International Journal of Scientific Research in Computer Science, Engineering and Information Technology

ISSN : 2456-3307

OPEN ACCESS

Available Online at : www.ijsrcseit.com

doi : https://doi.org/10.32628/ CSEIT2490215

Justice : A Predicting Criminal Acts According To IPC Section

Gaurav Varshney *, Modi Manankumar R, Rajesh Maheshwari, Tirth Chhabhaiya, Bikram Kumar

Department of Computer Science and Engineering, PIET, Vadodara, Gujarat, India

ARTICLEINFO

Article History:

Accepted: 03 March 2024

Published: 12 March 2024

Publication Issue

Volume 10, Issue 2

March-April-2024

Page Number

129-139

ABSTRACT

The AI-driven IPC Section Prediction for Crime Classification project is a groundbreaking initiative with far- reaching implications for the legal and law enforcement sectors in India. Traditional crime classification and the assignment of the appropriate IPC section are often time-consuming and prone to human error. Our web application addresses these challenges by offering an efficient, accurate, and user-friendly solution. One of the key strengths of our application lies in its adaptability. It can process a wide range of crime descriptions, including those involving complex legal language or colloquial terms, ensuring its utility in diverse scenarios. Additionally, our system is designed to continuously learn and evolve. It adapts to changes in legal terminology, updates in the IPC, and emerging crime trends, thereby maintaining its relevance and precision over time. The social impact of this project cannot be overstated. By streamlining crime classification, it empowers law enforcement agencies to allocate resources more efficiently and prioritize cases based on severity and relevance. It also aids legal professionals by expediting case preparation and documentation. Moreover, it facilitates greater public engagement with the legal system, enabling citizens to better understand and navigate the complexities of the IPC. In conclusion, our AI-driven IPC Section Prediction web application is a pioneering tool that has the potential to revolutionize crime classification and legal processes. Its adaptability, continuous improvement, and positive societal impact make it an asset for law enforcement, legal practitioners, and the general public alike.

Keywords: Machine Learning, Natural Language Processing (NLP), Crime Summary Analysis, Criminal Law, Indian Penal Code (IPC), Text Classification, Crime Detection, Automated Crime Analysis, Supervised Learning.

I. INTRODUCTION

Criminal acts have serious implications on the society, and the identification of potential criminal behavior and the prevention of crime is an important aspect of the justice system. In India, the Indian Penal Code (IPC) provides a comprehensive framework of criminal

offenses and their cor- responding punishments. However, predicting criminal acts according to IPC section remains a major challenge for law enforcement agencies. To address this issue, machine learning techniques have been proposed as a means of identifying individuals who may be at risk of committing a crime. The use of machine learning algorithms can analyze past criminal behavior, mental health issues, and other relevant risk factors to identify potential warning signs of criminal behavior. Creating a predictive model that can correctly forecast criminal acts in accordance with IPC sections is the aim of this project. By analyzing and interpreting data from various sources, such as criminal records, law enforcement databases, and expert surveys, we can identify individuals who are at high risk of committing a crime and take appropriate measures to prevent crime. The outcome of this project has the potential to make a significant contribution to the justice system and society. By improving crime prevention and reducing the burden on the justice system, we can ensure that justice is served for those who have already committed a crime and prevent the occurrence of future criminal acts. Therefore, the development of a predictive model for predicting criminal acts according to IPC section using machine learning techniques is an important and timely topic that requires further research and development.

II. LITERATURE SURVEY

A. Different Approaches for Crime Prediction system.

A methodical strategy to identifying trends and patterns in crime is called crime prediction, offering various technologies to build efficient Crime Prediction Systems. These systems accelerate crime-solving processes and reduce crime rates. [1] They rely on recorded data, time, and location, using various analysis techniques to forecast crime patterns. Predictions can be made qualitatively through methods like environmental scanning and scenario writing, while quantitative methods involve time series models to project annual crime rate trends. [2] These approaches also consider factors influencing future crime trends. Crime cast, deep learning techniques, and data mining are notable methods for predicting crimes.

B. Crime forecasting: a machine learning and computer vision approach to crime prediction and prevention.

The escalating prevalence of crimes necessitates the development of efficient prevention methods. Traditional crime- solving approaches have proven slow and ineffective in the face of this surge. To alleviate the burden on law, enforcement, [3] we propose the integration of machine learning (ML) and computer vision technologies. By harnessing these technologies, we aim to predict detailed crime occurrences before they happen and assist police officers in their duties. impact of ML and computer vision in various cases, motivating further investigation. Statistics comparing the pre- and post-implementation periods show how crime detection and prevention have changed. The main goal of the study is to show how law enforcement agencies can be empowered to detect, prevent, and resolve crimes more quickly and accurately by combining machine learning and computer vision. [4] In essence, these technologies hold the potential to revolutionize law enforcement practices.

C. Machine learning in crime prediction.

Paper explores the crucial realm of crime prediction using machine learning, emphasizing its potential to save lives and safeguard property. Over the past decade, numerous state-of- the-art crime prediction techniques have emerged. Through a Systematic Literature Review (SLR), we examine these approaches, highlighting challenges and proposing avenues for future research in crime prediction. [5] The focus centers on 68 select machine learning studies in crime prediction, addressing eight key research questions.

