PREDICTION OF CRIME RATE USING SVM MODEL WITH INCLUDING OF GOOGLE MAPS FOR ROAD SAFETY

[1]**Mr. J. Murali ,**[2]**G.Mahendra,**[3]**G.V.Sunil Kumar,**[4]**S.Shobha,**[5]**K.Yasini**
[1]Assistant Professor,[2,3,4,5]UG Scholar,Dept. of CSE
[1,2,3,4,5]PBR Visvodaya Institute Of Technology & Science, Kavali,Nellore Dt, A.P

ABSTRACT

In this project, we aim to explore the interaction between crime rates and road safety issues using the large geographic data provided by the Google Maps API. The SVM model is trained on historical crime data as well as road safety indicators obtained from Google Maps, including accident history, lighting conditions and traffic density. By analyzing these factors and crime patterns, we aim to uncover relationships and create a predictive framework that can predict crime rates in different geographic areas. In addition, we conduct a comprehensive evaluation to assess the accuracy and robustness of the model, and consider the potential benefits of incorporating road safety considerations into crime prediction methods. This research can inform targeted interventions and resource allocation strategies aimed at reducing crime rates and improving public safety outcomes.

I.INTRODUCTION:

The safety and security of individuals is important every day to any community. With the advancement of technology and the abundance of digital maps, it is no longer possible to use them for a large scale change. The way we perceive and interact with the environment around us. In an era of constant connectivity and abundant data, effective use of these resources can improve our ability to navigate urban environments safely and confidently. Traditional methods of assessing social security often rely on static crime statistics or anecdotal evidence, which may not always be a comprehensive or up-to-date picture. However, using the power of machine learning and integration with real data sources such as Google Maps, we can create dynamic response systems to predict and prevent potential risks. The goal of this project is to take advantage of this technological convergence by developing a predictive model that uses the extensive capabilities of Google Maps to provide users with safety insights in multiple locations. By analyzing historical crime data and other relevant factors such as time of day, population, and neighborhood conditions, the model aims to provide an accurate assessment of relative risk. to a place. In addition, by incorporating user-generated data and feedback mechanisms, the system can adjust and continuously improve its predictions over time, thereby increasing efficiency and reliability. . This collaborative approach not only empowers individuals to make decisions about their work, but also fosters community participation and

shared responsibility to ensure safety of the people. Finally, the overall goal of this work is to create a platform that not only increases users' awareness of potential risks, but also enables them to take steps to reduce them. chance. By harnessing the power of technology and collective intelligence, we can create safer and more resilient communities where people can navigate their environments with confidence and calmness. In addition, by encouraging cooperation between local governments, law enforcement agencies, and community stakeholders, the program seeks to develop a holistic approach to crime prevention and safety. of the people. By sharing data and real-time insights, these stakeholders can work together to identify emerging threats, better allocate resources, and implement targeted interventions address risk factors. Ultimately, using the power of Google Maps and advanced analytics, this project aims to create a safer urban environment where everyone can live. By providing individuals with the tools and information they need to make decisions about their safety, we can build stronger communities and promote resilience and resilience in the face of adversity.

II.LITERATURE SURVEY:

1.'Crime forecasting: A machine learning and computer vision approach to crime prediction and prevention,:

Crime is an intentional act that can cause physical or mental harm and damage or loss of property, and carries penalties from the government and other authorities depending on the severity of the crime. The amount and nature of crime is increasing at an alarming rate, forcing agencies to develop effective methods of prevention. In the current situation where the number of crimes is increasing, the traditional methods of solving crimes are ineffective, slow and ineffective. So, if we find a way to predict crime before it happens, or create a "machine" that can help the police, it will reduce the burden on the police and help prevent it. in bad deeds. In short, machine learning and computer vision technologies can transform the legal profession.

2.Empirical analysis for crime prediction and forecasting using machine learning and deep learning techniques,

Crime and violence are threats to justice and governance. Accurate crime forecasts and predicting future trends can be calculated to improve the security of cities. Humans have limited ability to process complex information in big data, thus hindering early and accurate crime predictions and predictions. Accurately estimating crime rates, types, and hotspots based on historical patterns presents many challenges and opportunities. Despite extensive research, there is still a need for better predictive analytics to guide police patrols in combating crime. Previous research still lacks study models to achieve crime prediction and prediction accuracy. Therefore, this research uses various machine learning algorithms, namely logistic regression, support vector machine (SVM), Naive Bayes, k-nearest neighbor (KNN), Decision Tree, Multilayer Perceptron (MLP), Random Forest and Extreme Root Boost (XGBoost) . , and time series analysis using short-term memory models (LSTM) and autoregressive integrated moving averages (ARIMA) to improve crime data. On both datasets, the LSTM method is very accurate for time-series analysis in terms of the magnitude of root mean square error (RMSE) and absolute error (MAE).

