RAJEEV GANDHI MEMORIAL COLLEGE
OF ENGINEERING & TECHNOLOGY
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CRIME PREDICTION USING A MACHINE LEARNING ALGORITHM

LITERATURE SURVEY

Related work- 1

Title: "A Meta-Analysis of ML Models in Crime Forecasting"

Authors: P. Karthik, P. Jayanth, K. Tharun Nayak, and K. Anil Kumar

"Crime Prediction Using Machine Learning and Deep Learning Methods" focused on leveraging ensemble machine learning techniques to improve crime prediction accuracy. They employed Decision Tree and Bagging Classifier algorithms, which are supervised learning methods known for their interpretability and robustness. By processing a comprehensive dataset containing over half a million records with features such as location, crime type, date, and time, they trained these models to classify and forecast criminal activities effectively. The approach was designed to enhance predictive accuracy and provide actionable insights for law enforcement agencies.

To achieve high levels of success, the team utilized ensemble learning methods, combining multiple decision trees using the Bagging technique, which helps reduce overfitting and increases model stability. This ensemble approach allowed the models to achieve impressive precision, with a reported accuracy rate of about 98% for training data and 95% for testing data. The models were capable of adapting to changing crime patterns and integrating various features, which contributed to their effectiveness. Their system also incorporated user-friendly interfaces for stakeholders such as law enforcement and urban planners, making the predictive tools accessible and practical for real-world applications.

Ultimately, the study demonstrated that ensemble classifiers, particularly decision trees combined with bagging, could significantly outperform traditional models. The models reached a remarkable accuracy of approximately 99.5% during actual crime prediction tests, representing a substantial improvement over the previous method. This success underscores the potential of machine learning approaches to transform crime forecasting, enabling earlier detection, smarter resource allocation, and more effective crime prevention strategies.

Related work- 2

Title: "Machine Learning for Smarter Crime Prevention Strategies"

Authors: Sridharan S. et al.

Many researchers have explored how machine learning can help in predicting crimes and understanding crime patterns. They use different data analysis techniques to analyse past crime data, which helps law enforcement agencies plan better strategies.

Sathya Devan and Gangadharan (2016) used data mining to analyse crime patterns and make predictions. They showed that by examining data carefully, it is possible to forecast where and when crimes might happen. Sivaranjani et al. (2016) used clustering techniques like K-means to identify crime hotspots in Tamil Nadu, helping authorities focus their efforts in high-risk areas.

Zhao and Tang (2017) introduced transfer learning, a method that uses knowledge from one area to improve predictions in another, making crime prediction models more accurate. Kansara and E. (2016) compared different machine learning methods such as Random Forest, Naive Bayes, and Linear Regression, finding that Random Forest provided the best results for predicting crime rates.

Overall, these studies show that machine learning techniques like clustering, classification, and deep learning can effectively analyse crime data. This helps in predicting where and when crimes may occur, enabling better prevention and resource management.

Related work- 3

Title: "Simplified ML Models for Crime Data Analysis"

Authors: Prof. R. Hinduja, Ms. T. Tejasree, Ms. Harini Ramesh Babu

Researchers have been exploring various methods to utilize machine learning to predict crimes and enhance law enforcement. Kumar et al. (2019) worked on a technique that used GIS-based clustering with K-Means to find areas with a high concentration of crimes. This helped police identify crime hotspots effectively. However, their system could not predict crimes in real-time, which limited its usefulness for proactive prevention.

Williams and Thomas (2022) focused on cybercrimes such as fraud. They used machine learning models like Support Vector Machines (SVM) and Naïve Bayes to detect online threats. While their techniques worked well for cybercrimes, they were not good at predicting physical crimes like assault or theft. This showed that different types of crimes might need different prediction techniques.

Chen et al. (2023) tried using the Random Forest algorithm, which is an ensemble method known for good accuracy. Their model achieved about 85% accuracy in predicting crimes, proving that Random Forest can be effective. Still, they noted that choosing the right features and tuning the model properly is very important to get the best results.

Other researchers, like Smith et al. (2020), used simpler models like Decision Trees and K-Nearest Neighbors (KNN). They managed to get about 78% accuracy, but their systems had trouble with imbalanced data — meaning some crime types, which happen less often, were not predicted well. Johnson and Lee (2021) used neural networks to analyze crime trends over time. These advanced models improved prediction accuracy but required powerful computers, making them hard to use in real-time situations.

Overall, the literature shows that machine learning techniques, particularly ensemble methods like Random Forest, are very promising for crime prediction. They can analyse large datasets and provide useful insights.