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MACHINE LEARNING-BASED CRIME DATA ANALYSIS AND PREDICTION FOR SMART POLICING

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Abstract:

The rising rate of crime in India presents significant challenges for law enforcement agencies in terms of timely analysis, classification, and prevention. Rapid technological advancements, including the widespread use of social media and modern communication tools, have further enabled offenders to carry out criminal activities more efficiently. In this context, data-driven approaches are essential for understanding and predicting crime patterns. This study focuses on the application of machine learning techniques for analyzing crime data and identifying key patterns across different regions and demographic groups. The proposed system aims to predict high-crime areas and analyze age groups with varying levels of criminal involvement. While traditional clustering and statistical methods provide limited insights, the use of advanced machine learning algorithms enables more accurate pattern recognition and predictive analysis. By leveraging historical crime datasets, the system identifies trends and predicts the likelihood and type of crimes in specific locations. This assists law enforcement agencies in resource allocation, proactive policing, and faster case classification. The approach ultimately contributes to improved decision-making, enhanced public safety, and more efficient crime prevention strategies.

Keywords: crime analysis, machine learning, crime prediction, data analytics, smart policing

I INTRODUCTION

In present scenario criminals are becoming technologically sophisticated in committing crime and one challenge faced by intelligence and law enforcement agencies is difficulty in analyzing large volume of data involved in crime and terrorist activities therefore agencies need to know technique to catch criminal and remain ahead in the eternal race between the criminals and the law enforcement. So appropriate field need to chosen to perform crime analysis and as data mining refers to extracting or mining knowledge from large amounts of data, data mining is used here on high volume crime dataset and knowledge gained from data mining approaches is useful and support police forces. To perform crime analysis appropriate data mining approach, need to be chosen and as clustering is an approach of

data mining which groups a set of objects in such a way that object in the same group are more similar than those in other groups and involved various algorithms that differ significantly in their notion of what constitutes a cluster and how to efficiently find them. To solve a case based upon a particular data there should be thorough investigation and analysis that is to be done internally. With the amount of crime data that is present in India currently the analysis and decision making of these criminal cases is too difficult for the officials. Identifying this a major problem this paper concentrates on creating a solution for the decision making of crime that is committed. The vehicle starts driving on its own. An autonomous driving vehicle performs various actions to arrive at its destination, repeating the steps of recognition, judgement and control on its own.

II LITERATURE SURVEY

The focus on this literature survey is the use of different manual techniques used for predicting crime data.

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III EXISTING SYSTEM

Crime analysis tool is developed using various distinct data mining methods. It supports the police officers for investigating crimes. Implementing a clustering algorithm on crime datasets enables analysis of crimes. It makes identification and analysis of various criminality trends over the years through their conclusion. The random initial starting points produced by K-means which gives results in the form of cluster that helps in reaching the local optima [8]. So to overcome this problem, the partitioned data along with the data axis with the highest variance for assigning the initial centroid for K-Means clustering was applied. So it is observed that the proposed technique uses a lesser number of iteration thereby reducing the clustering time. Using merge sort, K- means algorithm can be improved for clustering the Hidden Markov Model (HMM).

Disadvantages

- Less Accuracy
- Less Efficiency

IV PROBLEM STATEMENT

Crimes now a days are increasing day by day and with different level of intensity and versatility. The result is a great loss to society in terms of monitory loss, social loss and further it enhances the level of threat against the smooth livelihood in the society. To overcome this problem, the computing era can help to reduce the crime or even may be helpful in predicting the crime so that sufficient measures can be taken to minimize the loss to property and life. It is essential to raise awareness of this issue and make people understand the severity of the situation. Machine learning advancements and algorithms can help identify new patterns in different data sets and uncover previously unknown information. It is a major challenge to understand the versatile data available with us, then model it to predict the future incidence with acceptable accuracy and further to reduce the crime rate.

V PROPOSED SYSTEM

We are working on Spyder for implementation. Here we use a Spyder 3.7 version. Spyder is an integrated development environment for systematic programming in Python. Here we implemented different packages like matplotlib,numpy,sklearn, pandas,etc. Which helps to plot elbow graph and data frame table using a K-means clustering algorithm? Dataset is collected from Kaggle datasets and import datasets into Spyder in CSV format as shown in Fig 1. We perform normalization for finding the accurate number of clusters

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(k) using the elbow method. The elbow method performs k- means clustering on the obtained dataset for a range of values of k (2-15) and calculates the SSE. A line chart of the SSE is plotted for each value of k

Advantages

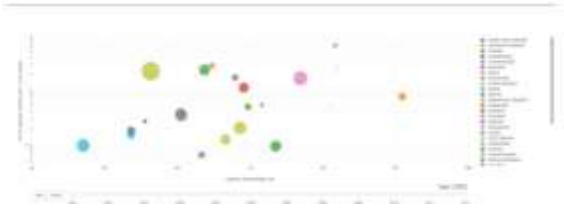
- High Accuracy
- High Efficiency

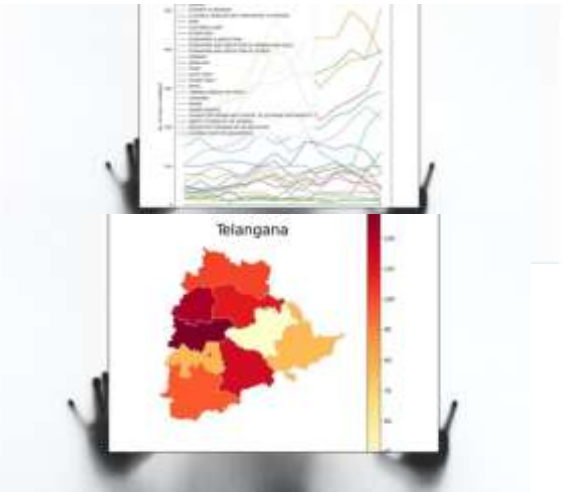
VI IMPLEMENTATION

Prediction : use this module to predict crime types .

Analysis : use this module to analyze.

VII RESULTS





technology and interdisciplinary cooperation, the potential for leveraging data-driven insights to enhance public safety remains promising..

VIII CONCLUSION

In conclusion, the integration of machine learning (ML) techniques in crime data analysis presents a transformative approach towards understanding and combating criminal activities. ML algorithms offer the capability to discern intricate patterns within vast datasets, enabling law enforcement agencies to anticipate, prevent, and respond to crimes more effectively. By leveraging predictive modeling, anomaly detection, and clustering algorithms, ML empowers stakeholders to identify high-risk areas, predict future crime hotspots, and optimize resource allocation for crime prevention strategies. However, the successful implementation of ML in crime data analysis requires robust data governance frameworks, ethical considerations, and collaboration between data scientists, law enforcement experts, and policymakers. Nonetheless, with continued advancements in ML

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