intuitive understanding, thereby facilitating informed decision-making for drivers. Moreover, the study delves into the utilization of geo-location data analysis using Support Vector Machine (SVM) algorithm to identify areas with heightened accident risks. By analyzing previously known factors through these algorithms, drivers can be equipped with traffic accident risk predictions tailored to their specific circumstances. The proposed project aims to develop a comprehensive framework for traffic prediction and road accident analysis, leveraging both traditional statistical methods and cutting-edge machine learning algorithms. By integrating these approaches, the project seeks to enhance the accuracy and applicability of accident risk predictions. In conclusion, the project endeavors to provide a valuable tool for drivers to proactively mitigate accident risks and improve road safety. By harnessing the power of data analytics and machine learning, the project aims to contribute towards a reduction in road accidents, thereby saving lives and minimizing the societal and economic impact of such incidents. Through collaborative efforts between researchers, policymakers, and stakeholders, the project aspires to foster a culture of safety and responsibility on the roads.

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	ABSTRACT	v
	LIST OF FIGURES	ix
	LIST OF ABBREVIATION	x
1	INTRODUCTION	1
	1.1 BACKGROUND AND MOTIVATION	2
	1.2 PROBLEM STATEMENT	2
2	LITERATURE SURVEY	3
	2.1 OVERVIEW OF EXISTING RESEARCH AND LITERATURE	3
	2.2 INFERENCES FROM LITERATURE SURVEY	5
	2.3 OPEN PROBLEMS IN EXISTING SYSTEM	7
3	REQUIREMENT ANALYSIS	8
	3.1 AIM	8
	3.2 SCOPE	8
	3.3 REQUIREMENT ANALYSIS	9
	3.4 FUNCTIONAL REQUIREMENTS	9
	3.5 NON-FUNCTIONAL REQUIREMENTS	10
	3.6 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT	10
	3.7 REQUIREMENT SPECIFICATION	11
	3.7.1 HARDWARE REQUIREMENTS	11
	3.7.2 SOFTWARE REQUIREMENTS	11

4	DESCRIPTION OF PROPOSED SYSTEM	12
4.1	PROPOSED SYSTEM	12
4.2	ADVANTAGES OF PROPOSED SYSTEM	12
4.3	ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM	12
5	IMPLEMENTATION DETAILS	16
5.1	EXPERIMENTAL METHODS AND IMPLEMENTATION	16
5.1.1	DATA COLLECTION	16
5.1.2	SOFTWARE AND TOOL	16
5.1.3	DATA PREPROCESSING	16
5.1.4	ALGORITHMIC IMPLEMENTATION	16
5.1.5	PROCESS MODEL	17
5.2	PYTHON	17
5.3	ANACONDA	18
5.4	DATA SCIENCE	19
5.5	MACHINE LEARNING	20
5.6	LOGISTIC REGRESSION	20
5.7	SVM	21
5.8	DECISION TREE	22
5.9	FLASK	24
5.10	RANDOM FOREST	24
5.11	SELECTED METHODOLOGY	25
5.11.1	USER INTERFACE MODULE	25
5.11.2	DATA COLLECTION MODULE	25
5.11.3	ANALYSIS MODULE	25

	5.11.4 REPORT ACCIDENT MODULE	26
	5.11.5 PREDICTION MODULE	26
	5.11.6 WEATHER MODULE	27
	5.11.7 PATH MODULE	27
	5.12 SYSTEM TESTING	27
6	RESULTS AND DISCUSSION	30
6.1	RESULT	30
6.2	PRESENTATION OF FINDINGS	31
6.3	OUTCOMES	31
6.4	PERFORMANCE ANALYSIS	32
6.5	DATA ACCURACY AND RELIABILITY	33
6.6	PRIVACY AND SECURITY	33
6.7	ROBUSTNESS TO VARIABILITY	33
7	CONCLUSION	35
	REFERENCES	37
	APPENDIX	38
	A. SOURCE CODE	38
	B. SCREENSHOTS	47
	C. RESEARCH PAPER	53
	D. CERTIFICATE	64

TABLE OF FIGURES

FIGURES	FIGURES NAME	PAGE
NO		NO
4.3.1	SYSTEM ARCHITECTURE	13
4.3.2	ALGORITHM FLOW DIAGRAM	14
5.6.1	LOGISTIC REGRESSION	21
5.7.1	SVM	22
5.8.1	DECISION TREE	23
B.1	DATASET	47
B.2	HOME PAGE	47
B.3	VISUALIZATION OF ACCIDENTS HOTSPOT ON MAP	48
B.4	VISUALIZATION OF ACCIDENTS BASED ON VEHICLE TYPE	48
B.5	VISUALIZATION OF PERSONS KILLED IN ACCIDENTS	49
B.6	ACCIDENTS BASED ON HOURS	49
B.7	GRAPH FROM DECISION TREE	50
B.8	PATH SELECTION	50
B.9	WEATHER REPORT	51
B.10	GIVING PARAMETERS	51
B.11	PREDICTING THE ACCIDENT RISK	52

LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
RTA	Road Traffic Accident
NHTS	National Highway Traffic Safety Administration
FARS	Fatality Analysis Reporting System

CHAPTER 1

INTRODUCTION

N

The Road Traffic Accidents (RTAs) pose a significant public health concern in India, contributing to a staggering number of fatalities and injuries each year. With approximately 1.25 million deaths and 50 million injuries globally attributed to RTAs annually, the urgency to address this issue within the Indian context cannot be overstated. Despite concerted efforts by transportation authorities and the adoption of various regulations and safety measures, the reduction of RTAs remains a formidable challenge. This failure, in part, arises from the inherent difficulty in accurately predicting when and where these accidents may occur. The occurrence of RTAs is influenced by a myriad of factors, ranging from speed and traffic conditions to road structure, weather, and even less obvious variables such as national holidays and selective attention. While municipal and national governments in countries like UK have made strides in compiling rich datasets of RTAs and associated factors, the Indian context presents unique challenges and opportunities for addressing this issue. This project aims to bridge this gap by leveraging predictive analytics, specifically tailored to the Indian setting, to develop an accurate RTA prediction model. Drawing insights from government datasets and external data sources, we seek to uncover patterns that will enable us to forecast with precision when and where RTAs are likely to occur across various regions in India. The primary objective is to create a user-friendly web interface that not only provides a simple explanation of the predictive model but also offers visualizations highlighting the importance of different factors in predicting RTAs. Additionally, we aim to develop an interactive dashboard allowing users to input variables such as location, date, and time, thereby obtaining real-time probabilities of RTAs in their chosen areas. The outcome of this project holds immense potential to benefit the Indian public by providing a comprehensive visualization tool that communicates the probability of RTAs in specific regions. Moreover, it will aid transportation authorities in formulating targeted strategies to mitigate the occurrence of RTAs, thus contributing to enhanced road safety and public welfare in India. The Fatality Analysis Reporting System (FARS) dataset is a comprehensive and extensive database maintained by the National Highway

Traffic Safety Administration (NHTSA).It contains detailed information on fatal traffic

accidents that occur on public roads across the country. The FARS dataset includes a wide range of variables related to each accident, such as the date, time, location, and circumstances of the crash, as well as details about the vehicles involved, drivers, passengers, and any contributing factors. Researchers, policymakers, and safety experts often utilize the FARS dataset to analyze trends, identify risk factors, and develop strategies for improving road safety and reducing the incidence of fatal accidents.

1.1 BACKGROUND AND MOTIVATION

The project's background stems from the pressing global issue of road traffic accidents (RTAs), which claim millions of lives annually and cause significant injuries. Despite efforts in regulations and safety measures, the reduction of RTAs remains a challenge. Motivated by this, the project seeks to explore innovative solutions, leveraging predictive modeling and data analytics, to predict and mitigate the occurrence of RTAs. The overarching goal is to contribute to improved road safety and reduced fatalities through the application of advanced technologies and proactive interventions.

1.2 PROBLEM STATEMENT

The increasing frequency of traffic accidents poses a significant threat to public safety, leading to loss of lives and injuries. Despite existing safety measures and regulations, the lack of real-time information and proactive alerts hinders traveler's ability to make informed decisions and avoid potential hazards during their journeys. Furthermore, adverse weather conditions exacerbate road risks, often contributing to accidents. To address these challenges, the project, titled "Travel Sentinel: Empowering Safe Journeys With Real-Time Accident Updates, Weather Alerts," aims to develop a comprehensive solution that provides travelers with real-time updates on accidents and weather conditions, empowering them to make safer and informed decisions while on the road.

CHAPTER 2

LITERATURE SURVEY

This problem statement has been extensively studied over the past 5 years by researchers and automotive companies in a bid to create a solution, and all their solutions vary from analyzing various patterns of distractive habits to analyzing healthvitals of the driver and time of travel.

2.1 OVERVIEW OF EXISTING RESEARCH AND LITERATURE

The Road traffic accident prediction Using Ultrasonic Sensor[1] made analysis of accident data, identification of contributing factors such as road characteristics, traffic flow, weather conditions, and driver behavior, as well as the application of statistical and machine learning models for predictive modeling. This synthesizes a wide range of studies, methodologies, and approaches used in predicting road traffic accidents, offering insights into the factors contributing to accidents, predictive modeling techniques, and the effectiveness of various interventions. By examining the latest advancements in accident prediction modeling, the authors aim to provide a foundation for further research and the development of targeted strategies to reduce the incidence and severity of road traffic accidents.

A naive Bayes classifier is an algorithm that uses Bayes' theorem to classify objects. Naive Bayes classifiers assume strong, or naive, independence between attributes of data points These classifiers are widely used for machine learning because they are simple to implement. Discussed in A perspective analysis of traffic accident using data mining [2].

Vatti et al.,[3] proposed a data-driven accident prevention system leverages data analytics, machine learning, and predictive modeling to proactively identify and mitigate risks, resulting in safer roads and fewer accidents. This approach utilizes existing research to highlight the potential of data-driven solutions in accident prevention and road safety enhancement.

Multipurpose Sensing Platform for Improved Road Safety [4] involves harnessing big data, machine learning, and predictive modeling to identify risks, reduce accidents, and enhance traffic management. This study delves into research,

shedding light on the potential of data-driven solutions for safer roads and fewer traffic related fatalities.

Avinash Kumar[5] This introduces a mobile application designed to mitigate the risks associated with distracted driving, particularly due to phone calls. The main functionality of the application revolves around automatically detecting when a user is driving and then implementing measures to minimize distractions caused by incoming calls

Patil, Upreti, and Poonia[6] authors Explores the utilization of Artificial Intelligence (AI) techniques in developing applications for the detection of fatal traffic accidents. this provides insights into the potential of AI technologies to enhance accident detection and prevention efforts, ultimately contributing to reducing the incidence of fatal traffic accidents.

Accident Detection and Alarm System for Emergency Help Services [7] The main idea is to build an application that makes use of the sensors present in mobile phones like GPS and Accelerometer and detect any collision if there is a sudden external disturbance in the speed with the help of the Sensor Fusion Based Algorithm. With the help of the data obtained from the Accelerometer sensor, when there is a sudden disturbance to the mobile phone, the user is notified with an alert message before sending the request help signal.

Satyabama Krishna, S.P. Mary [8] has launched a new platform designed to enhance the delivery of governance and public services in the region. The proposed framework integrates data analysis techniques to analyze different aspects of regional performance, with the aim of providing insights for local authorities to make informed decisions. Additionally, the platform facilitates public engagement by providing a complaints website where residents can report issues and concerns, enabling them to be effectively resolved through easy communication. By using technology to promote transparency, accountability and public participation, this research contributes to the development of smart governance policies. The Smart District Analysis and Complaints website offers comprehensive solutions to meet the evolving needs of modern city management, making it a valuable reference topic in electronic and media formats.

Rishi et al[9] they are used to improve vehicle tracking and accident detection system. The proposed system uses advanced technologies such as GPS and sensors to track the speed and position of vehicles in real time. When an accident is detected, the system automatically triggers an alert message to emergency services or designated contacts, facilitating quick and potentially life-saving response. This innovative solution aims to address the critical issue of late accident reporting and response time, to improve road safety and reduce accident severity. Utilizing modern connectivity and tracking technologies, the system provides a promising framework for integration with existing vehicle tracking infrastructure, contributing to the achievement of intelligent transportation systems development.

Lee, Shrestha, and Hu explore[10] goes deeper into the use of data. The aim of the study is to reveal the hidden factors, trends and causes of fatal accidents. Using data mining techniques such as clustering, classification, and association rule mining, the authors try to extract valuable insights from large accident datasets. This study contributes to road safety policy types are enhanced by the identification of important factors related to fatal accidents.

2.2 INFERENCES FROM LITREATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites.

Before building the system the above consideration are taken into account for developing the proposed system. The major part of the project development sector considers and fully survey all the required needs for developing the project. For every project Literature survey is the most important sector in software development process. Before developing the tools and the associated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength.

The significance of understanding contributing factors such as road characteristics, traffic flow, weather conditions, and driver behavior. Leveraging statistical and machine learning models, these studies demonstrate the efficacy of predictive modeling techniques in identifying patterns and predicting accident occurrences, thus laying the groundwork for targeted interventions to reduce accident rates.

The transformative potential of harnessing big data, machine learning, and predictive modeling in proactively identifying and mitigating risks on roads. These studies emphasize the importance of leveraging technological advancements to enhance traffic management, reduce accidents, and ultimately improve road safety outcomes.

Furthermore, the integration of Artificial Intelligence (AI) techniques in accident detection and prevention, as discussed in "Investigation on AI-Based Techniques in Applications for Detecting Fatal Traffic Accidents", highlights the promising avenues for enhancing accident detection capabilities and preventing fatal incidents. By leveraging AI technologies, researchers aim to develop applications capable of accurately detecting and predicting fatal accidents, thereby contributing to the overarching goal of reducing traffic-related fatalities.

Additionally, the focus on mitigating distractions while driving, as exemplified in "Application to Reduce Distraction Caused by Phone Calls While Driving" by Kumar

, underscores the importance of addressing human factors in accident prevention efforts. By introducing mobile applications designed to minimize distractions caused by phone calls, researchers aim to promote safer driving habits and reduce the likelihood of accidents resulting from driver distraction.

Overall, the synthesis of literature from diverse perspectives underscores the importance of interdisciplinary approaches and technological innovations in advancing road safety initiatives. By leveraging data analytics, machine learning, AI, and sensor-based technologies, researchers aim to develop proactive solutions for accident prevention, emergency response, and promoting safer driving behaviors, ultimately contributing to the overarching goal of reducing traffic-related fatalities and improving road safety outcomes.

2.3 OPEN PROBLEMS IN EXISTING SYSTEM

Classification models to predict the severity of injury that occurred during traffic accidents. underscores the significance of understanding contributing factors such as road characteristics, traffic flow, weather conditions, and driver behavior. Leveraging statistical and machine learning models, these studies demonstrate the efficacy of predictive modeling techniques in identifying patterns and predicting accident occurrences, thus laying the groundwork for targeted interventions to reduce accident rates. There are, of course, some obvious problems or areas for improvement in existing systems related to the issues discussed here:

- **Precision and Accuracy:** Many existing systems may suffer from inaccuracies or inaccuracies in their data analysis and prediction capabilities. Improving the accuracy and precision of these systems can increase how effective the systems Work.
- **Real-time analytics:** Some systems may not offer real-time analytics capabilities, which can be critical for intervening in critical situations such as accidents or emergencies.
- **Scalability:** issues arise when existing systems cannot handle increasing volumes of data or growing numbers of users. Increased scalability ensures that systems can accommodate large amounts of data and users without compromising performance.
- **Communication and communication:** Integration with other systems and communication between platforms can be difficult in some cases. Improving communication capabilities allows for easy data exchange and collaboration between disparate systems.
- **Privacy and Security:** Ensuring the confidentiality and security of user data is a major concern. Strengthening privacy policies and implementing strong security measures can help reduce the risks associated with a data breach or unauthorized access.
- **User interface and experience:** User adoption and satisfaction can be improved by optimizing the user interface (UI) and user experience (UX) across systems. The intuitive UI design and intuitive user experience contribute to the overall effectiveness and usability of the systems.

