Crime Rate Prediction Using Machine Learning

Bindu K P, Mohammed Yaseen, Nagendra B N, Nitesh A, Prajwal R

Assistant Professor,
Department Of CSE,
K S School of Engineering and Management, Bengaluru ,
Karnataka, India.

Abstract - In the real world of crime analysis and the investigative process, especially in developing nations like India, the endeavor is often time-intensive. This research endeavors to explore methodologies that can expedite the anticipation of prevalent crime types in specific regions. Crime, a pervasive social issue impacting individuals worldwide, has experienced a significant surge in recent years, with a projected increase in the future. This study aims to furnish law enforcement agencies and the public with effective crime forecasting tools to optimize resource allocation in response to prospective crime hotspots. To this end, the research paper proposes the utilization of a machine learning algorithm for the detection of crimes based on collected data, revealing the extent of criminal activities in specific areas. Given the existing gaps in prior studies concerning the accuracy of crime forecasting and prediction through learning models, this study employs various machine learning algorithms, including k-nearest neighbors (KNN), decision tree, support vector machine (SVM), eXtreme Gradient Boosting (XGBoost), and random forest. The algorithm demonstrating the highest accuracy is selected for evaluating the results.

Index Terms - Crime rate, Random Forest, Crime prediction, Machine Learning, Analysis and Forecast .

I. INTRODUCTION

The Crime analyzing and prediction is a way to identify crime. This method can predict areas or cities with high crime rates and crime areas. Crime often affects a country's quality of life and economic growth. To protect people from crime, advanced techniques and new methods are needed to improve crime detection in order to protect society. We propose this system to detect and predict various crimes in a particular area. Crime, as a social threat and illegal behavior, offers many opportunities to people. The crimes limited to assault, rape, murder, theft, assault, robbery and drug crimes. The crimes of the first category, crimes include violation of tourist rights, damage to living spaces and citizens, and other crimes.

Crime analysis is an important aspect of crime that requires analysis of crime patterns to understand the relationship between crime and the situation in an area. These issues have inspired many studies in recent years on predicting future crime to help police allocate resources. Machine learning technique's is used to get the information from this large database and discover new, never-before-seen connections. The information is then used to note and investigate crime, which can help the crime analyst investigate these crimes using a variety of interactive methods, thus helping prevent crime. S. Kim et al. Various kinds of machine learning techniques were applied to predict crime based on crime data from the last 15 years in Vancouver, and K nearest neighbor algorithm and P-based augmented decision tree algorithm achieved 39% and 44% accuracy respectively. Kumar et al. Predicting the average probability of many different types of crime at different places and times in the city using additive classification trees, K-Neighbour, Support vector machine, decision tree classification and k-nearest neighbor algorithm.

The data gives a picture of the security situation in the country, according to data given by the Crime Bureau of India, which shows that crime is increasing every year. Crime today can take many different forms, including crimes such as theft and vandalism, as well as emerging problems such as digital crime. These figures are a reminder of strengthening counter-terrorism strategies, law enforcement and investigate in urine technology to prevent a rise in crime in India. By this problem does not guarantee the safety and health of the public. The speed at which new solutions are implemented to keep up with the changing crime scene is also important.

II. LITERATURE SURVEY

"Crime Detection Techniques Using data Mining and K-Means" Khushabu A.Bokde, Tisksha P. Kakade, Dnyanes hwari S. Tumsare, Chetan G. Wadhai (2018).

A high rate of social crime can have a impact on companies and organizations. This study focuses on the classification of crime groups according to their occurrence within a year. We drew on theoretical models of real crime data collected by the police of England and Wales from 1990 to 2011, using exploratory mining techniques for analysis, exploration and pattern discovery. We focused on working to improve the quality of our advertisements and emphasized their importance. Eliminates products of low importance. Using the Rapid Miner tool, a genetic algorithm (GA) was used to utilize the operator detection. This model includes a limited number of data breaches and cannot be used for multiple data breaches.This project focuses on crime analysis using crime analysis techniques on crime data using speed mining tools, here we do crime analysis by taking into account murders and organizing them according to years, the result is that murders saw a decline from 1990 to 2011. According to the output of the joint effort, crimes committed over the years are easily detected and used to develop preventive measures in the future.

"Crime Rate Prediction Using K-Nearest Neighboring Algorithm" Akash Kumar, Aniket Verma, Gandhali Shinde and Yash Sukhdeve (2020).