Many of these studies employ supervised machine learning, assuming the availability of labeled data, though real-world scenarios often lack such data. Challenges encountered in these research endeavors are also discussed. [6] Ultimately, this research lays the foundation for further studies aimed at aiding law enforcement and governments in the fight against crime, ultimately enhancing safety and security.

D. Empirical Analysis for Crime Prediction and Forecasting Using Machine Learning and Deep Learning Techniques.

Predicting and controlling crime is vital for maintaining justice and urban safety. Human limitations in processing vast amounts of data hinder accurate crime prediction. In order to address the demand for more precise crime forecasting, this study analyzes historical crime data using a range of machine learning algorithms and time series analytic methodologies. In addition to machine learning methods like logistic regression, SVM, Naïve Bayes, KNN, decision trees, MLP, random forest, and XGBoost, LSTM and ARIMA time series analysis were also employed. LSTM performed brilliantly on both datasets, demonstrating reasonable accuracy in terms of root mean square error (RMSE) and mean absolute error (MAE). The analysis shows that there are over 35 different kinds of crimes, that February has less crimes than other months, that Chicago's annual crime rate is declining, and that Los Angeles's crime rate is marginally higher. The analysis predicts a small increase in Chicago's total crime rate in the future, despite the ARIMA model showing a dramatic decline in crime rates in Los Angeles. Furthermore, the study pinpoints areas of high crime, which helps law enforcement focus their efforts more efficiently. To sum up, this study improves the accuracy of crime prediction and offers useful information for police tactics.

E. Machine Learning and Criminal Justice: A Systematic Re- view of Advanced Methodology for Recidivism Risk Prediction.

Advances in data science have made it possible to use machine learning (ML) to predict the recidivism of criminals, which has led to an explosion of relevant literature. We reviewed 79 papers from the Scopus and PubMed databases in order to systematically evaluate the state of the art in this area. Of these, 12 studies had replicable models that could be used to predict recidivism. Our analysis shows that each of the ML techniques and datasets used in these chosen studies performed well, with an area under the curve (AUC) of 0.74 and an average accuracy score (ACC) of 0.81. The significance of performance metrics, the need for high-quality input data, and transparent algorithms or explainable artificial intelligence (XAI) techniques are among the main conclusions to be drawn from this systematic review. All things considered; this research gives criminal justice professionals useful tools for routinely predicting the risk of recidivism using machine learning techniques.

F. A systematic literature review of machine learning methods in predicting court decisions.

Predicting the outcome of a legal case can be helpful in the judicial process. Predictions can be made for a variety of situations, such as estimating the likelihood of trouble developing, criminal issues, parental rights, types of employees, divorces, and tax laws [7]. As artificial intelligence advances, machine learning can be used as a decision support tool in law enforcement. This research aims to conduct a literature review (SLR) study of the research on the prediction of court decisions by machines. This review analyzes and evaluates machine learning techniques for predicting court decisions. Evidence-Based Systematic Report on Systems (ROSES) re- porting standards were used in this review. 22 pertinent research were then chosen from large databases like Scopus and Web of Sciences, majority of which were able to predict the ranking by binary classification result. Different machine learning

techniques can be applied to anticipate court decisions based on SLR outcomes. Furthermore, the approach achieves over 70% accuracy [8], demonstrating performance. Still, the kinds of decisions that can be anticipated with current machine learning can be improved.

G. Application of Machine Learning for E-justice.

In the legal field, decision support systems (DSS) have a lengthy history. Since the 1950s, it began to be built in various architectural styles [9]. However, while the ability of DSS to improve legal systems has been proven, reliability, interpretation, usability, scalability, etc. Practical applications have been limited due to several problems, including lack of This article creates a machine learning-based service-decision support platform for e-government and internal regulation design and shows application data of this platform in migration studies. We are developing a decision support system made up of numerous microservices that are asynchronously connected using the REST protocol. The knowledge base upon which the platform's AI core is based comprises machine learning models and methodologies. In this study, we develop a machine learning-based approach for building and analyzing legal data models. During the calculation of the test, the effectiveness of the design is presented, and the results are explained, providing stronger instructions for maintenance.

H. Using machine learning to predict decisions of the Euro- pean Court of Human Rights.

Big data analytics in law (i.e. massive analysis of legal documents and machine learning) will be possible once the court starts making decisions. The European Court of Human Rights' data as an example, we discover how to use natural language processing techniques to the analysis of court papers in order to determine jurisdiction. [10]. The promise of machine learning in the legal field was demonstrated by our method, which was quite basic and achieved 75% accuracy in predicting violations of nine provisions of the European Convention on Human Rights. On the other hand, we discovered that performance suffered when decisions regarding future events were made based on past events (average accuracy 58%, roughly 68%). We also demonstrate that when we anticipate outcomes based on the trial judge's last name, we can achieve good classification performance (65% accuracy).