3.'Diagnosis of crime rate against women using K-fold cross validation through machine learning

Crime against women has become a major problem in our country. Many countries are still struggling to control these crimes, and prevention is an important task. Crimes against women have increased dramatically in recent years. Currently, the government of India is showing interest in solving this problem and focusing on the development of our society. A large amount of data is collected each year on crime reports. This data is very useful in assessing and predicting crime, and can help us prevent crime. This is done during data pre-processing. K-fold cross-validation is a sampling technique used to test machine learning models on small data samples. This is a common strategy because it is easy to understand

and usually has less or less negative impact on the model's simple statistics than other methods such as training split, or simple test. Machine learning plays an important role in data processing. This article describes six different types of machine learning algorithms, such as KNN and Decision Trees, Naive Bayes, Linear Regression CART (Classification and Regression Trees), and SVM, which use similar characteristics of bad news. This algorithm is tested for correctness. The main objective of this study is to evaluate the efficiency and effectiveness of machine learning algorithms in data analysis.

4."Crime rate detection based on text mining on social media using logistic regression algorithm,'

Social media has become very popular in Indonesia and the world recently. Fortunately, this platform allows them to express their thoughts and feelings as well as other groups, especially researchers who use this opportunity to find solutions for competing businesses, decision makers and analysis and predictive support systems. In this case, our analysis is based on Twitter and Facebook, users who often post about crimes that require the attention of the police. Therefore, our goal is to detect crime rates on social media to determine crime patterns and trends in the number of tweets. This work uses text mining techniques to classify the text of tweets and posts into 10 crime categories. The algorithms used for classification are Logistic Regression, Naive Bayes, Support Vector Machine (SVM) and Decision Tree. Of all the algorithms used, Logistic Regression provides the highest accuracy of 90%.

III.EXISTING SYSTEM

Current systems that use machine learning algorithms for crime prediction have made significant progress in improving law enforcement strategies and increasing public safety. These systems often use historical crime data, demographic information, and geographic characteristics to identify patterns and trends that can predict future crime. A common approach is to use supervised learning algorithms (such as decision trees and support vector machines) to classify crime incidents based on various attributes such as location, time, and type. crime In addition, some existing systems combine advanced statistical models with data mining techniques to analyze complex relationships between variables and uncover hidden patterns in crime data. This technology allows law enforcement agencies to gain a deeper understanding of crime patterns and develop targeted intervention strategies. In addition, current systems often use geospatial analysis tools to visualize crime scenes and identify high-risk areas that are prone to crime. By incorporating crime data into geographic maps, law enforcement officials can identify spatial clusters of crime and better allocate resources. Furthermore, as the volume and frequency of data increases, existing systems must adapt to efficiently manage large data sets. In addition, ensuring the accuracy and clarity of forecasting changes remains a key issue, as it can lead to inaccurate results and undermine social differences.

Disadvantages Of Existing System

The disadvantages of the existing is it can't use the power of SVM Algorithm also this doesn't show the crime hotspots in google maps for better extraction of signature:

- Historical Data Limitations
- Complexity in Model Interpretation
- Privacy Concerns with Location Data Usage
- Inability to Identify Crime Spots.

IV.PROPOSED SYSTEM

The proposed system aims to overcome the limitations of existing crime prediction systems by increasing security awareness across sites and allowing users to make informed decisions about their actions. By integrating with Google Maps, the system provides clear visibility and route planning capabilities, allowing users to safely navigate through dangerous areas. Through alerts and real-time updates, users are informed of dangerous areas or security risks around them, thereby contributing to the safety and well-being of people. The main feature of this system is its ability to identify dangerous areas and provide a safe route from point A to point B. The level of risk is included. This information allows users to choose a safe route based on their needs and security concerns, thereby reducing the risk of being exposed to criminal activity while traveling. In addition, the proposed system has the potential to improve public safety through data-driven insights and crime prevention efforts. By analyzing crime patterns and trends, the system can identify areas with higher crime rates and coordinate actions to prevent crime. In addition, by providing users with up-to-date information on security measures, this system can increase the sense of security and confidence of residents and visitors, ultimately creating a safer environment. for everyone.