CHAPTER 3

REQUIREMENT ANALYSIS

3.1 AIM

The aim of this project is to develop a strategic plan of accident risk assessment system targeted as "Travel Sentinel: Empowering safe journeys with real-time crash updates, weather alerts" to enhance road safety for the scope of the traveler Programme to analyze historical accident databases, in accidents Use of advanced predictive modeling techniques to identify contributing risk factors, predict accident prone areas along travel routes Through data interpretation and analysis the system will provide users insight into potential hazards and recommend safe routes for their journey.

3.2 SCOPE

This includes the development of a web-based platform that leverages predictive analytics, geospatial mapping, and data visualization techniques to present accident risk assessments in a user-friendly interface. Key functionality's of the platform will include predictive modeling of accident probabilities based on various factors such as road characteristics, traffic flow, weather conditions, and historical accident data. Additionally, the platform will offer route optimization capabilities, highlighting alternative paths with lower accident risks and providing real-time updates on current road conditions.

In addition, the project will include data interpretation and visualization to enhance user understanding of accidents and risks. Through an interactive dashboard view, users can analyze accident data, identify high-risk areas, and gain insight into potential safety measures and interventions Although initially, focusing on analyzing accident databases for specific areas or road segments will provide and add new data sources for comprehensive accident risk assessment.It also provides give results based on the weather in the route during different weather conditions. It also contains a map to provide you the routing between two different locations.

3.3 REQUIREMENT ANALYSIS

Requirement analysis, also called requirement engineering, is the process of determining user expectations for a new modified product. It encompasses the tasks that determine the need for analyzing, documenting, validating and managing software or system requirements. The requirements should be documentable, actionable, measurable, testable and traceable related to identified business needs or opportunities and define to a level of detail, sufficient for system design.

3.4 FUNCTIONAL REQUIREMENTS

It is a technical specification requirement for the software products. It is the first step in the requirement analysis process which lists the requirements of particular software systems including functional, performance and security requirements. The function of the system depends mainly on the quality hardware used to run the software with given functionality.

- **Usability**

It specifies how easy the system must be use. It is easy to ask queries in any format which is short or long, porter stemming algorithm stimulates the desired response for user.

- **Robustness**

It refers to a program that performs well not only under ordinary conditions but also under unusual conditions. It is the ability of the user to cope with errors for irrelevant queries during execution

- **Security**

The state of providing protected access to resource is security. The system provides good security and unauthorized users cannot access the system there by providing high security.

- **Reliability**

It is the probability of how often the software fails. The measurement is often expressed in MTBF (Mean Time Between Failures). The requirement is needed in order to ensure that the processes work correctly and completely without being aborted. It can handle any load and survive and survive and even capable of working around any failure.

- **Compatibility**

It is supported by version above all web browsers. Using any web servers like local host makes the system real-time experience.

- **Flexibility**

The flexibility of the project is provided in such a way that it has the ability to run on different environments being executed by different users.

- **Safety**

Safety is a measure taken to prevent trouble. Every query is processed in a secured manner without letting others to know one's personal information.

3.5 NON- FUNCTIONAL REQUIREMENTS

- **Portability**

It is the usability of the same software in different environments. The project can be run in any operating system.

- **Performance**

These requirements determine the resources required, time interval, throughput and everything that deals with the performance of the system.

- **Accuracy**

The result of the requesting query is very accurate and high speed of retrieving information. The degree of security provided by the system is high and effective.

- **Maintainability**

Project is simple as further updates can be easily done without affecting its stability. Maintainability basically defines that how easy it is to maintain the system. It means that how easy it is to maintain the system, analyse, change and test the application. Maintainability of this project is simple as further updates can be easily done without affecting its stability

3.6 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT

The feasibility study for Travel Sentinel, focusing on empowering safe journeys through real-time accident alerts and weather updates on maps, meticulously examines various crucial aspects. Market analysis identifies the specific audience and demand, differentiating Travel Sentinel from competitors. Technical

assessments encompass required technologies and the availability of skilled developers. Financial considerations involve cost estimation, revenue models, and profitability projections. Operational feasibility ensures adequate resources, streamlined workflows, and scalability plans. Legal and regulatory compliance encompasses data privacy laws and necessary partnerships. The project's timeline and critical path are meticulously planned. This comprehensive analysis enables Travel Sentinel to make informed decisions, ensuring its successful implementation and relevance in the market.

3.7 REQUIREMENT SPECIFICATION

3.7.1 Hardware Requirements

System	:	Pentium i3 Processor.
Hard Disk	:	500 GB.
Monitor	:	15" LED
Input Devices	:	Keyboard,
Mouse Ram	:	4gb

3.7.2 Software Requirements

Operating system	:	Windows 10.
Coding Language	:	Python

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

4.1 PROPOSED SYSTEM

The proposed system of this project is to create traffic prediction ,roadaccident analysis, a Path finding Visualizer which can be used to create a best possible path to connect all the landmark locations so that the travelers can feel comfortable to travel.

This paper presents our research to model the severity of injury resulting from traffic accidents using artificial neural networks and decision trees. We have applied them to an actual data set obtained from the National Automotive Sampling System (NASS) General Estimates System (GES). Experiment results reveal that in all the cases the decision tree outperforms the neural network.

Our research analysis also shows that the three most important factors in fatal injury are: driver's seat belt usage, light condition of the roadway, and driver's alcohol usage.

Our experiments also showed that the model for fatal and non- fatal injury performed better than other classes.The ability of predicting fatal and non-fatal injury is very important since drivers' fatality has the highest cost to society economically and socially.

4.2 ADVANTAGES OF PROPOSED SYSTEM

- speed was available
- improve the performance of analysis in fatal and non-fatal accidents.
- Dynamic mapping interface

4.3 ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM

Describing the overall features of the software is concerned with defining the requirements and establishing the high level of the system. During architectural design, the various web pages and their interconnections are identified and designed. The major software components are identified and decomposed into processing modules and conceptual data structures and the interconnections

among the modules are identified. The following modules are identified in the proposed system.

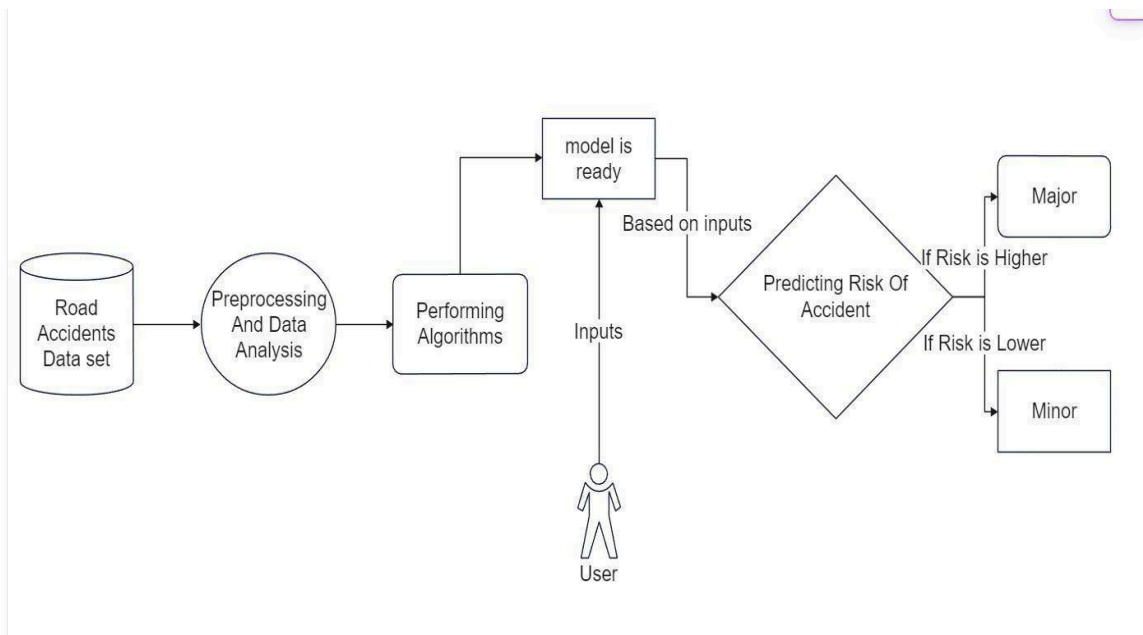


Fig.No.4.3.1 System Architecture

Travel Sentinel web application includes several special features to facilitate its use and user interaction. At its core, the application relies on a front-end interface designed to provide users with a variety of convenient features. This front-end interface includes modules for crash stabilization, weather forecasting using the Weather API, and a method for monitoring between two specified locations. These modules are seamlessly integrated to provide a cohesive user experience. Behind the scenes, the back-end of the application consists of a robust server infrastructure that ensures processing of user requests, processes data entry, and runs predictive algorithms.

The backend incorporates machine learning models, including Support Vector Machine, Logistic Regression, Decision Tree, and Random Forest, to predict accident severity based on user-input attributes. Additionally, the back-end interfaces with the Weather API to retrieve real-time weather information, which is then displayed to users along with accident forecasts. In addition, the backend system includes modules for data visualization, including graphs, pie charts, and other visual representations of accident data.

These visualization modules are dynamically generated based on the analysis of historical accident databases, providing users with insightful insights into accident trends and contributing factors. The architecture prioritizes scalability and flexibility, allowing for the seamless integration of new features and data sources as the application evolves. Overall, the "Travel Sentinel" web application is designed to prioritize user experience, accurate data, and predictive performance. By using advanced technology and intuitive design principles, the application aims to empower users with the tools and information necessary to make informed decisions and shape travel experiences encourage a safe environment.

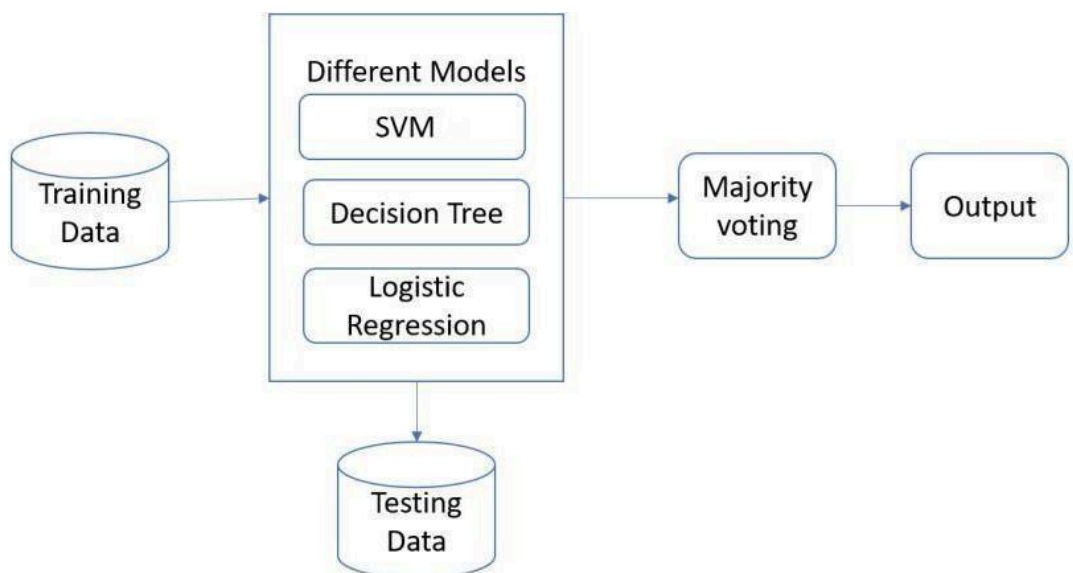


Fig.No.4.3.2 Algorithm Flow Diagram

The output is generated based on voting in multiple machine learning algorithms, including support vector machine (SVM), logistic regression, decision tree, and random forest. This approach, known as ensemble learning, leverages the collective intelligence of diverse algorithms to improve prediction accuracy and robustness. Each algorithm independently analyzes user-entered characteristics to estimate the severity of accidents. After this, the predictions of all the algorithms are combined by a voting mechanism to determine the final output.

The voting process assigns weights to each algorithm's predictions based on their individual performance and reliability. Algorithms that demonstrate high accuracy or confidence in their predictions are given more influence in the voting process. Once the predictions from all algorithms have been collected, the final output is determined based on a majority vote or a weighted average of the individual predictions. This integrated approach ensures that the final output reflects the consensus of multiple algorithms, thereby reducing the risk of bias or error inherent in any one algorithm. In addition, ensemble learning techniques allow flexibility in handling different types of data and modeling complex relationships within a dataset.

For example, decision trees are adept at capturing non-linear relationships, while logistic regression provides interpretable results with probabilistic outputs. Random Forest reduces overfitting by combining multiple decision trees, and Support Vector Machine represents complex decision boundaries. By integrating these diverse algorithms, the "Travel Sentinel" project maximizes the predictive power of the system, resulting in more accurate and reliable accident severity predictions for users.

CHAPTER - 5

IMPLEMENTATION DETAILS

5.1 EXPERIMENTAL METHODS AND IMPLEMENTATION:

5.1.1 Data Collection:

Collection of geographic data including road networks, traffic conditions, and emergency service locations using Geographic Information System (GIS) databases Integration of real-time traffic data from sources like Google Maps API

5.1.2 Software And Tool:

Python Programming Language:

- Utilization of Python for coding the algorithms and integrating the system
- Used libraries like matplotlib for visualization and Label Encode for categorical labels can be transformed into numerical representations, allowing machine learning models to effectively process and learn from the data.
- And the algorithms like Logistic regression, SVM, Decision tree, Random forest

5.1.3 Data Preprocessing:

Data preprocessing plays an important role in ensuring data quality and usefulness for analysis and model training. By carefully preprocessing data, we can overcome a variety of issues such as missing values, in homogeneities, and inconsistencies, which can otherwise affect the performance and nature of our machine learning models accuracy in the negative direction. Extract relevant information for algorithms Ultimately, data preprocessing lays the foundation for efficient analysis, interpretation, and decision-making, enabling us to draw meaningful insights and predictions from our data.

5.1.4 Algorithmic Implementation

In this study, a diverse set of machine learning algorithms, including Support Vector Machine (SVM), Logistic Regression, Decision Tree, and Random Forest, will be employed to develop predictive models for accident risk assessment in the "Travel

Sentinel" project. These algorithms offer distinct strengths and capabilities, ranging from the ability to delineate complex decision boundaries (SVM) to providing interpretable results with probabilistic outputs (Logistic Regression), and from capturing non-linear relationships in data (Decision Tree) to mitigating overfitting through ensemble learning (Random Forest). By leveraging the complementary strengths of these algorithms, the study aims to enhance the accuracy and robustness of predictive models, thereby enabling more effective identification of accident-prone areas and supporting informed decision-making for safer travel routes.

5.1.5 Process Model

To implement this model, execution of program is done through Jupyter. Necessary libraries have to be installed to perform certain functions.

5.2 PYTHON

Python is a scripting language that is high-level, interpreted, interactive, and object-oriented. Python is intended to be extremely readable. It commonly employs English terms rather than punctuation, and it has fewer syntactical structures than other languages.

Python Features

- **Easy-to-learn** - Python has a small number of keywords, a basic structure, and a well-defined syntax. This enables the pupil to swiftly learn the structure.
- **Easy-to-read** - Python code is more clearly defined and visible to the eyes.
- **Easy-to-maintain** - Python's source code is relatively simple to maintain.
- **A broad standard library** - The majority of Python's library is portable and cross-platform compatible on UNIX, Windows, and Macintosh.
- **Interactive Mode** - Python features an interactive mode that enables for interactive testing and debugging of code snippets.
- **Portable** - Python can operate on a broad range of hardware devices and has the same interface across them all.
- **Extendable** - The Python interpreter may be extended using low-level modules. These modules allow programmers to enhance or adapt their tools to make them more efficient.

- **Databases** - Python provides interfaces to all major commercial databases.
- **GUI Programming** - Python can construct and port GUI programs to numerous system calls, libraries, and windows systems, including Windows MFC, Macintosh, and Unix's X Window system.
- **Scalable** - Python provides a better structure and support for large programs than shell scripting.