The system is identification of crimes by using classification techniques and crime prediction that can be done using data set of six cities of Tamil Nadu by using KNN classification, K Means clustering, Agglomeration hierarchical clustering,whose main aim was to use a datasets where the data positions were divided into the different classes to get clarity of a new sample positions. Using features like Day, Date, Year of the crime using KNN - algorithm it is found to be 40% accurate. Their model used techniques like Logistic-regression, Decision trees, Bayesian Methods and Support Vector Machine. There were many trails of different methods were used on the training datasets by splitting it into two sets; training and testing, both validation and cross-testing were conducted, the method with the lowest loss was applied to get the results for the test data. This research work offers a way to foresee and predict crimes and frauds within a city. It focuses on having a crime prediction tool that can be helpful to law enforcement. This paper is aimed at increasing the prediction accuracy as much as possible. As compared to the others work, this work was successful in achieving the highest accuracy in prediction. The KNN system helps law implementing agencies for improved and exact crime analysis. By traversing through the crime datasets, we have to find out different reason that lead to crime. Since this paper is bearing in mind only some limited factors, full accuracy cannot be accomplished. Thus far this system has trained using certain attributes but we can take account of more factors to improve accuracy. In the future, this work can be stretched to have developed classification algorithms to detect criminals more efficiently. The crime rates that are increasing non-stop may go down in the future due to such prediction techniques.

"Study on Crime Examination and Forecasting using Machine Learning" Sakshi mench, Hafsa Bagwan and Charu Negi (2021).

This research intends to predict criminal behavior by making use of the myriad of characteristics included in the datasets. The datasets was compiled using data from the relevant official websites. It is possible to apply machine learning algorithms, the primary language of which is Python, to make predictions on the type of criminal activity that are take place in a specific location. The goal would be to train a model such that it could make predictions. The training dataset will be checked with test dataset. Depending up on the level of precision required, a more suitable method will be used to generate the model. The prediction of criminal activity will have the k nearest-neighbor (KNN) classification, other techniques. Visual and graphical representations of the datasets are provided for the aim of conducting an investigation into possible offenses that were committed within the nation. Crime prediction system using various techniques as machine learning, deep learning technologies, specifically employing the k-Nearest Neighbour classifier and support vector machine algorithms. The models analysed show promising accuracy and effectiveness, aiding law enforcement in resource allocation and decision-making. By analysing crime datasets, visualizing data through graphs and charts, and comparing various algorithms to optimize accuracy, the project demonstrates the potential for the machine learning in the field of crime prevention. Importantly, the system are adaptable to various regions and countries, provided that relevant datasets are available, highlighting its potential for widespread implementation and significant impact on global crime reduction efforts. However, addressing ethical, privacy, and fairness concerns is crucial to avoid biases and discrimination

"Empirical Analysis for Crime Prediction and Forecasting Using Machine Learning and Deep Learning Techniques" Wajiha Safat, Sohail Asghar, Saira Andleeb Gillani (2021).

Overcoming critical challenges arising from crimes and criminal offenses before justice requires effective management. Improving urban safety with computational tools on accurate of the crimes and prediction models. There are still gaps in the use of best predictive techniques that can guide well about the law enforcement in tracking crime. This research aims to fill this gap using different machine algorithms, including regression, support vector (SVM), naive Bayes, k-nearest (KNN), tree decision trees, and multilayer perceptron (MLP). , random forest. and increasing cloud slope. Also perform time analysis using Long Short Term Memory and Overaggressive Integrated Moving Average models to better fit crime data. This comprehensive program uses machine learning and real-time analysis to prediction models. More importantly, the entire system is not tied to a specific time when a crime occurs, making it more effective and less time-consuming.

III. CONCLUSIONS

The main goal of this research is to assess crime rates in different locations, specifically focusing on factors such as population density, country, crime rate, and centrality. India has been selected as the focal point for this inquiry, utilizing a Random Forest model to predict crime rates. The study includes a visual representation in the form of a graph post the implementation of the Random Forest model. Recognizing the global significance of crime as a major issue affecting communities and societies, the research underscores the importance of effectively addressing and managing this challenge. The study acknowledges the intricacies involved in predicting crime and extracting meaningful insights from extensive crime datasets. It highlights the potential for reducing crime through advanced forecasting, emphasizing ongoing efforts to enhance prediction systems through advancements in data gathering and mining technologies.The survey aims to refine crime predictions by identifying trends and patterns, anticipating the likely types of violations in specific districts during particular time periods and seasons. Emphasis is placed on the practical application of crime prediction, highlighting its role in aiding individuals to make informed decisions about their living and visiting choices based on anticipated crime scenarios in different neighborhoods at various times

IV. ACKNOWLEDGEMENTS

V. REFERENCES

[1] "Crime Detection Techniques Using Data Mining and K-Means" Khushabu A.Bokde, Tisksha P. Kakade, Dnyanes hwari S.Tumsare, Chetan G. Wadhai(2018)

[2] "Crime Prediction using KNN and Data Mining " Vrushali Pednekar, Trupti Mahale, Pratiksha Gadhave and Arti Gore (IJRITCC-2018)

[3] "Crime Rate Prediction Using K-Nearest Neighboring Algorithm" Akash Kumar, Aniket Verma, Gandhali Shinde and Yash Sukhdeve (IEEE-2020)

[4] "Study on Crime Examination and Forecasting using Machine Learning" Sakshi mench, Saloni Kuge and Hafsa Bagwan (Kalahari-2021)

[5] "Empirical Analysis for Crime Prediction and Forecasting Using Machine Learning and Deep Learning Techniques" Wajiha Safat, Sohail Asghar, Saira Andleeb Gillani (IEEE-2021)