Advantages Of Proposed System

The proposed system offers several advantages over traditional way of identifying the crime spots in google maps:

- Enhanced Safety Awareness
- Empowerment for Informed Decision-Making
- Real-Time Warnings and Updates
- Contribution to Community Safety
- Integration with Google Maps
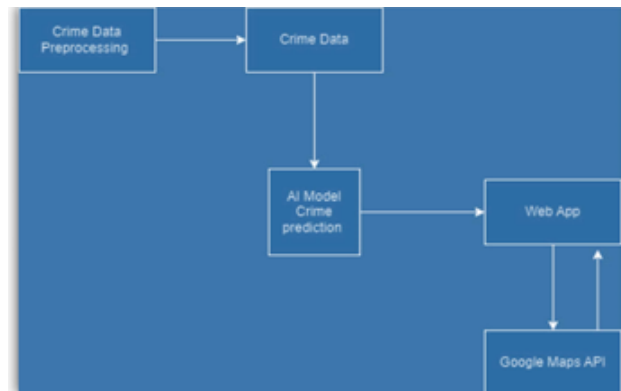
V.ARCHITECTURE DIAGRAM

Figure 1 :Proposed System Architecture

VI.MODULE DESCRIPTION:

- State-wise Crime Rate Analysis
- Crime Data Collection and Predicting Crime Spots
- Integrating Google Maps APIs for Safe Routing
- Web Application Development

1.STATE-WISE CRIME RATE ANALYSIS:

Analyzing state crime rates can provide valuable insight into the geographic distribution of crime and help identify areas with higher crime rates. By examining crime statistics in various countries, law enforcement agencies and policy makers can develop intervention strategies to address specific challenges and allocate resources more efficiently. Understanding the differences in crime rates between states is important in developing crime prevention and intervention strategies. Through an in-depth study of federal crime data, policymakers can identify areas of concern, allocate resources, and implement targeted measures to reduce crime and improving public safety. In addition, sharing best practices and learning between countries can help them work together to address shared challenges and strengthen crime prevention efforts across the country.

```
{"data": [
    {
     "field1": "0",
     "STATE_NAME": "ANDHRA PRADESH",
     "CRIME (2014)": "114604",
     "CRIME (2015)": "110693",
     "CRIME (2016)": "106774",
     "CRIME PER SHARE (STATE)": "3.6",
     "CRIME RATE": "206.4"
    },
    {
     "field1": "1",
     "STATE_NAME": "ARUNACHAL PRADESH",
     "CRIME (2014)": "2843",
     "CRIME (2015)": "2968",
     "CRIME (2016)": "2534",
     "CRIME PER SHARE (STATE)": "0.1",
     "CRIME RATE": "192.3"
```

Figure 2: State wise crime data

```
"data": [
    {
     "lati": 77.249200000000002,
     "type": "Feature",
     "properties": {
         "mag": 1
     },
     "longi": 28.536300000000001
    },
    {
     "lati": 77.085999999999999,
     "type": "Feature",
     "properties": {
         "mag": 2
     },
     "longi": 28.6127
    },
```

Figure 4.2 Crime Spots data

2. CRIME DATA COLLECTION AND PREDICTING CRIME SPOTS:

Effective crime forecasting depends on the comprehensive collection and analysis of crime data from multiple sources. Law enforcement agencies, government agencies, and investigative agencies collect data on reported crimes, including information such as the type of crime, location, date, time, and population. individually. Additionally, data from other sources such as detectives, social media, and community reports can provide valuable insight into criminal activity. Once collected, crime data is carefully analyzed to identify patterns, trends and relationships that can predict future criminal activity. Use data mining techniques, machine learning algorithms, and statistical models to extract actionable insights from large data sets. These techniques allow analysts to identify crime hotspots, predict crime trends, and develop predictive models to predict where and when crime is most likely to occur. One method of predicting crime scenes is the use of machine learning techniques, such as clustering and classification algorithms. The algorithms group together similar crime incidents based on their characteristics so that analysts can identify Spatial clusters or hot spots of crime. Classification algorithms, on the other hand, classify crime incidents into different categories based on different characteristics, which allow the identification of patterns and trends that can reveal crime prediction models.