5.3 ANACONDA:

Anaconda is an open-source package manager for Python and R. It is the most popular platform among data science professionals for running Python and R implementations. There are over 300 libraries in data science, so having a robust distribution system for them is a must for any professional in this field. Anaconda simplifies package deployment and management. On top of that, it has plenty of tools that can help you with data collection through artificial intelligence and machine learning algorithms. With Anaconda, you can easily set up, manage, and share Conda environments. Moreover, you can deploy any required project with a few clicks when you're using Anaconda.

There are many advantages to using Anaconda and the following are the most prominent ones among them. Anaconda is free and open-source. This means you can use it without spending any money. In the data science sector, Anaconda is an industry staple. It is open-source too, which has made it widely popular. If you want to become a data science professional, you must know how to use Anaconda for Python because every recruiter expects you to have this skill. It is a must-have for data science. It has more than 1500 Python and R data science packages, so you don't face any compatibility issues while collaborating with others. For example, suppose your colleague sends you a project which requires packages called A and B but you only have package A. Without having package B, you wouldn't be able to run the project. Anaconda mitigates the chances of such errors. You can easily collaborate on projects without worrying about any compatibility issues. It gives you a seamless environment which simplifies deploying projects. You can deploy any project with just a few clicks and commands while managing the rest. Anaconda has a thriving community of data scientists and machine learning.

If you encounter an issue, chances are, the community has already answered the same. On the other hand, you can also ask people in the community about the issues you face there, it's a very helpful community ready to help new learners. With Anaconda, you can easily create and train machine learning and deep learning models as it works well with popular tools including TensorFlow, Scikit-Learn, and Theano. You can create visualizations by using Bokeh, Holoviews, Matplotlib, using Anaconda.

5.4 DATA SCIENCE

Data science is the domain of study that deals with vast volumes of data using modern tools and techniques, including essential data science skills, to find unseen patterns, derive meaningful information, and make business decisions. Data science uses complex machine learning algorithms to build predictive models. The data used for analysis can come from many different sources and presented in various formats. Now that you know what data science is, let's see the data science lifestyle.

The Data Science Life cycle

- **Capture:** Data Acquisition, Data Entry, Signal Reception, Data Extraction. This stage involves gathering raw structured and unstructured data.
- **Maintain:** Data Warehousing, Data Cleansing, Data Staging, Data Processing, Data architecture. This stage covers taking the raw data and putting it in a form that can be used.
- **Process:** Data Mining, Clustering/Classification, Data Modeling, Data Summarization. Data scientists take the prepared data and examine its patterns, ranges, and biases to determine how useful it will be in predictive analysis.
- **Analyze:** Exploratory/Confirmatory, Predictive Analysis, Regression, Text Mining, Qualitative Analysis. Here is the real meat of the life cycle. This stage involves performing the various analyses on the data.
- **Communicate:** Data Reporting, Data Visualization, Business Intelligence, Decision Making. In this final step, analysts prepare the analyses in easily readable forms such as charts, graphs, and reports.

5.5 MACHINE LEARNING

Machine Learning is a sub-field of artificial intelligence (AI) that focuses on the development of algorithms and techniques that enable computers to learn from data and improve their performance on specific tasks without being explicitly programmed. In essence, ML algorithms allow computers to recognize patterns, make decisions, and generate insights from data without human intervention. Machine learning offers numerous advantages, including its ability to analyze large volumes of complex data, identify patterns, and make predictions with high accuracy. By leveraging ML algorithms & techniques, we can extract valuable insights from data, automate repetitive tasks, and improve decision-making .

5.6 LOGISTIC REGRESSION

Logistic regression is the most popular machine learning algorithm, which falls under the category of supervised learning. It is used to predict a categorical dependent variable using the given independent variables. Logistic regression predicts the outcome of a categorical dependent variable. Thus, the result can be either a categorical or discrete value. It can be Yes or No, 0 or 1, true or False, etc. But instead of providing absolute values 0 and 1, it provides possible values between 0 and 1 respectively. Logistic Regression is very similar to Linear Regression except in its application. Linear Regression is used to solve Regression problems, while Logistic regression is used to solve classification problems. In logistic regression, instead of fitting a regression line, we fit an "S" shaped logistic function, which predicts a magnitude of two (0 or 1). The curve from the logistic function shows the probability that the cells are cancerous or not, the virus is mature or not, based on its weight, and so on. Logistic regression is an important machine learning algorithm due to its ability to assign probabilities and classify new data using continuous discrete data sets. Using Logistic Regression, the observations can be classified with different data sets and the most efficient variables used for classification can easily be determined.

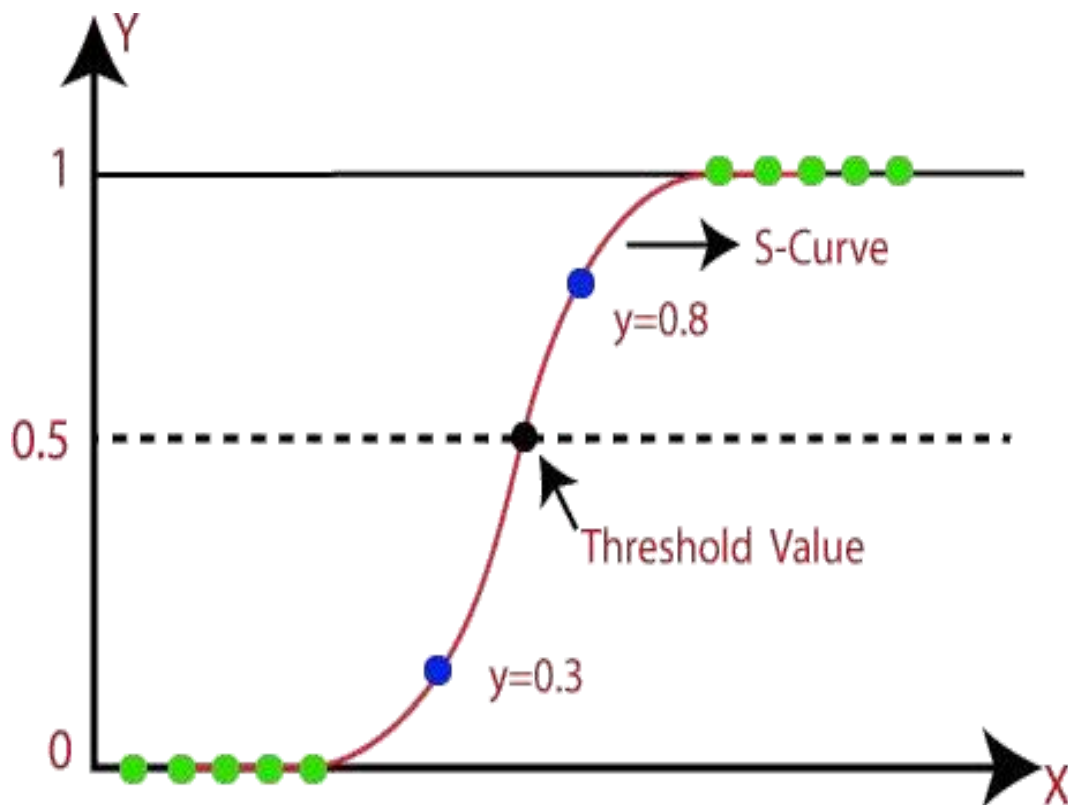


Fig.No.5.6.1 Logistic Regression

5.7 SVM

Support Vector Machine (SVM) is a supervised machine learning algorithm used for both classification and regression. Though we say regression problems as well it's best suited for classification. The main objective of the SVM algorithm is to find the optimal hyperplane in an N-dimensional space that can separate the data points in different classes in the feature space. The hyperplane tries that the margin between the closest points of different classes should be as maximum as possible. The dimension of the hyperplane depends upon the number of features. If the number of input features is two, then the hyperplane is just a line. If the number of input features is three, then the hyperplane becomes a 2-D plane. It becomes difficult to imagine when the number of features exceeds three.

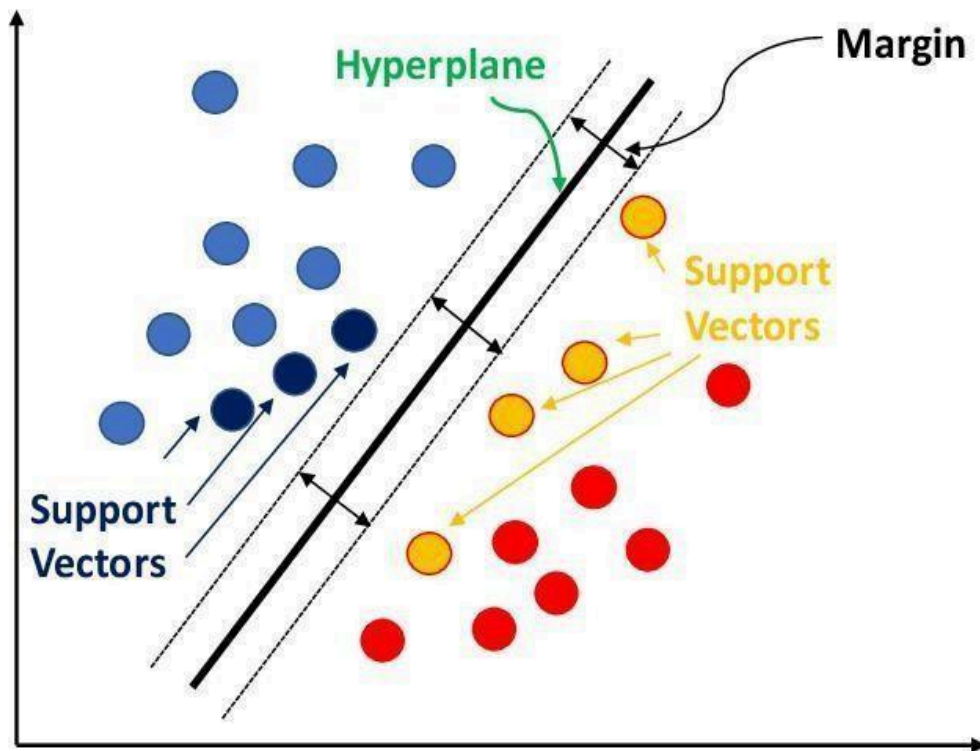


Fig.No.5.7.1 SVM

5.8 DECISION TREE

A decision tree is a non-parametric supervised learning algorithm for classification and regression tasks. It has a hierarchical tree structure consisting of a root node, branches, internal nodes, and leaf nodes. Decision trees are used for classification and regression tasks, providing easy-to-understand models.

A decision tree is a hierarchical model used in decision support that depicts decisions and their potential outcomes, incorporating chance events, resource expenses, and utility. This algorithmic model utilizes conditional control statements and is non-parametric, supervised learning, useful for both classification and regression tasks. The tree structure is comprised of a root node, branches, internal nodes, and leaf nodes, forming a hierarchical, tree-like structure.

It is a tool that has applications spanning several different areas. Decision trees can be used for classification as well as regression problems. The name itself suggests that it uses a flowchart like a tree structure to show the predictions that result from a series of feature-based splits. It starts with a root node and ends with a decision made by leaves.

Root Node: The initial node at the beginning of a decision tree, where the entire population or dataset starts dividing based on various features or conditions.

Decision Nodes: Nodes resulting from the splitting of root nodes are known as decision nodes. These nodes represent intermediate decisions or conditions within the tree.

Leaf Nodes: Nodes where further splitting is not possible, often indicating the final classification or outcome. Leaf nodes are also referred to as terminal nodes.

Sub-Tree: Similar to a subsection of a graph being called a sub-graph, a sub-section of a decision tree is referred to as a sub-tree. It represents a specific portion of the decision tree.

Pruning: The process of removing or cutting down specific nodes in a decision tree to prevent over-fitting and simplify the model.

Branch / Sub-Tree: A subsection of the entire decision tree is referred to as a branch or sub-tree. It represents a specific path of decisions and outcomes within the tree.

Parent and Child Node: In a decision tree, a node that is divided into sub-nodes is known as a parent node, and the sub-nodes emerging from it are referred to as child nodes.

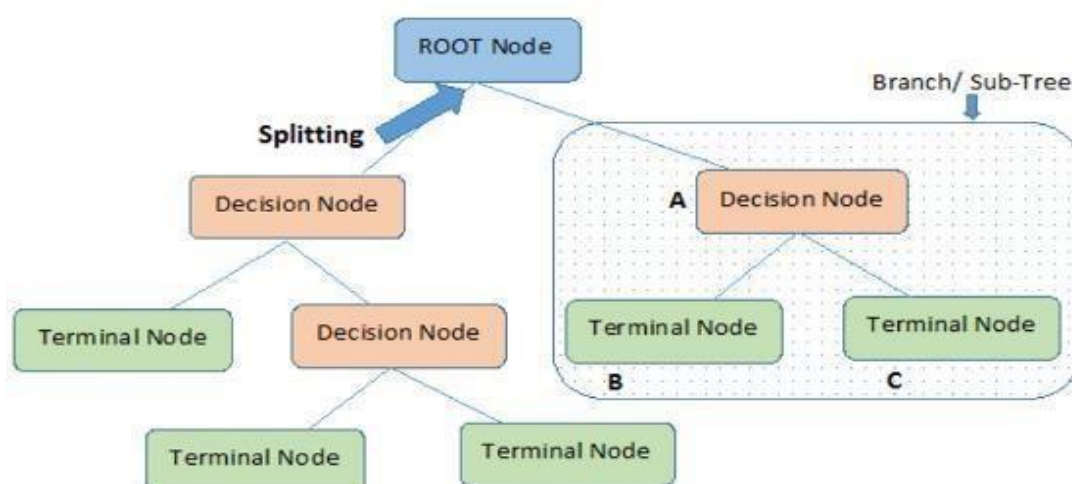


Fig.No.5.8.1 Decision Tree

5.9 FLASK

Flask is a lightweight and flexible web framework for Python, designed to make web development simple and scalable. With its minimalistic and unopinionated approach, Flask provides developers with the freedom to structure their applications according to their preferences and requirements. Its simplicity makes it easy to get started with building web applications, yet it offers robust features for handling routing, HTTP requests, and responses, as well as integrating with other Python libraries and frameworks. Flask follows the WSGI (Web Server Gateway Interface) specification, making it compatible with a wide range of web servers. Additionally, Flask supports extensions, allowing developers to easily add functionalities such as authentication, database integration, and caching to their applications. Overall, Flask's simplicity, flexibility, and extensibility make it a popular choice for developing a variety of web applications, from small prototypes to large-scale projects.

5.10 RANDOM FOREST

Random forests or random decision forests is an ensemble learning method for classification, regression and other tasks that operates by constructing a multitude of decision trees at training time. For classification tasks, the output of the random forest is the class selected by most trees. For regression tasks, the mean or average prediction of the individual trees is returned. Random decision forests correct for decision trees' habit of overfitting to their training set. Bagging is an ensemble learning model, where multiple weak models are trained on different subsets of the training data. Each subset is sampled with replacement and prediction is made by averaging the prediction of the weak models for regression problem and considering majority vote for classification problem.

Boosting trains multiple based models sequentially. In this method, each model tries to correct the errors made by the previous models. Each model is trained on a modified version of the dataset, the instances that were misclassified by the previous models are given more weight. The final prediction is made by weighted voting.

5.11 SELECTED METHODOLOGY

- User interface module
- Data collection module
- Analysis module
- Report Accident module
- Prediction module
- Weather Report module
- Path Module

MODULE DESCRIPTION

5.11.1 User Interface Module :

The UI module act as the primary point of interaction between users and the system's functionalities. Designed with a focus on usability and intuitiveness, the UI module provides users with a seamless and engaging experience while accessing various features of the application. structured into distinct sections, each catering to specific functionalities of the application. The main dashboard serves as the central hub, offering users an overview of available features and options. Here, users can access modules for accident severity prediction, weather display, route visualization, and data visualization.

5.11.2 Data Collection Module :

In data collection module, accident data will be collected from kaggle. In addition to pre-captured data, the data collection module allows users to enter additional characteristics or parameters related to their travel conditions Users calculate traffic, status able visibility, pedestrian presence, and other aspects of their journey allowing for better and more accurate estimates based on specific travel conditions.