3. INTEGRATING GOOGLE MAPS APIS FOR SAFE ROUTING:

Integrating the Google Maps API into a crime prediction system will have a significant impact on improving user safety and providing faster navigation assistance. Using the power of Google Maps, users can access accurate geographic data, view dangerous hot spots, and plan safe routes to their locations. This integration allows users to make informed decisions about their travel routes and avoid high-risk areas, thus reducing the risk of crime. A key feature of the Google Maps API integration is the ability to overlay crime scenes onto map views, allowing users to view crime scenes and assess safety in different areas. By adding crime data to Google Maps, users can see the latest information on crime and assess the risk level of an area before deciding on a travel route. This visual display of crime data helps improve safety and security by allowing users to safely navigate their surroundings and avoid dangerous areas. In addition, integration with the Google Maps API allows the system to provide instant navigation assistance by suggesting safer routes based on information about crime and other relevant factors. Using Google Maps' routing algorithm, the system can take into account potential hot spots, traffic conditions and other parameters to calculate the safest and most efficient route for users. This instant navigation feature helps users navigate confidently and safely, guiding them away from high crime areas and into safer areas. In addition, integration with the Google Maps API improves the overall user experience by providing route maps and navigation capabilities. Users can enter their itinerary and receive step-by-step instructions to navigate safely

to their desired destination. Integration with Google Maps gives users access to additional features such as Maps, satellite imagery and local business information, enriching their navigation experience and making better decisions. going. Overall, integrating the Google Maps API into a crime prediction system can increase user safety, aid faster navigation, and improve the overall user experience.
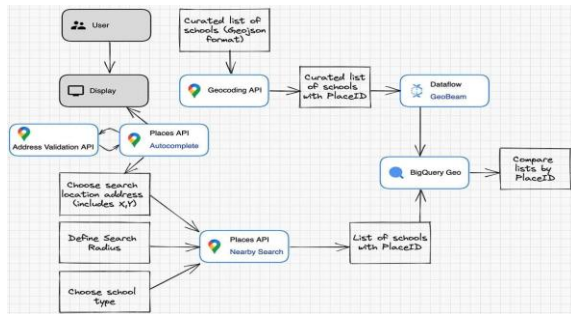

Figure 4.3 Google Maps APIs

4.WEB APPLICATION DEVELOPMENT

The development of the web application for crime prediction and safe routing involves utilizing a combination of programming languages and technologies to create a user-friendly and efficient platform. Python serves as the primary backend programming language, providing the foundation for data processing, analysis, and predictive modeling. With its robust libraries for data manipulation, machine learning, and web development, Python offers the flexibility and scalability required to build complex algorithms and integrate them seamlessly into the application.

HTML and CSS are utilized for designing the user interface (UI) of the web application. HTML (Hypertext Markup Language) is used to structure the content of the web pages, defining the layout and organization of elements such as text, images, and buttons. CSS (Cascading Style Sheets) is employed to style and customize the appearance of the UI, including aspects such as colors, fonts, and spacing. Together, HTML and CSS enable developers to create visually appealing and intuitive interfaces that enhance the user experience.

In addition to JavaScript, Embedded JavaScript (EJS) is employed as a templating language for generating dynamic HTML content on

the server-side. EJS enables developers to embed JavaScript code directly into HTML templates, facilitating the creation of dynamic and data-driven web pages. This allows for the generation of dynamic content, such as displaying crime statistics, generating route information, and presenting real-time updates to users. EJS enhances the flexibility and maintainability of the web application by streamlining the process of rendering dynamic content.

Overall, the development process involves leveraging Python for backend logic and data processing, HTML/CSS for UI design, JavaScript for interactive mapping functionalities,and EJS for generating dynamic content. By combining these technologies, developers can create a comprehensive web application that provides users with valuable insights into crime prediction and safe routing, ultimately enhancing personal safety and security.

VII.CONCLUSION:

In short, the development and deployment of crime prediction and safe road systems is an important step forward in machine learning and geospatial technology to improve personal safety. By combining predictive analytics with real-time navigation assistance, the system enables users to make informed decisions about their movements and navigate their surroundings safely. The integration of Google Maps API will enrich the user experience, providing clear road maps and visualization of crime scenes. Overall, this system has great potential to improve public safety and prevent crime.

REFERENCES:

[1] K. Zakir Hussain, M. Durairaj and G. R. J. Farzana, "Criminal behavior analysis by using data mining techniques," IEEE-Intemational Conference On Advances In Engineering, Science And Management (ICAESM-2012), Nagapattinam, Tamil Nadu, 2012, pp. 656-658.

[2] Keyvanpour, Mohammad & Javideh, Mostafa & Ebrahimi, Mohammadreza. (2011). Detecting and investigating crime by means of data

mining: A general crime matching framework. Procedia CS. 3. 872-880. 10.1016/j.procs.2010.12.143.