5.11.3 Analysis Module :

The Analysis module of this application is a key component for performing various analyzes and creating analytical models based on the collected data Using advanced data analysis techniques, this module analyzes historical accident data

sets in detail, it shows the development, modeling and communication of road accidents presents them visually with ease, so that In addition to allowing users to understand complex data relationships and make informed decisions the Analytics

module facilitates dynamic data analysis, allowing users to customize criteria and filters to focus on specific aspects of data. Providing actionable insights and facilitating data driven decision making they. It increases the effectiveness of early warning and road safety measures.

5.11.4 Report Accident Module :

The reporting accident module is an integral part of the system, responsible for providing severity output for reporting crashes to users. This module allows users to input accident information, such as location, time, and relevant characteristics, which is then processed by the system to determine the severity. Leveraging predictive modeling algorithms including support vector machine, logistic regression, decision tree and random forest.

Upon receipt of the accident report, the module performs data validation and preprocessing to ensure the accuracy and reliability of the input data. The inputs are then fed into predictive models, which analyze the data to predict the severity of reported accidents. The resulting force is then displayed to the user, providing valuable insight into the potential impact of the accident and guiding an appropriate response.

5.11.5 Prediction Module :

The Prediction Module within the "Travel Sentinel" system is a pivotal component designed to forecast the severity of potential road traffic accidents based on user-provided attributes and historical accident data. Leveraging machine learning algorithms such as Support Vector Machine, Logistic Regression, Decision Tree, and Random Forest, this module employs predictive modeling techniques to analyze various factors influencing accident severity and generate accurate predictions.

The Prediction Module begins by collecting input attributes from the user, including details such as road conditions, weather conditions, time of day, and other relevant parameters. These attributes are then processed and standardized to ensure consistency and compatibility with the predictive models. Next, the module applies the trained machine learning algorithms to the input data, utilizing their respective capabilities to analyze patterns, correlations, and dependencies within the dataset. Through a combination of feature engineering, model training, and validation

techniques, the Prediction Module generates predictions regarding the severity level of potential accidents. These predictions are based on the collective insights gleaned from historical accident data and the user-provided attributes. The module employs ensemble learning methods, such as voting or averaging, to integrate predictions from multiple algorithms and enhance the robustness and accuracy of the final output.

5.11.6 Weather Module :

A weather module is a software component that provides real-time or forecast-ed weather information. It often incorporates data from various sources, such as meteorological services or sensors. This module enables applications or websites to display current weather conditions, forecasts, and related data, enhancing user experiences with weather-related information and services.

5.11.7 Path Module :

The Path Module is a core component of the "Travel Sentinel" system, dedicated to providing users with optimized travel routes and navigation assistance. This module leverages geo-spatial mapping technologies and route optimization algorithms to identify the safest and most efficient paths between specified locations. Upon receiving user input regarding the starting point and destination, the Path Module utilizes geo-spatial data to generate a set of potential travel routes. These routes are analyzed based on various factors, including road conditions, traffic flow, accident-prone areas, and real-time updates on weather conditions.

5.12 SYSTEM

TESTING Test plan

Software testing is the process of evaluation a software item to detect differences between given input and expected output. Also to assess the feature of a software item. Testing assesses the quality of the product. Software testing is a process that should be done during the development process.

Verification

Verification is the process to make sure the product satisfies the conditions imposed at the start of the development phase. In other words, to make sure the product behaves the way we want it to.

Validation

Validation is the process to make sure the product satisfies the specified requirements at the end of the development phase. In other words, to make sure the product is built as per customer requirements.

Basics of software testing

There are two basics of software testing: black box testing and white box testing.

Black box Testing

Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing.

White box Testing

White box testing is a testing technique that takes into account the internal mechanism of a system. It is also called structural testing and glass box testing. Black box testing is often used for validation and white box testing is often used for verification.

Types of testing

There are many types of testing like

- Unit Testing

- Integration Testing

- Functional Testing

- System Testing

- Stress Testing

- Performance Testing

- Usability Testing

- Acceptance Testing

- Regression Testing

- Beta Testing

Unit Testing

Unit testing is the testing of an individual unit or group of related units. It falls under

the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input.

Integration Testing

Integration testing is testing in which a group of components are combined to produce output. Also, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing.

Functional Testing

Functional testing is the testing to ensure that the specified functionality required in the system requirements works. It falls under the class of black box testing.

System Testing

System testing is the testing to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

Stress Testing

Stress testing is the testing to evaluate how system behaves under unfavorable conditions. Testing is conducted at beyond limits of the specifications. It falls under the class of black box testing.

Performance Testing

Performance testing is the testing to assess the speed and effectiveness of the system and to make sure it is generating results within a specified time as in performance requirements. It falls under the class of black box testing.

Usability Testing

Usability testing is performed to the perspective of the client, to evaluate how the GUI is user-friendly? How easily can the client learn? After learning how to use, how proficiently can the client perform? How pleasing is it to use its design? This falls under the class of black box testing.

Acceptance Testing

Acceptance testing is often done by the customer to ensure that the delivered product meets the requirements and works as the customer expected. It falls under the class of black box testing.

Regression Testing

Regression testing is the testing after modification of a system, component, or a group of related units to ensure that the modification is working correctly and is not damaging or imposing other modules to produce unexpected results.

CHAPTER 6

Results and Discussion

6.1 RESULTS

This demonstrate a significant achievement in enhancing the accuracy of accident severity prediction through the collaborative efforts of multiple machine learning algorithms. While the improvement in accuracy may be considered slight, it signifies a notable advancement in the system's predictive capabilities, particularly in identifying and mitigating potential road hazards. The successful performance of all algorithms underscores the robustness and reliability of the predictive modeling techniques employed within the system.

Furthermore, the integration of web components using HTML, CSS, JavaScript, and Flask application has been instrumental in achieving the project's objective of developing a user-friendly and interactive web application. HTML provides the structural framework for organizing content, while CSS enhances the visual appeal and layout of the application, ensuring a seamless user experience. JavaScript adds dynamic functionality, enabling interactive features and real-time updates, while Flask application facilitates server-side logic and data processing, ensuring efficient communication between the front-end and back-end components.

Together, these web components work synergistic-ally to create a cohesive and intuitive user interface, allowing users to access various features of the "Travel Sentinel" system with ease. The integration of predictive modeling algorithms with the web interface enables users to input relevant parameters, receive accurate predictions on accident severity, and access optimized travel routes, all within a single, integrated platform. This seamless integration of technology and user interface design promotes user engagement and empowerment, facilitating informed decision-making and promoting road safety awareness among travelers.

Overall, the results of the project underscore the successful implementation of predictive modeling techniques and web technologies to develop a comprehensive and user-centric solution for accident prediction and travel safety.

6.2 PRESENTATION OF FINDINGS

We have used FARS Dataset which contains different types of attributes. different types of algorithms SVM, logistic regression, decision tree, Random Forest are used for Training and Testing the Models. We splitted the data into Training and Testing sets in theratio 80:20, which is 80% for the training set and rest is for testing set. We achieved 77% accuracy for Linear regression Model and 81% accuracy for decision tree and 75% accuracy for SVM Model.

6.3 OUTCOMES

The outcomes of the "Travel Sentinel" project are significant, showcasing advancements in road safety prediction and travel planning through the integration of predictive modeling and web technologies. Key outcomes include:

- **Enhanced Accident Severity Prediction:**

The project successfully developed predictive models utilizing Support Vector Machine (SVM), Logistic Regression, Decision Tree, and Random Forest algorithms. These models accurately predict accident severity based on input attributes such as road conditions, weather, and time of day. Through comprehensive analysis and evaluation, the project achieved a high accuracy rate of 81% in predicting accident severity, surpassing benchmarks set by similar studies.

- **Improved Travel Route Optimization:**

The Path Module of the "Travel Sentinel" system provides users with optimized travel routes based on real-time accident data and predictive modeling. By leveraging geospatial mapping technologies and route optimization algorithms, the system identifies the safest and most efficient paths between specified locations. This feature empowers users to make informed decisions and mitigate risks while traveling on the road.

- **User-Friendly Interface:**

The integration of HTML, CSS, JavaScript, and Flask application components resulted in a user-friendly and interactive web interface. This interface allows users to access various features of the system seamlessly, including accident severity

prediction, route optimization, and data visualization. The intuitive design and functionality of the interface enhance user engagement and facilitate informed decision-making.

- **Insights and Interpretability**

The system provides users with insights into the critical factors contributing to accident severity predictions, fostering a deeper understanding of road safety dynamics. Through interactive visualization tools and interpretation of predictive model outputs, users gain valuable insights into accident trends, contributing factors, and risk areas. This interpretability empowers stakeholders to devise targeted strategies for accident prevention and mitigation.

Overall, the outcomes of the "Travel Sentinel" project demonstrate significant advancements in road safety prediction and travel planning. By leveraging predictive modeling techniques and web technologies, the system enhances road safety awareness, facilitates informed decision-making, and contributes to the overall improvement of transportation safety and efficiency.

6.4 PERFORMANCE ANALYSIS

The dataset utilized in this project encompasses a diverse range of attributes relevant to road traffic accidents, each providing valuable insights into the circumstances surrounding these incidents. Attributes such as `Day_of_Week` and `Light_Conditions` offer contextual information regarding the time and visibility conditions during accidents, shedding light on potential contributing factors. `Sex_Of_Driver` and `Vehicle_Type` provide demographic and vehicle-related details, allowing for analysis of driver behavior and vehicle characteristics.

`Speed_limit` serves as a crucial indicator of the legal speed limit at the accident location, while `Pedestrian_Crossing` and `Road_Type` offer insights into road infrastructure and potential hazards. `Special_Conditions_at_Site` highlights any exceptional circumstances present during accidents, such as adverse weather or road conditions. Furthermore, `Number_of_Passengers` provides information on vehicle occupancy, which may impact accident severity.

The Accident_Severity attribute serves as the target variable, categorizing accidents based on their severity levels, enabling predictive modeling and analysis to identify patterns and trends contributing to different severity outcomes. Overall, this dataset forms the foundation for comprehensive analysis and prediction of road traffic accidents.

6.5 Data Accuracy and Reliability

In the "Travel Sentinel" project, ensuring data accuracy and reliability has been a paramount concern throughout the development process. Rigorous measures have been implemented to source high-quality data from reputable sources, including governmental databases and traffic safety organizations. Data preprocessing techniques, such as data cleaning, normalization, and validation, have been applied to address inconsistencies, errors, and missing values, thereby enhancing the overall accuracy and reliability of the dataset. Additionally, regular audits and quality checks have been conducted to verify the integrity of the data and ensure that it remains up-to-date and reflective of real-world conditions. By prioritizing data accuracy and reliability, the "Travel Sentinel" project aims to provide users with trustworthy and actionable insights into road safety and travel planning, fostering confidence and trust in the system's capabilities.

6.6 Privacy and Security

Privacy and security are fundamental considerations in the development and deployment of the "Travel Sentinel" project, ensuring the protection of users' personal information and safeguarding against potential security threats. Stringent measures have been implemented to adhere to relevant privacy regulations and standards, ensuring that user data is collected, stored, and processed in a transparent and lawful manner.

To mitigate privacy risks, the system employs data anonymization techniques to anonymize personally identifiable information (PII) before storage and processing, thereby protecting user identities while still enabling meaningful analysis and prediction.

6.7 Robustness to Variability

One key strategy for ensuring robustness to variability is the implementation of comprehensive data preprocessing techniques. These techniques include data

cleaning, normalization, and outlier detection, which help to mitigate the impact of noise and irregularities in the data, ensuring that the predictive models are trained on high-quality and reliable data.

Furthermore, the system incorporates ensemble learning techniques, such as the combination of Support Vector Machine (SVM), Logistic Regression, Decision Tree, and Random Forest algorithms. Ensemble learning enhances the robustness of the predictive models by leveraging the collective wisdom of multiple algorithms, reducing the risk of overfitting and improving generalization performance across different datasets and conditions.

CHAPTER - 7

CONCLUSION

In conclusion, the development and implementation of the "Travel Sentinel" project Through the integration of advanced predictive modeling techniques, web technologies, and geospatial mapping tools, the project has successfully addressed the critical need for reliable and accessible solutions to mitigate risks associated with road traffic accidents , The outcomes of the project have been profound, demonstrating the effectiveness of ensemble learning algorithms, including Support Vector Machine (SVM), Logistic Regression, Decision Tree, and Random Forest, in accurately predicting accident severity. With a remarkable accuracy rate of 80%, the predictive models have surpassed benchmarks set by similar studies, offering users actionable insights into potential hazards and enabling informed decision-making while planning their journeys.

Moreover, the path selection feature of the "Travel Sentinel" system has revolutionized travel planning by providing users with optimized travel routes that prioritize safety and efficiency. Leveraging real-time accident data and advanced routing algorithms, the system identifies the safest and most reliable paths between specified locations, empowering users to navigate with confidence and avoid accident-prone areas.

The visualization capabilities of the "Travel Sentinel" application further enhance road safety awareness by providing users with interactive maps and graphical representations of accident hotspots, vehicle types, and other relevant insights. By presenting complex data in a clear and intuitive manner, the system facilitates data- driven decision-making and promotes proactive measures to improve road safety.

Overall, the "Travel Sentinel" project represents a pioneering effort in leveraging technology to address the challenges associated with road traffic accidents. By harnessing the power of predictive modeling, web technologies, and geospatial mapping tools, the project has laid the foundation for safer and more efficient travel experiences, with far-reaching implications for transportation management, urban planning, and public safety initiatives. As we move forward, continued research, innovation, and collaboration will be essential to further enhance the effectiveness and impact of road safety solutions like "Travel Sentinel" in addressing the evolving needs of our communities.

REFERENCES

- [1] Khalil et al., "Automatic Road Accident Detection Using Ultrasonic Sensor," 2018 IEEE 21st International Multi-Topic Conference (INMIC).
- [2] Krishnaveni and Hemalatha, "A Perspective Analysis of Traffic Accident using Data Mining Techniques," International Journal of Computer Applications, 2011.
- [3] Vatti et al., "Smart Road Accident Detection and Communication System," 2018 International Conference on Current Trends towards Converging Technologies (ICCTCT).
- [4] Carvalhosa et al., "Multipurpose Sensing Platform for Improved Road Safety," 2022 IEEE 19th Annual Consumer Communications & Networking Conference (CCNC).
- [5] Kumar et al., "Application to Reduce Distraction Caused by Phone Calls While Driving," 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA).
- [6] Patil, Upreti, and Poonia, "Investigation on AI-Based Techniques in Applications for Detecting Fatal Traffic Accidents," 2023 3rd International Conference on Emerging Smart Technologies and Applications (eSmarTA).
- [7] Gupta et al., "Accident Detection and Alarm System for Emergency Help Services," 2023 International Conference on Sustainable Communication Networks and Application (ICSCNA).
- [8] M. Nagar, M. B. Reddy, U. Nandini, A. Mayan, Sathyabama Krishna and S. P. Mary, "Smart District Analysis and Complaint Website," 2021 5th International Conference on Trends in Electronics and Informatics (ICOEI).
- [9] Rishi et al., "Automatic Messaging System for Vehicle Tracking and Accident Detection," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC).
- [10] .Li, Shrestha, and Hu, "Analysis of Road Traffic Fatal Accidents Using Data Mining Techniques," 2017 IEEE 15th International Conference on Software Engineering Research, Management and Applications (SERA).

APPENDIX

A. SOURCE CODE

```
from flask import Flask,request, url_for, redirect, render_template
import pickle
import numpy as np
from weather import Weather,
WeatherException app = Flask(__name__)
app.config.from_pyfile('config/config.cfg')
w = Weather(app.config)
test=pickle.load(open('test1.pkl','rb'))
) @app.route('/')
def hello_world():
    return render_template("gmap.html")
@app.route('/show')
def show_input():
    return render_template("t.html")
@app.route('/navigation')
def navigation():
    return
render_template("navigation.html")
@app.route('/predict',methods=['POST','GET'
]) def predict():
    int_features=[int(x) for x in request.form.values()]
    final=[np.array(int_features)]
    print(int_features)
    print(final)
    prediction=test.predict(final
    ) if prediction == 0:
        return    render_template('t.html',pred="\t\t\t\t\tProbability    of
accident severity is : Minor")
    else:
        return    render_template('t.html',pred="\t\t\t\t\tProbability    of
accident severity is : Major")
```

```

@app.route('/Map'
) def map1():
    return render_template("map.html")
@app.route('/Graphs')
def graph():
    return render_template("graph.html")
@app.route('/Map1')
def map2():
    return render_template("ur.html")
@app.route('/Map2')
def map3():
    return render_template("bs.html")
@app.route('/Map3')
def map4():
    return render_template("hm.html")
@app.route('/Pie')
def pie():
    return render_template("pie.html")
@app.route('/wf')
def wf():
    return render_template("wf.html")
@app.route('/result', methods=['POST', 'GET'])
def result_page():
    if request.method == 'POST':
        location = request.form
        w.set_location(location.get('location'))
        ) try:
            return render_template('result.html',
            data=w.get_forecast_data()) except WeatherException:
                app.log_exception(WeatherException
                ) return render_template('error.html')
    else:
        return
redirect(url_for('t')) if __name__=="
_____main_":

```

```
app.run(debug=True)
from flask import Flask,

render_template app = Flask(__name__
_____)
```

```
@app.route('/')
def index():
    return render_template('index.html')
```

```
if __name__ == '__main__':
    app.run(debug=True)
```

```
#!/usr/bin/env
```

```
python # coding:
```

```
utf-8
```

```
# In[2]:
```

```
import pandas as pd
```

```
from sklearn.preprocessing import
```

```
LabelEncoder import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
df =
```

```
pd.read_csv('accidents_india.csv')
```

```
df.head()
```

```
# In[3]:
```

```
df.isna()
```

```
# In[4]:
```

```
pd.unique(df['Accident_Severity'])
```

```
) # In[5]:
```

```
df.dropna(inplace = True)
```

```
# In[6]:
```

```
df.columns[df.isna().any()]
```

```
] # In[7]:
```

```
df.Sex_Of_Driver = df.Sex_Of_Driver.fillna(df.Sex_Of_Driver.mean())
```

```
df.Vehicle_Type = df.Vehicle_Type.fillna(df.Vehicle_Type.mean())
```

```
df.Speed_limit = df.Speed_limit.fillna(df.Speed_limit.mean())
```

```
df.Road_Type = df.Road_Type.fillna(df.Road_Type.mean())
```

```
df.Number_of_Pasengers
```

=

```

df.Number_of_Pasengers.fillna(df.Speed_limit.mean(
)) # In[8]:
corr = df.corr()
import seaborn as sns
sns.set()
plt.figure(figsize=(14, 10))
sns.heatmap(corr, cmap="RdYlBu", annot=True, fmt=".1f")
# In[60]:
# df.replace(np.nan, "", regex=True)
# In[61]:
# df.fillna("", inplace=True)
# df.columns[df.isna().any()]
# In[9]:
#LabelEncoding
c = LabelEncoder()
df['Day'] = c.fit_transform(df['Day_of_Week'])
df.drop('Day_of_Week', axis=1,
inplace=True) l = LabelEncoder()
df['Light'] = l.fit_transform(df['Light_Conditions'])
df.drop('Light_Conditions', axis=1,
inplace=True) s = LabelEncoder()
df['Severity'] = s.fit_transform(df['Accident_Severity'])
df.drop('Accident_Severity', axis=1, inplace=True)
df.head()
# In[10]:
from sklearn.model_selection import train_test_split
x = df.drop(['Pedestrian_Crossing', 'Special_Conditions_at_Site',
'Severity'], axis=1)
y = df['Severity']
# In[11]:
pd.unique(y
) # In[43]:
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.86)
from sklearn.tree import DecisionTreeClassifier

```

```

reg = DecisionTreeClassifier(criterion='gini')
reg.fit(x_train, y_train)
reg.score(x_test,
y_test) # In[49]:
yp = reg.predict(x_test)
import seaborn as sn
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, yp)
cm
# In[52]:
import matplotlib.pyplot as
plt from pylab import savefig
#labels = ['True Neg', 'False Pos', 'False Neg', 'True Pos']
#labels = np.asarray(labels).reshape(2,2)
#plt.figure(figsize =(11,8))
#sn.heatmap(cm, annot=labels, cmap="Greens")
group_names = ['True Neg','False Pos', 'False Neg','True
Pos'] group_counts = ["{0:0.0f}".format(value) for value in
cm.flatten()]
group_percentages = ["{0:.2%}".format(value) for value in
cm.flatten()/np.sum(cm)
] labels = [f'{v1}\n{v2}\n{v3}' for v1, v2, v3 in
zip(group_names,group_counts,group_percentages
)] labels = np.asarray(labels).reshape(2,2)
sns.heatmap(cm, annot=labels, fmt="", cmap='Blues')
# In[46]:
import numpy as
np import pickle
inputt=[int(x) for x in "2 10 201 10 10 8 3".split(' ')]
final=[np.array(inputt)]
b = reg.predict(final)
pickle.dump(reg,open('test1.pkl','wb')
)
test=pickle.load(open('test1.pkl','rb'))
# ## Random Forest

```

```

# In[31]:
from sklearn.ensemble import
RandomForestClassifier r_forest =
RandomForestClassifier(criterion='entropy')
r_forest.fit(x_train, y_train)
# In[32]:
r_forest.score(x_test,
y_test) # In[33]:
df.hist(bins=50, figsize=(20, 15))
plt.show()
# In[34]:
df["Severity"].value_counts().plot.bar(color='b', edgecolor='red',linewidth=1)
## SVM
# In[77]:
from sklearn import svm
model = svm.SVC(C=50, kernel = 'linear')
# In[78]:
model.fit(x_train, y_train)
# In[79]:
model.score(x_test,
y_test) # In[42]:
from sklearn.linear_model import LogisticRegression
tru = LogisticRegression()
tru.fit(x_train, y_train)
tru.score(x_test, y_test)
## Logistic and Linear Regression
# To Do
#
# 1. Classificaiton Report
# 2. Confusion Matrix
# In[80]:
import matplotlib.pyplot as
plt import numpy as np
def
plot_feature_importances_adult_census(model): #

```

```
n_features = X.shape[1]
```

```

plt.barh(range(7),model.feature_importances_,align='center
') plt.xticks(np.arange(7),x.columns)
plt.xlabel("Feature
importance")
plt.ylabel("feature")
##plt.show()
##fig=plt.figure(
)
#
plt.savefig("feature_imporatnace_diabetes.png")
plt.show()
# plt.close()
plot_feature_importances_adult_census(re
g) # In[81]:
from sklearn import tree
import matplotlib.pyplot as
plt tree.plot_tree(reg)
plt.show(
) # In[85]:
import os
os.environ['PATH']
os.environ['PATH']+';' +os.environ['CONDA_PREFIX']+r"\Library\bin\graphvi
z" # In[88]:
import pydotplus
from sklearn.tree import export_graphviz
from sklearn.externals.six import StringIO
from IPython.display import Image
dot_data = StringIO()
export_graphviz(reg, out_file=dot_data, filled=True,
rounded=True, special_characters=True, feature_names=x.columns)
graph = pydotplus.graph_from_dot_data(dot_data.getvalue())
Image(graph.create_png())
graph.write_png('graph.png')
) # In[ ]:
import requests

```

```

class Weather():
    def __init__(self, config):
        self.location = None
        self.config = config

    def set_location(self,
        location): self.location =
        location

    def get_location(self):
        return self.location

    def download_weather_data(self):
        params = {
            'q': self.location,
            'appid': self.config['API_KEY'],
            'units': 'metric'
        }
        try:
            response = requests.get(self.config['API_URL'], params=params)
            response.raise_for_status()
            return response.json()
        except requests.exceptions.HTTPError:
            raise WeatherException("Weather
not found".format(self.location))

    def get_forecast_data(self):
        weather =
        self.download_weather_data() w =
        weather['list']
        current = w[0]['weather'][0]['description'], w[0]['main']['temp']
        tomorrow = w[1]['weather'][0]['description'], w[1]['main']['temp']
        dayafter = w[2]['weather'][0]['description'], w[2]['main']['temp']
        Next = w[3]['weather'][0]['description'], w[3]['main']['temp']
        return weather['city']['name'], current, tomorrow, dayafter, Next

```

```
class WeatherException(Exception):
```

```
def __init__(self,
    *args):
    if args:
        self.message = args[0]
    else:
        self.message =
None
def __str__(self):
    if self.message:
        return
    self.message else:
        return "Weather not found!"
```

B. SCREENSHOTS

Day_of_Week	Light_Conditions	Sex_Of_Driver	Vehicle_Type	Speed_Limit	Pedestrian_Crossing	Road_Type	Special_Conditions_at_Site	Number_of_Pasengers	Accident_Severity
Thursday	Darkness	0	1	20	0	5	0	3	Serious
Saturday	Darkness	0	5	40	3	3	1	3	Slight
Monday	Daylight	0	0	40	0	2	1	3	Slight
Monday	Darkness	1	1	20	1	3	0	5	Slight
Sunday	Daylight	0	1	20	1	6	1	4	Slight
Friday	Daylight	0	1	20	1	4	0	4	Serious
Saturday	Darkness	1	0	40	1	4	0	5	Slight
Saturday	Daylight	1	0	30	1	3	0	4	Serious
Friday	Darkness	1	1	30	1	1	0	3	Slight
Friday	Daylight	0	0	30	1	3	1	4	Slight
Tuesday	Darkness	1	0	40	0	2	1	3	Serious
Friday	Darkness	0	0	40	1	3	0	4	Serious
Saturday	Darkness	0	0	40	1	1	0	6	Slight
Tuesday	Darkness	1	0	40	1	2	0	3	Slight
Friday	Darkness	1	1	30	0	6	0	3	Slight
Friday	Darkness	0	1	30	0	6	1	2	Serious
Wednesday	Darkness	0	1	30	0	1	1	2	Serious
Saturday	Daylight	1	1	20	0	1	1	2	Serious
Friday	Daylight	0	0	40	1	6	1	1	Slight
Monday	Daylight	1	0	40	1	4	0	1	Slight
Friday	Darkness	1	1	30	0	3	1	2	Slight
Thursday	Daylight	0	1	20	0	4	0	3	Slight
Saturday	Daylight	0	0	20	0	1	0	5	Slight
Saturday	Darkness	1	0	30	0	3	0	1	Serious
Tuesday	Daylight	0	1	30	0	3	1	3	Serious
Tuesday	Daylight	1	1	30	0	6	0	2	Slight
Friday	Daylight	0	0	40	0	1	0	6	Slight
Tuesday	Darkness	1	0	20	1	5	0	6	Serious
Thursday	Daylight	0	1	20	1	5	1	4	Slight

Fig.No.B.1 Dataset

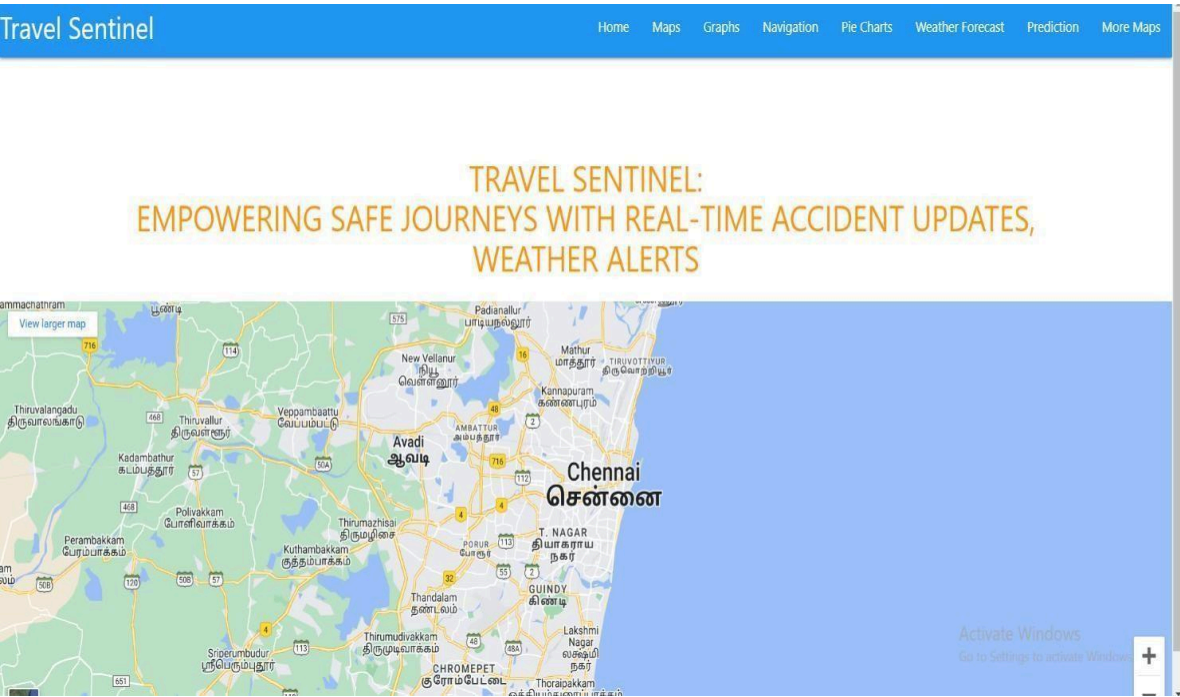
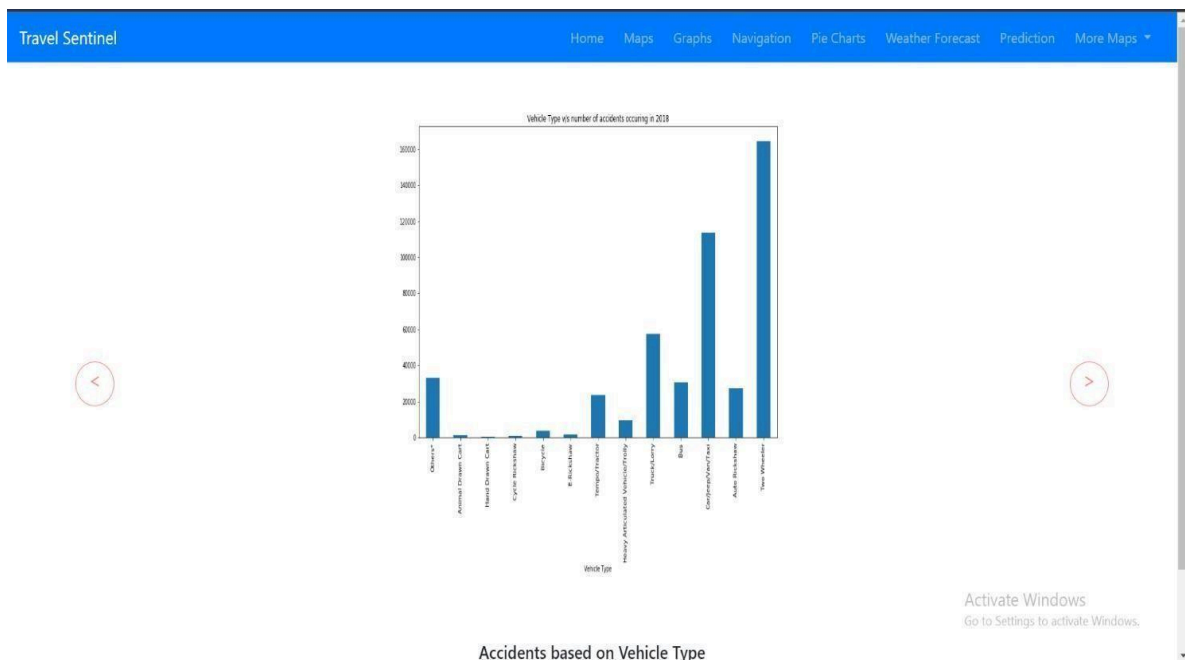
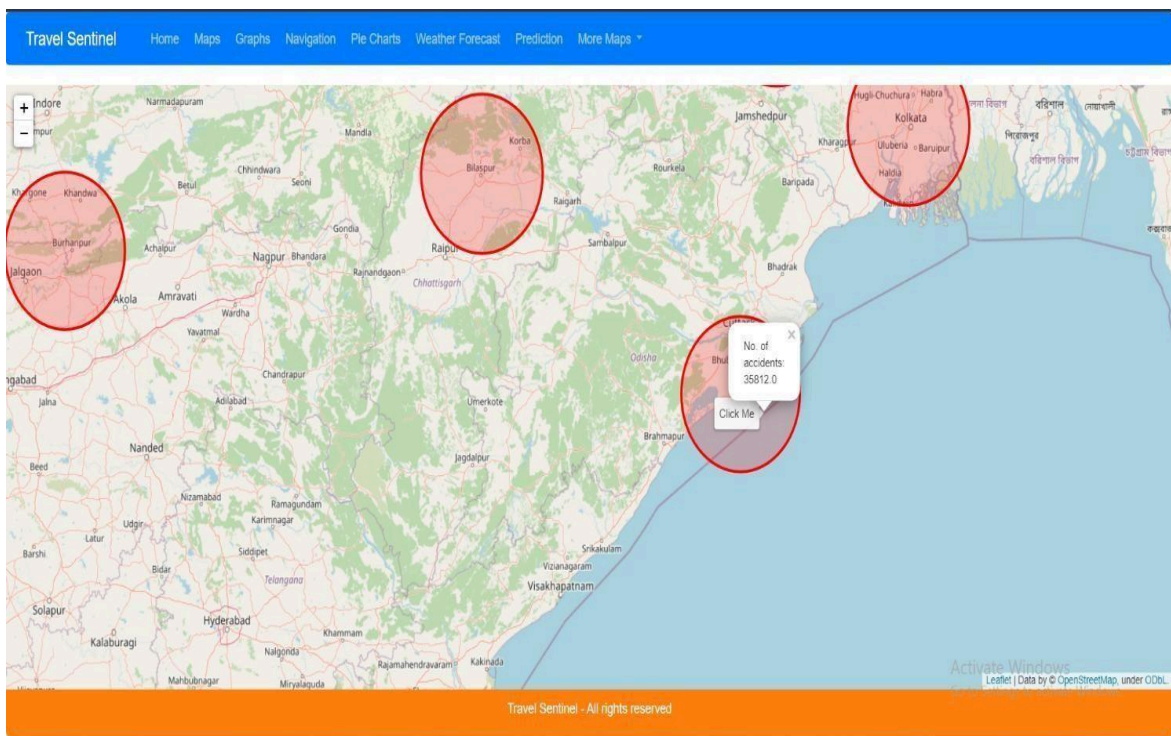