[3] Ioannis Kavakiotis OlgaTsave Athanasios Salifoglou Nicos Maglaveras Ioannis Vlahavas Ioanna Chouvarda, Machine Learning and Data Mining Methods in Diabetes Research, Computational and Structural Biotechnology Journal Volume 15, 2017, Pages 104-116

[4] Frank, Eibe & Hall, Mark & Holmes, Geoffrey & Kirkby, Richard & Pfahringer, Bernhard & Witten, Ian & Trigg, Len. (2010). Weka-A Machine Learning Workbench for Data Mining. 10.1007/978-0-387-09823-4_66.

[5] Pang-Ning Tan; Michael Steinbach; Anuj Karpatne; Vipin Kuma Introduction to Data Mining 2nd ed, Publisher: Pearson, 2019, Print ISBN: 9780133128901, 0133128903 eText ISBN: 9780134080284,013408028

[6] M. Kantardzic, Data Mining Concepts, Models, Methods, and Algorithms, 2nd ed, John Wiley & Sons, Inc., Hoboken, New Jersey 2011, ISBN 978-0-470-89045-5, oBook ISBN: 978-1-118-02914-5, ePDF ISBN: 978-1-118-02912-1, ePub ISBN: 978-1-118-02913-8

[7] Ahishakiye, Emmanuel & Opiyo, Elisha & Wario, Ruth & Niyonzima, Ivan. (2017). A Performance Analysis of Business Intelligence Techniques on Crime Prediction. International Journal of Computer and Information Technology. 06. 84-90.

[8] Marlina, Leni & Muslim, Muslim & Siahaan, Andysah Putera Utama. (2016). Data Mining Classification Comparison (Naïve Bayes and C4.5 Algorithms). International Journal of Emerging Trends & Technology in Computer Science. 38. 380-383.10.14445/22315381/IJETT-V38P268.

[9] Himani Bhavsar, Mahesh H. Panchal, (2012). A Review on Support Vector Machine for Data Classification, International Journal of Advanced Research in Computer Engineering & Technology

(IJARCET), Volume 1, Issue 10, December 2012, ISSN: 2278 -1323.

[10] Xiaohu, Wang & Lele, Wang & Nianfeng, Li. (2012). An Application of Decision Tree Based on ID3. Physics Procedia. 25. 1017-1021. 10.1016/j.phpro.2012.03.193.

[11] Hssina, Badr & MERBOUHA, Abdelkarim & Ezzikouri, Hanane & Erritali, Mohammed. (2014). A comparative study of decision tree ID3 and C4.5. (IJACSA) International Journal of Advanced Computer Science and Applications. Special Issue on Advances in Vehicular AdHoc Networking Applications. 10.14569/SpecialIssue.2014.040203

[12] Kumbhare, Trupti A. and Santosh V. Chobe. "An Overview of Association Rule Mining Algorithms." (2014).

[13] Chengqi Zhang Shichao Zhang, Association Rule Mining Models and Algorithms, ISSN 0302-9743, ISBN 3-540-43533-6 Springer-Verlag Berlin Heidelberg New York, Springer, 2002

[14] Larose, Daniel T. Data mining methods and models, Published by John Wiley & Sons, Inc., Hoboken, New Jersey, 2006, ISBN-13 978-0-471

[15] Han, J., Kamber, M., & Pei, J. (2011). Data mining: concepts and techniques. Morgan Kaufmann.

[16] Witten, I. H., Frank, E., Hall, M. A., & Pal, C. J. (2016). Data mining: practical machine learning tools and techniques. Morgan Kaufmann.

[17] Tan, P. N., Steinbach, M., & Kumar, V. (2006). Introduction to data mining. Pearson Education.

[18] Hastie, T., Tibshirani, R., & Friedman, J. (2009). The elements of statistical learning:data mining, inference, and prediction. Springer Science & Business Media.

Author's Profiles:

J. Murali working as Assistant Professor in Department of CSE, PBR Visvodaya Institute of Technology and Science, Kavali. He completed his MCA in S.V.Arts and Science College, Gudur, affiliated to S.V University Tirupathi and completed his M.Tech in SKR College of Engineering and Technology, affiliated to JNTUA. He has 16 years of Teaching experience in various colleges.

G. Mahendra B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology and Science, Kavali.

G. Venkata Sunil Kumar B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology and Science, Kavali.

S. Shobha B.Tech with Specialization of Computer Science Engineering in PBR Visvodaya Institute Of Technology and Science ,Kavali.

K. Yasini B.Tech with specialization of Computer Science and Engineering in PBR Visvodaya Institute Of Technology and Science,Kavali.