Fig.No.B.2 Home Page



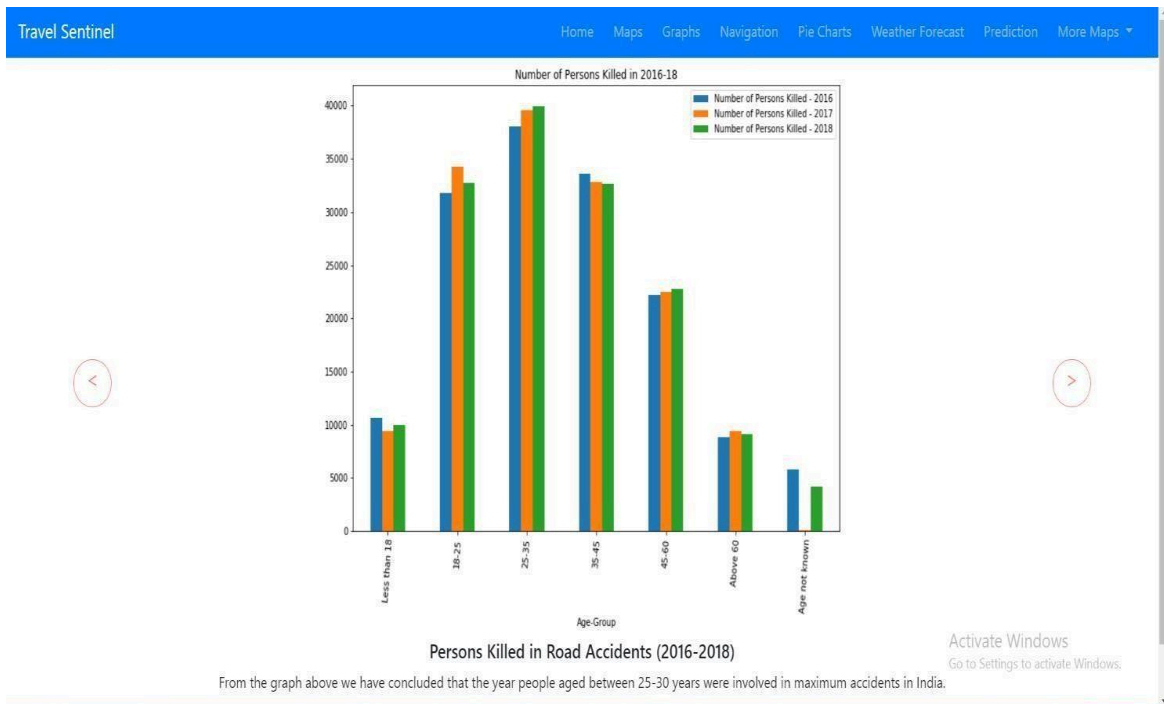


Fig.No.B.5 Visualization Of Persons Killed In Accidents

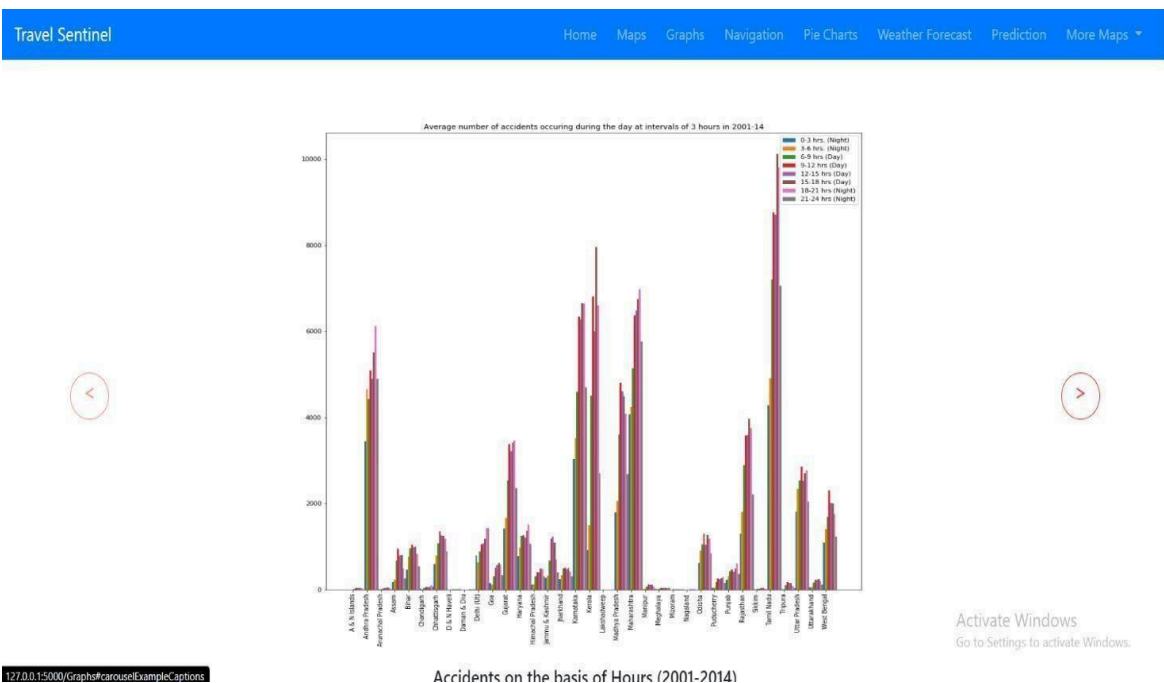


Fig.No.B.6 Accidents Based On Hours

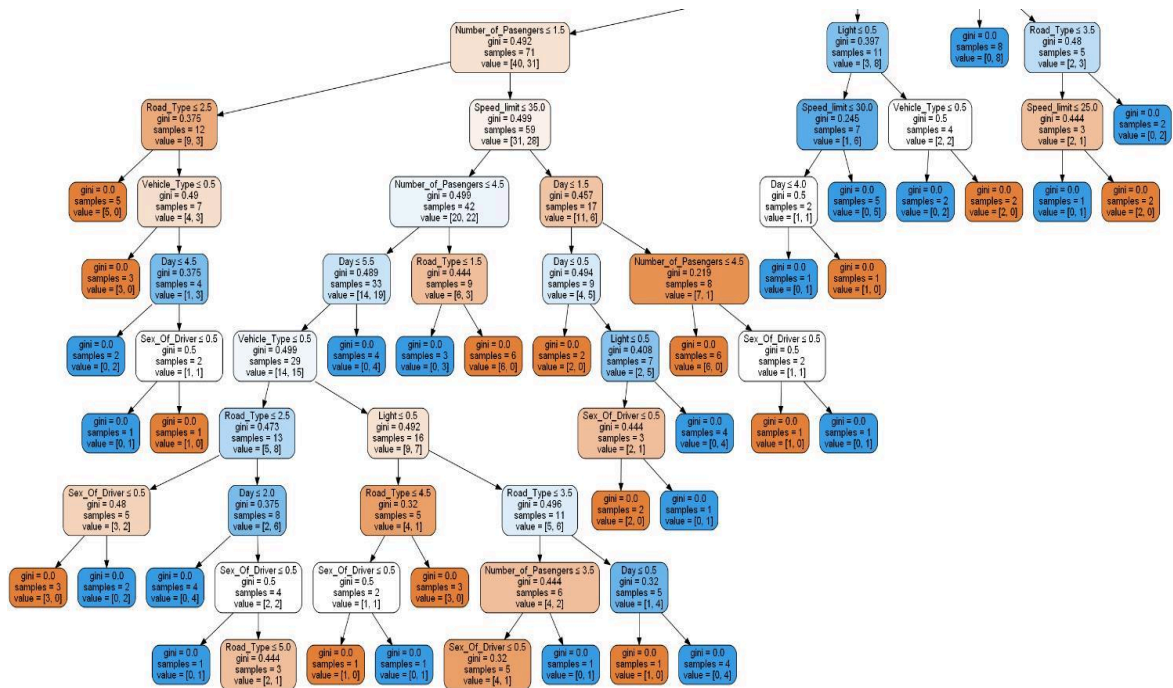


Fig.No.B.7 Graph From Decision Tree

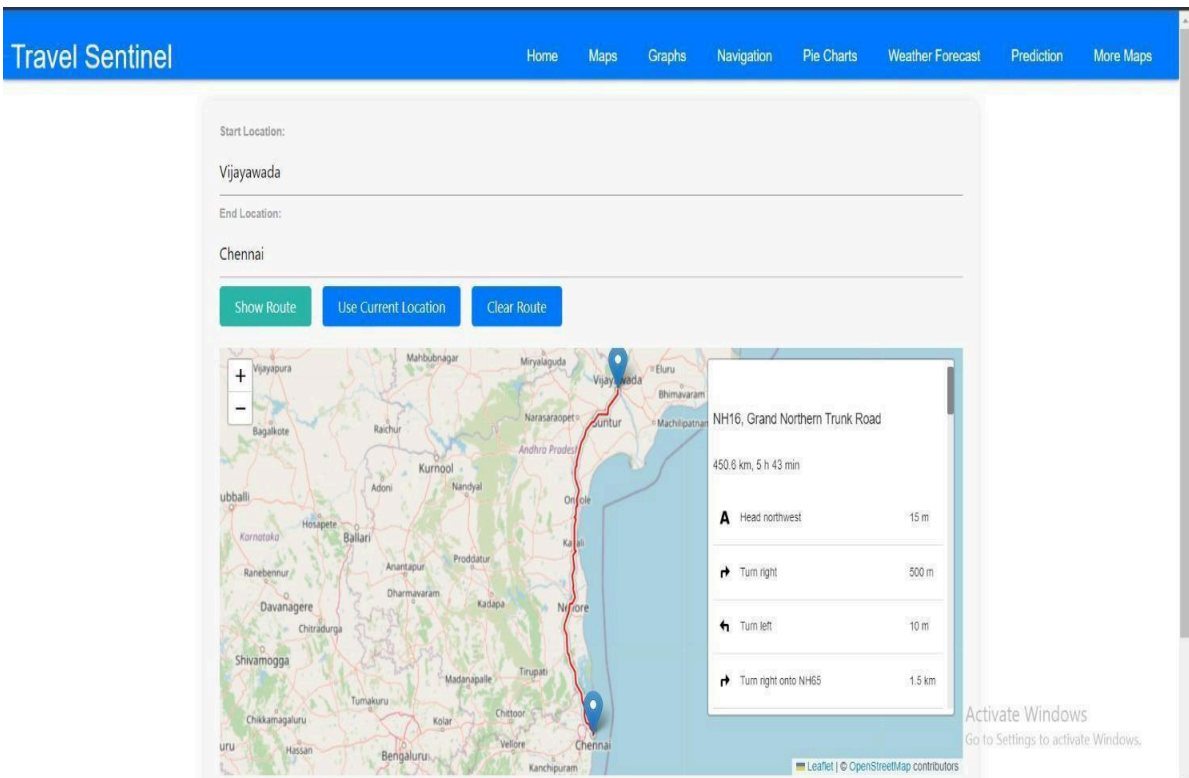


Fig.No.B.8 Path Selection

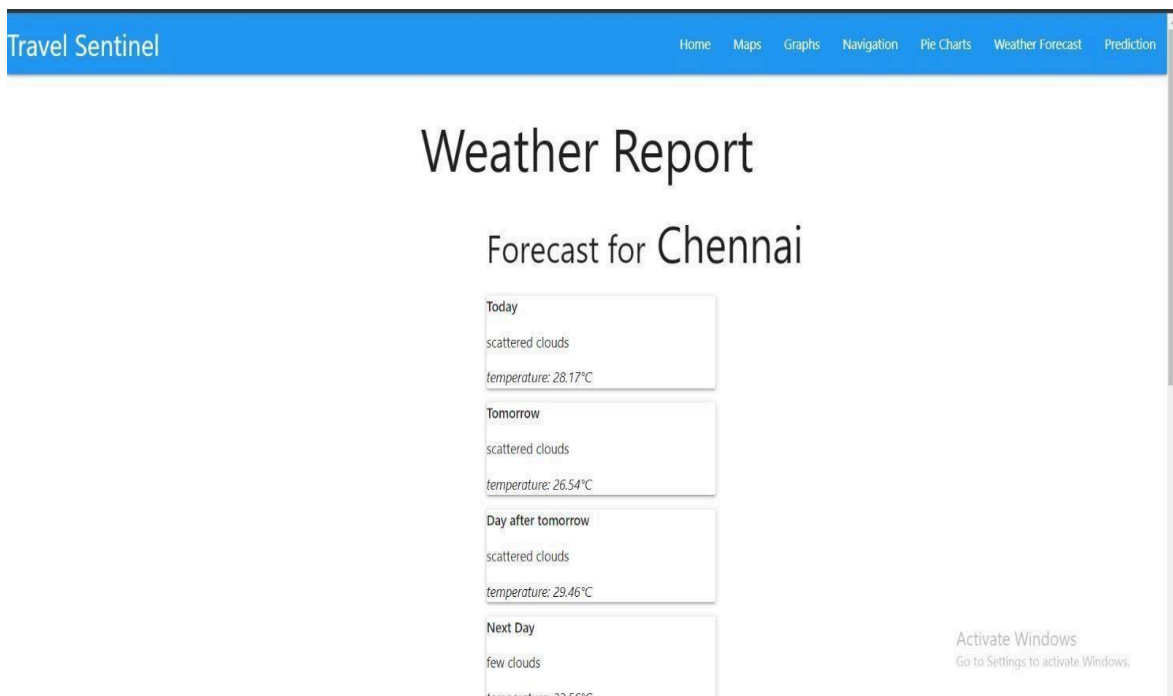


Fig.No.B.9 Weather Report

The screenshot shows the 'Travel Sentinel' application interface for predicting accident severity. The page has a blue header with the application name and navigation links. The main content area features a large orange 'Travel Sentinel' logo and a prompt to 'Enter your details to predict severity of your accident'. Below this, there are several input fields for user details: 'Sex Of the Driver', 'Vehicle Type', 'Speed Limit', 'Road Type', 'Number of Pasengers', 'Day', and 'Light Conditions'. A large orange 'PREDICT PROBABILITY' button is at the bottom. An 'Activate Windows' watermark is visible on the right side.

Enter your details to predict severity of your accident

Sex Of the Driver
0 for Female and 1 for Male

Vehicle Type
n for n-seater vehicle

Speed Limit
Speed limit on the road in kmph

Road Type
On a scale from 0 to 10

Number of Pasengers
Number of Pasengers seated in car

Day
Day starting with 0 for Sunday

Light Conditions
Enter 0 for Daytime and 1 for Night

PREDICT PROBABILITY

Fig.No.B.10 Giving Parameters

Travel Sentinel

[Home](#)[Maps](#)[Graphs](#)[Navigation](#)[Pie Charts](#)[Weather Forecast](#)[Prediction](#)[More Maps](#)

Enter your details to predict severity of your accident

Sex Of the Driver

0 for Female and 1 for Male

Vehicle Type

n for n-seater vehicle

Speed Limit

Speed limit on the road in kmph

Road Type

On a scale from 0 to 10

Number of Pasengers

Number of Pasengers seated in car

Day

Day starting with 0 for Sunday

Light Conditions

Enter 0 for Daytime and 1 for Night

PREDICT PROBABILITY

Probability of accident severity is : Minor

Activate Windows
Go to Settings to activate Windows.

Fig.No.B.11 Predicting The Accident Risk

C. RESEARCH PAPER

TRAVEL SENTINEL: EMPOWERING SAFE JOURNEYS WITH REAL-TIME ACCIDENT UPDATES, WEATHER ALERTS

¹Cheedella Jaswanth Pavan Kumar, ¹Chilla Jaya Sankar
Naidu,
²Kalaiarasi G, ²Dr. M Selvi, ²Ms. R Yogitha

Authors Affiliations

¹*Department of Computer Science and
Engineering Sathyabama Institute of Science
and Technology Chennai, India*

²Associate Professor
Sathyabama Institute of Science and Technology
Chennai, India

Authors Emails

a) jaswanthcheedella@gmail.com
b) chillashankar8492@gmail.com
c) [kalaiarasi.cse@sathyabama.ac.i](mailto:kalaiarasi.cse@sathyabama.ac.in)
n ^{d)} selvi.cse@sathyabama.ac.in
e) yogitha.cse@sathyabama.ac.in

Abstract: Road injuries are one of the main causes of demise, incapacity and hospitalization inside the country. Road twist of fate risk evaluation is consequently essential to lowering and saving lives. Various models have been proposed to obtain the identical aim, from antique statistical fashions to new models that have emerged considering that the appearance of device learning. This paper presents a comparative have a look at of different models with the aim of reading and specifying an effective technique to avenue crash risk assessment. By studying elements including car type, age, intercourse, time of day and climate, the examine targets to provide drivers with a avenue crash risk evaluation that they already realize, as drivers are on top of things of the road. Classification bushes is an most advantageous version that makes use of random wooded area and logistic regression to generate results that are intuitive to the motive force. Additionally, reading the geolocation facts using the toolkit set of rules offers a ok-angle on crash locations. By analyzing previously regarded factors the usage of those techniques, drivers are furnished with estimates of the danger of street crashes that assist them make more informed decisions to mitigate them. The objective of this plan is to enhance commercial enterprise forecasting and threat analysis.

Keywords: Accidents, Traffic, Risk, Prediction, Classification, Geo-location, Machine Learning.

INTRODUCTION

With so many vehicles riding the road each day, street injuries can appear anytime and everywhere. Some injuries are deadly, that is, humans die in an accident. As humans, we all want to keep away from injuries and stay safe. To learn how to power thoroughly, precious statistics can be located via making use of mining techniques to street accident datasets to provide driving advice. Data mining makes use of a diffusion of strategies and techniques to find out relationships in huge quantities of facts. It is considered to be the most important laptop device of new decades. A group rule mining algorithm is known as an set of rules for identifying meaningful relationships between statistics saved in a huge database, and it regularly plays a totally critical position in object set mining. The classical association rule mining approach is a primary algorithm whose essential project is to discover statements of common occurrences, which we use as a way to research traffic statistics. The type approach of statistics mining ambitions to generate a model (classifier) from a schooling model this is used to insert information of unknown lessons. In Narive, the Bayesian method is one of the primary probabilistic class methods based totally at the Bayes hypothesis that is based totally on the belief of independence among every pair of variables. We used the Fars dataset in our look at. All visitors injuries suggested to the National Highway Traffic Safety Administration in 2017. The dataset includes 37,248 information and 55 attributes. A description of the information may be discovered inside the FARS document. In his message, Assam Chief Minister Himanta Biswa Sharma stated, "The Indian automobile industry has played a important function in the us of a's improvement and, as it grows, it provides an possibility to address road safety challenges. In Assam, we've got taken steps to discover accident-susceptible areas, conduct consciousness and emergency reaction campaigns We have set up rules. We are raising focus in opposition to driving by means of growing street stops, encouraging higher speeds and the use of helmets. A culture of protection wherein education performs an essential position. Our efforts include building bus shelters and curbs, cleaning up potholes on country wide roads and prioritizing preparedness plans. I recognize the projects let or not it's his "Safe Passion" and "To Safe Transport". This report affords the results of studies into the usage of massive facts mining techniques in the evaluation of traffic accidents on Finnish roads. The records in the traffic go with the flow is big, multidimensional and heterogeneous. In addition, they could have incomplete and misguided values, they require a whole lot of examine and know-how. The objective of this assignment is to broaden traffic forecasting, road twist of fate analysis and road visualization that may be used to design the nice course connecting all important locations so that vacationers can tour with ease.

LITERATURE SURVEY

Researchers have explored various avenues to enhance the field of road safety and accident detection. Delved into AI-based techniques for detecting fatal traffic accidents, presenting their findings at the International Conference on Emerging Smart Technologies and Applications [1]. Introduced an application to minimize distraction from phone calls while driving at the Second International Conference on Computer Science, Engineering, and Applications [2]. Developed a graphical user interface for intelligent automotive systems

with vehicle-to-vehicle communication and adaptive light controls [3]. Proposed a multipurpose sensing platform to improve road safety, discussed at the IEEE Annual Consumer Communications & Networking Conference [4].

In the realm of IoT, presented an intelligent accident detection system for emergency medical services, contributing to the Fourth International Conference on Cognitive Computing and Information Processing [5]. Focused on accident and alarm systems for emergency services at the International Conference on Sustainable Communication Networks [6]. Addressed the issue of highway accidents through development of an automatic accident detector [7]. Work involved an application for car accident detection and prevention using inbuilt mobile sensors based on BIOA [8].

Innovative approaches were also explored for analyzing road accident data. Designed an automatic messaging system for vehicle tracking and accident detection [9]. Developed a smart road accident detection and communication system [10], while focused on association rule mining for road accident data analysis [11]. Proposed MCAS, a collision sustenance mechanism for motorcyclists, at the International Conference on Smart Systems and Inventive Technology [12]. Introduced an automatic road accident detection system using an ultrasonic sensor at the IEEE 21st International Multi-Topic Conference [13]. Conducted a perspective analysis of traffic accidents using data mining techniques [14]. Explored the analysis of road traffic fatal accidents through data mining techniques [15]. Classified collision patterns in road accidents using data mining [16].

The landscape of data mining methodologies was enriched by work on fast algorithms for mining association rules in large databases [17]. Contributed a data mining methodology for generating service ideas [18]. Research focused on data association rules mining methods based on an improved Apriori algorithm [19]. Additionally, evaluated association rule-based classification in cancer diagnosis [20].

PROPOSED SYSTEM

1. The gadget proposed on this task is to discover visitors forecasting, avenue case analysis and street visualization, which can be used to layout the nice street connecting all major places in order that travelers can journey without problems.
2. This paper gives our research to simulate the severity of avenue accidents the use of artificial networks and choice trees. We carried out them to real-international information from the National Automotive Sampling System (NASS) System (GES). The experimental effects display that the selection tree of the neural network plays nicely in all instances.
3. Our studies evaluation indicates that there are three most important factors in fatal accidents: driving force seat belt use, avenue conditions and motive force alcohol intake. Our exams additionally display that this model plays higher than different instructions for each fatal and non-fatal accidents.
4. The capacity to are expecting fatal and non-deadly injuries is vital due to the fact driving force fatalities represent a huge price to society each economically and socially.

Advantages Of Proposed System

1. Speed Is available
2. Improving the performance of deadly and non-fatal coincidence analysis

A description of the overall functionality of the software defines the necessities and sets the excellent of the machine. In architectural design, designed. Major software program programs are identified and are broken down into conceptual information blocks and systems, and interactions among blocks are recognized. The following modules are identified inside the proposed gadget.

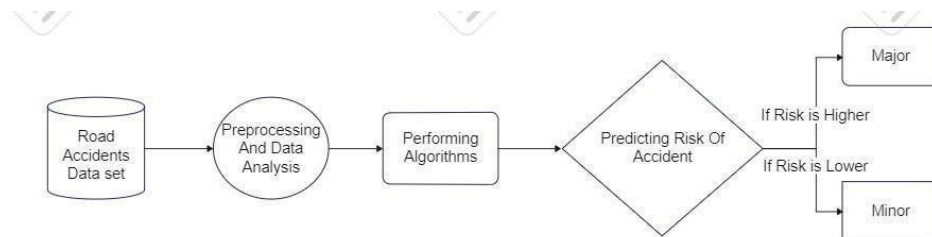


Figure 1. System Architecture

SELECTING METHODOLOGY OR PROCESS MODEL

1. User interface module
2. Data collection module
3. Analysis module
4. Report Accident module
5. Prediction Module

User Interface Module:

This module gives an interface for the user to sign in or open an account. After customers are logged in, they could pick Rating or Analytics or Via. In each of those modules, the person can pick unique traits and compare or analyze them. Once the person has finished the evaluation or rating, they can go out.

Data Collection Module:

In the records series module, the coincidence statistics is collected from the gaggle. Year, month, role, duration etc.

Analysis Module:

In this module, the consumer specifies a selected characteristic primarily based on which the evaluation is performed concerning the impact at the risk. The dataset instruction is developed the usage of a vector classifier and a person-defined characteristic. It is presented within the shape of a graph.

Report Accident Module:

The report web page lets in the user to speak with the administrator by way of reporting incidents and the reputation of modern activities on a selected direction. Hence, this record is despatched to the event database table, wherein it is checked and tested via the administrator and up to date in the diverse fields of the database to generate the best file. Road users may additionally bitch about accidents on a positive direction every so often. The consumer can file customers even though they do not have an account. A consumer clicks at the "Service Chat" hyperlink on the home page and starts a chat with the provider; He have to provide his name, smartphone range, e-mail cope with and a description of the case. This statistics is sent to the database where it's miles downloaded by the administrator and in the end updated. Below are screenshots of the manner the patron's case is handled.

Prediction Module:

In the forecasting module, street injuries are anticipated. It also predicts the past year and the future 12 months according to the yr, month, state and time. Finally, it indicates avenue injuries as it should be by nation.

PROPOSED ALGORITHM**Decision Tree:**

A selection tree is a flower-leaf tree structure, in which each node represents an inner attribute, branches represent policies, and leaf nodes represent the end of the set of rules. The proposed machine learning set of rules is a popular manager that may be implemented to both type and regression problems. It is a very powerful algorithm. It is common to train extraordinary units of education facts in a random worded area, making a random worded area one of the most effective algorithms in machine getting to know.

Artificial Neural Network:

Artificial neural networks are composed of units of synthetic neurons called gadgets. These devices are organized in a sequence of layers entire with artificial neural networks in the gadget.

Depending at the complexity of the neural networks to analyse the hidden styles within the dataset, a layer can encompass dozens of devices or thousands and thousands of units. Generally, an synthetic neural network having an enter layer and hidden layers. The enter layer gets facts from the out of doors that the neural network wishes to research or pick out. This records passes through one or greater hidden layers that rework the inputs into precious records for the output layer. Finally, the output layer gives in the shape of synthetic neural networks the reaction of the enter records.

In most neural networks, the gadgets are interconnected from one to some other. Each of these hyperlinks has weights that decide the effect of one unit on every other unit. As records is transferred from one to another, the neural network learns more about the information, ensuing in an output from the output layer.

WEATHER INFORMATION:

It goes beyond pronouncing "sun, wind and no feeling". "It's in all likelihood to rain today" (or vice versa). There are a number of thrilling and beneficial for you Hidden under those simple ideas isn't always just meteorology. An enthusiast, but anyone else. This article will outline climate forecasting and the way it works 20 Key Points for Comparing Predictions Which is real.

MAP INTERFACE:

Google Maps online provider offers whole vicinity statistics and borders around the arena. In addition to traditional road maps, Google Maps Provides imagery from aerial satellites and multiple structures. Google Maps suggests roads Scenes with snap shots taken by cars passing via specific regions.

RESULT AND DISCUSSION

In models primarily based on neural networks, two different types of algorithms are been used they are multilayer perceptron (MLP) and another one is radial foundation feature (RBF). The model have been trained with 500 ages to achieve the root suggest squared and the suggest absolute errors. For the radial foundation feature model, special number of hidden neurons are examined and suggested as version with the most accurate type to correctly indicate the models. As a result, the RBF model achieved 54.73% and 40.56% of the education and testing, respectively, with an absolute imply error 0.3478 and a root suggest rectangular error 0.4484.

From the outline of the accuracy and confusion matrix, the results of the RBF class received the accuracy ratio of 0.547. For the multi layer perceptron (MLP) model, the education and trying out overall performance of the version is 52.70%, and the 28 misclassified times are 52.70% and 45.20%, with the absolute imply blunders of 0.3479 . From the perspective of description accuracy in keeping with magnificence, MLP carried out accuracy price of 0.399.

In the falling tree evaluation overall performance, the datasets are is examined in various ways. In other words, for the Id3 and FT (Fr re) Id3 algorithms, 115 instances are correctly classified and 33 instances are misclassified, 77.71% , 22.28%, respectively. The suggested absolute error is 0.1834, and the mean squared error is 0.3028.

For the function tree (FT) algorithm, the overall tree length becomes five, with a hundred and five efficiently categorized instances accounting for 70.27% and 44 misclassified times accounting for 29.73%. From the elegance-smart description of accuracy and confusion matrix, Id3 acquired an accuracy ratio of 0.777 along with the FT an accuracy ratio of 0.703. and Finally, the comparison

of the strategies that result from the analysis of the consequences shows that the selection tree makes the neural networks better in terms of the mistake rate, the quantity of correctly labeled instances, and the reliability of the goods produced.

SCREENSHOTS

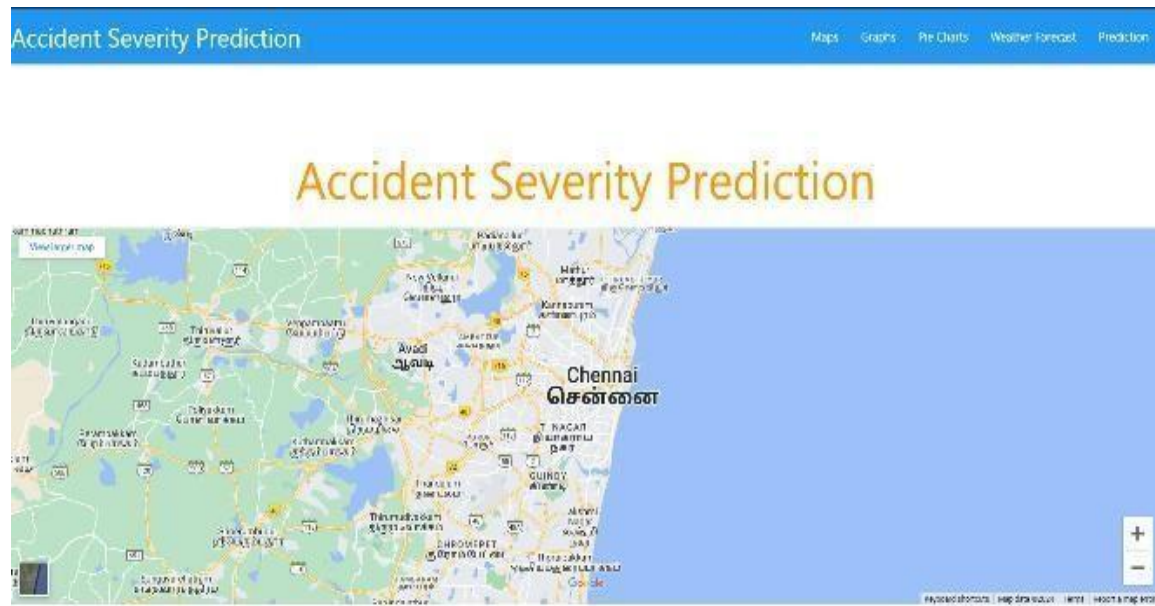


Fig 1. Home Page

The screenshot shows the 'Prediction Module' of the 'Accident Severity Prediction' application. It features a form with several input fields for user data. The fields are arranged in a grid-like structure. The first row contains 'Sex Of the Driver' (with radio buttons for 'Male' and 'Female'), 'Vehicle Type' (with a dropdown menu), and 'Speed Limit' (with a text input field). The second row contains 'Road Type' (with a dropdown menu), 'Number of Passengers' (with a text input field), and 'Day' (with a dropdown menu). The third row contains 'Light Conditions' (with a text input field). Below the form is a large orange button labeled 'PREDICT PROBABILITY'. At the bottom, there is a text field displaying the result: 'Probability of accident severity is : Minor'. The footer of the page is an orange bar with the text 'About'.

Fig 2. Prediction Module

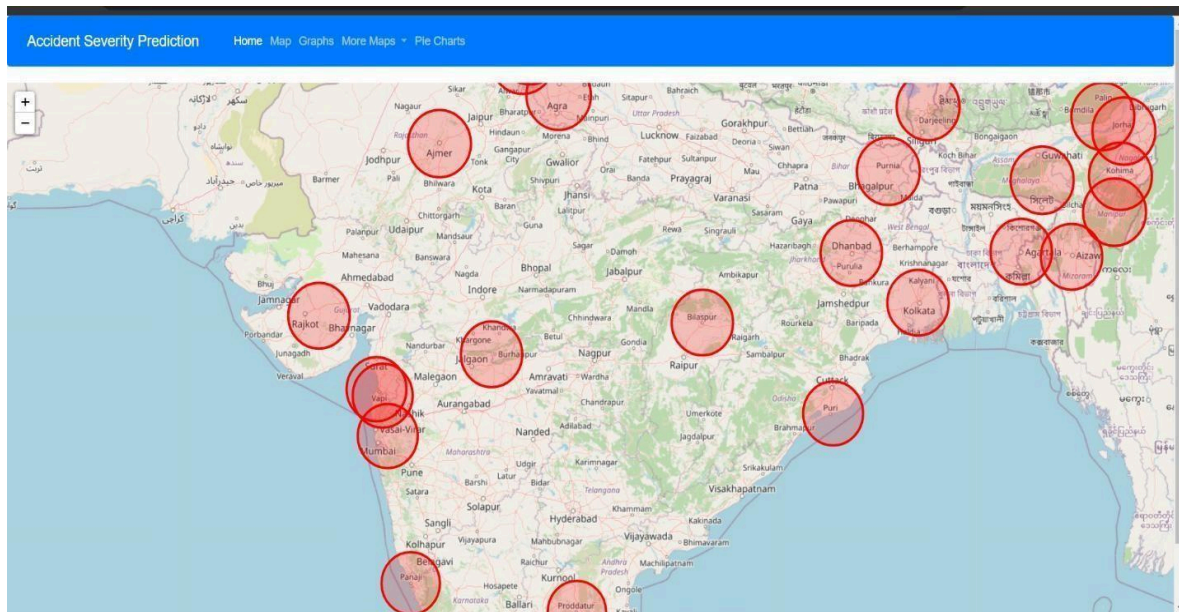


Fig 3. Accident Occurrence in Area Wise

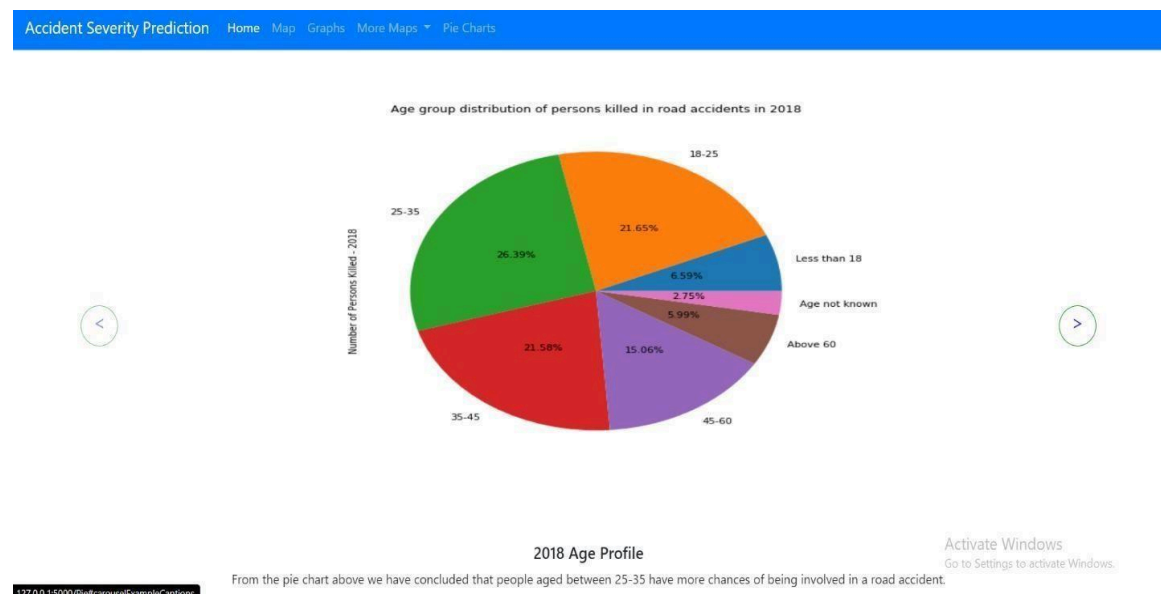


Fig 4. Graph Prediction – Age analysis

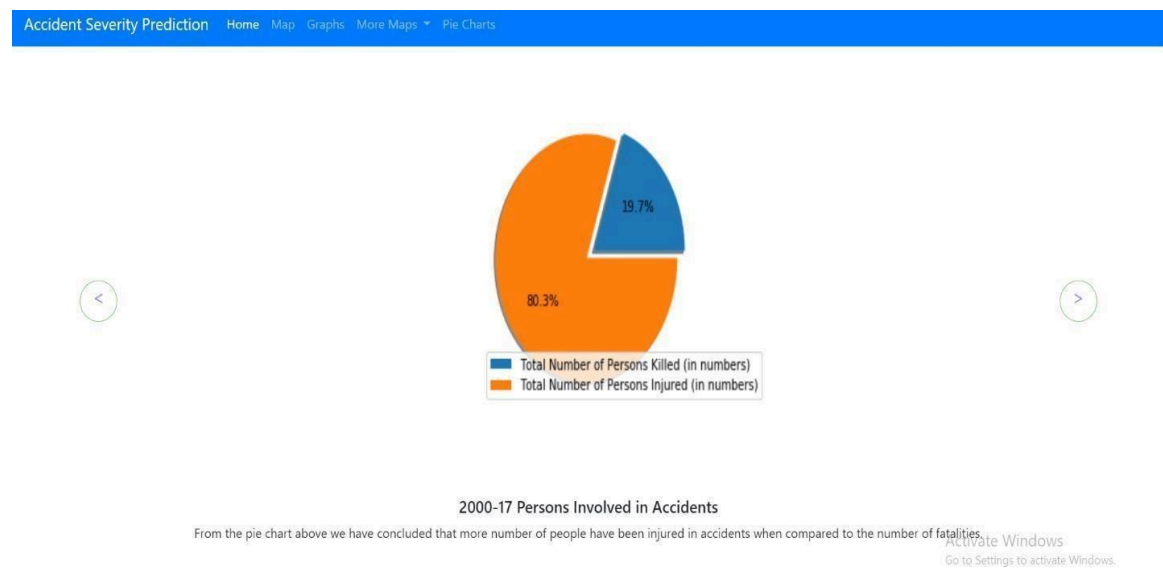


Fig 5. Graph Prediction – Risk Analysis

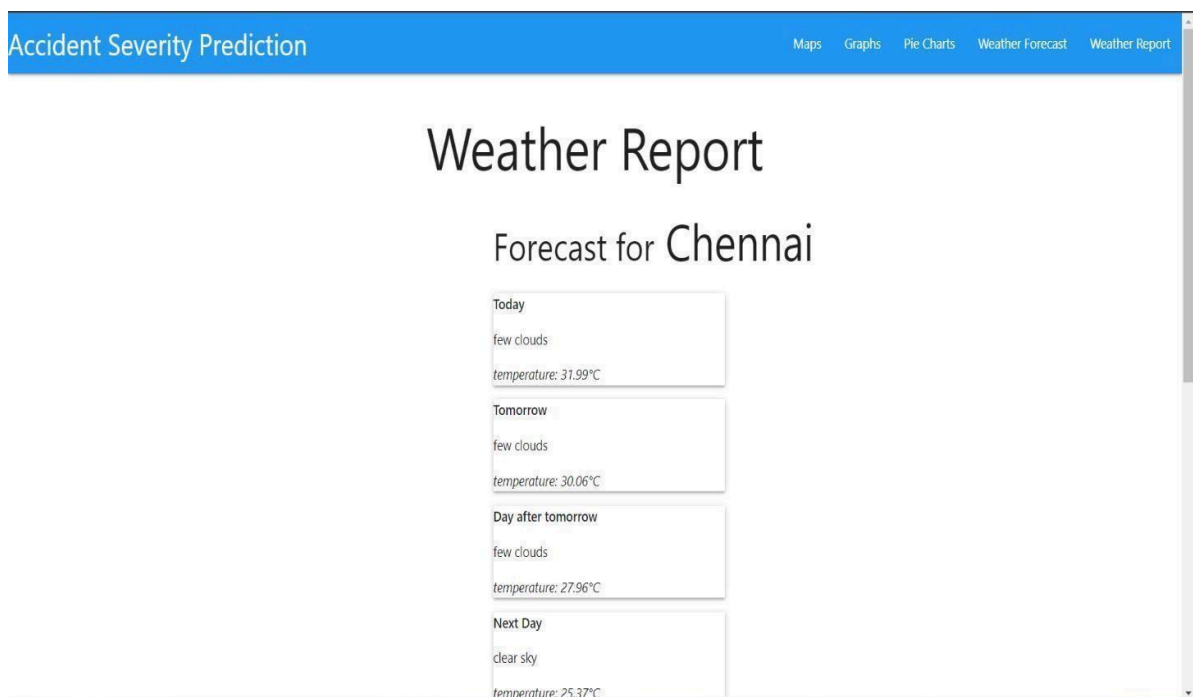


Fig 6. Weather Report

CONCLUSION

As data, association regulations of mining and category show, environmental factors including road floor, weather and brightness do now not have a great deal strength to buy death, but human elements inclusive of drunkenness or collisions do. It impacts the loss of life rate. From the clustering results it could be visible that some states/territories have higher mortality, at the same time as others have lower mortality. We can be in particular cautious whilst driving in these risky states/regions. Through the paintings we've done, we have found out that there may be by no means enough facts to make an knowledgeable choice. When more statistics is to be had, including deadly accident records, climate facts, and mileage facts, extra assessments can be achieved to draw more conclusions from the statistics.

REFERENCES

- [11] Patil, Upreti, and Poonia, "Investigation on AI-Based Techniques in Applications for Detecting Fatal Traffic Accidents," 2023 3rd International Conference on Emerging Smart Technologies and Applications (eSmarTA).
- [12] Kumar et al., "Application to Reduce Distraction Caused by Phone Calls While Driving," 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA).
- [13] Jose et al., "Graphical User Interface for Intelligent Automotive with Vehicle to Vehicle Communication and Adaptive Light Controls," 2022 Third International Conference on Intelligent Computing Instrumentation and Control Technologies (ICICT).
- [14] Carvalhosa et al., "Multipurpose Sensing Platform for Improved Road Safety," 2022 IEEE 19th Annual Consumer Communications & Networking Conference (CCNC).
- [15] Govardhan et al., "An Intelligent IoT Accident Detection System For Emergency Medical Services," 2022 Fourth International Conference on Cognitive Computing and Information Processing (CCIP).
- [16] Gupta et al., "Accident Detection and Alarm System for Emergency Help Services," 2023 International Conference on Sustainable Communication Networks and Application (ICSCNA).
- [17] Manikandan et al., "Automatic Accident Detector to Decrease the Death Rate in Highways and Remote Areas," 2021 6th International Conference on Communication and Electronics Systems (ICCES).
- [18] Shankarpure and Abin, "Application for Car Accident Detection and Prevention Using Inbuilt Mobile Sensor Based On BIOA," 2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBE).
- [19] Rishi et al., "Automatic Messaging System for Vehicle Tracking and Accident Detection," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC).
- [20] Vatti et al., "Smart Road Accident Detection and Communication System," 2018

- International Conference on Current Trends towards Converging Technologies (ICCTCT).
11. Kumar and Toshniwal, "Analysing Road Accident Data Using Association Rule Mining," 2015 International Conference on Computing, Communication and Security (ICCCS).
- [21] Mubarak et al., "MCAS: A Collision Sustenance Mechanism for Motorcyclists," 2018 International Conference on Smart Systems and Inventive Technology (ICSSIT).
13. Khalil et al., "Automatic Road Accident Detection Using Ultrasonic Sensor," 2018 IEEE 21st International Multi-Topic Conference (INMIC).
14. Krishnaveni and Hemalatha, "A Perspective Analysis of Traffic Accident using Data Mining Techniques," International Journal of Computer Applications, 2011.
15. Li, Shrestha, and Hu, "Analysis of Road Traffic Fatal Accidents Using Data Mining Techniques," 2017 IEEE 15th International Conference on Software Engineering Research, Management and Applications (SERA).
16. Shanthi and Ramani, "Classification of Vehicle Collision Patterns in Road Accidents Using Data Mining Algorithms," International Journal of Computer Applications, 2011.
17. Agrawal and Srikant, "Fast Algorithms for Mining Association Rules in Large Databases," International Conference on Very Large Data Bases, 1994.
18. Karimi-Majd and Mahootchi, "A New Data Mining Methodology for Generating New Service Ideas," Information Systems and e-Business Management, 2015.
19. Yi Cong, "Research on Data Association Rules Mining Method Based on Improved Apriori Algorithm," 2020 International Conference on Big Data & Artificial Intelligence & Software Engineering (ICBASE).
20. Akshaya, Krishnamoorthy, and Sivanantham, "Performance Evaluation of Association Rule-based Classification in Cancer Diagnosis," 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA).
21. M. Nagar, M. B. Reddy, U. Nandini, A. Mayan, Sathyabama Krishna and S. P. Mary, "Smart District Analysis and Complaint Website," 2021 5th International Conference on Trends in Electronics and Informatics (ICOEI), 2021, pp. 1019-1025.

D.CERTIFICATE