I. Semantics and machine learning for building the next generation of judicial court management systems.

Information and communications technology plays a key role in e-justice: traditional documents are being transformed into a shared documents tool that can access and search documents, audio and video files from the web's decision- making content management platform. The validity of forensic documents is still hampered by legacy support tools that only allow searches in text and not directly in audio and video files [11]. The writing and writing style of the recording is still a work in progress. Consequently, Most of the material in the case file can only be found by laborious manual study; this is particularly true for audio and video files that provide details about the precise setting of the document as well as the words that were spoken in court. Try answering the query. In this work, we propose the JUMAS system, which tackles the problem of employing semantics to enhance the validity of multimedia decision-making folders, and is made available via the JUMAS project, which was started in February 2008. This article's primary goal is to demonstrate how JUMAS gives users the resources they need to make use of all the data inherent in the text.

J. A general approach for predicting the behavior of the Supreme Court of the United States.

We've developed a special model to forecast the actions of the US Supreme Court using the most recent advancements in machine learning and legal research. This model, which has been refined over time [12], can predict over 28,000 outcomes and over 240,000 fair

votes over a nearly two-century period from 1816 to 2015. We based our predictions on data available before the court's decisions, using both a baseline model and different tests. Our model achieved an accuracy rate of 70% in predicting results and 71.9% in forecasting fair votes. Over the last century, it outperformed a basic model by nearly 5%. Our findings not only align with but also enhance previous predictions made in other studies [13]. However, what makes our model unique is its versatility—it can be applied to the entire historical and future court cases. This marks a significant advancement in predictive legal research with far-reaching applications.

K. Criminal justice, artificial intelligence systems, and human rights.

The way we approach criminal justice is changing because of automation utilizing technologies like artificial intelligence, machine learning, and big data analytics. This article explores how automation is impacting the criminal justice system, identifying what processes are automated and who may be replaced in this transformation [14]. It delves into the interactions between artificial intelligence systems and the law, examining relevant case law and assessing the human rights implications. In order to reduce the risks involved with the application of artificial intelligence systems in the field of criminal justice, the article concludes with some possible solutions. All things considered, it presents important questions and provides guidance for negotiating this changing environment.

L. Machine Learning and Criminal Justice: A Systematic Re- view of Advanced Methodology for Recidivism Risk Prediction.

Recent advancements in data science have showcased the potential of machine learning (ML) in criminal justice, particularly in predicting criminal recidivism risk. This systematic review evaluated 79 studies and selected 12 that demonstrated replicability and applicability in recidivism prediction. [15] The comparison considered different datasets and ML techniques using two metrics: accuracy (ACC) and area under the curve (AUC). The selected studies achieved good performance with an average score of 0.81 for ACC and 0.74 for AUC. The review emphasizes the importance of performance metrics, transparent algorithms, [16] explainable AI (XAI) techniques, and high-quality input data for criminal justice professionals to effectively leverage ML-based recidivism risk predictions.

M. A Meta Analysis of Attention Models on Legal Judgment Prediction System.

Artificial Intelligence is reshaping the legal sector by ad- dressing issues like pending court cases. Lack of judges and outdated technology contribute to delays in the judicial system. AI, particularly deep learning models [17] can aid in predicting legal case outcomes, assisting lawyers, judges, and the public. The study focuses on using AI to predict judgments, considering the challenge of dealing with extensive case details. The goal is to enhance the efficiency and reliability of the legal system through accurate predictions. The research also explores transformer models with attention mechanisms for this purpose. [18] The advancement has applications beyond judgment prediction, including legal document classification and sentiment analysis, among others.

N. Machine Learning-based Soft Computing Regression Analysis Approach for Crime Data Prediction.

Indian researchers analyzed crime data from 2001 to 2012 and projected regional crime rates using machine learning algorithms. For precise forecasts, they used a variety of regression models, including Random Forest Regression and Simple Linear Regression. With a high adjusted R squared value and low error, the Random Forest Regression model was the most successful at predicting crimes. [19] The study focused on different crime types, such as murder, rape, kidnapping, and more. Their approach aids law enforcement in

understanding and controlling crime patterns at regional and state levels. Data collected from the official NCRB website provided the foundation for this analysis. The study aims to empower police. [20] and other organizations to enhance crime prevention strategies using data-driven insights.

O. Legal Judgement Prediction System for UK court.

Legal Judgment Prediction (LJP) involves using a court case document to predict its outcome automatically. Researchers have successfully applied LJP for China, France, and the European Union's supreme courts in recent years. To develop a LJP model for UK court cases, this research must first create a labeled dataset of UK court judgments and apply machine learning models. After evaluating several feature representations and algorithms, the best model obtained an accuracy of 69.05% and an F1 score of 69.02 With its high model performance and capacity to extract useful features, this study highlights the potential of LJP research for UK courts.

P. Justice and Criminal Acts Prediction through Analysis of IPC Sections.

In this research, we delve into the Indian Penal Code (IPC) to predict criminal acts using data science and machine learning techniques. By analyzing IPC sections, our goal is to provide justice to victims by forecasting criminal acts and their severity. [21] We collect and preprocess data from di- verse sources, including police and court records, then encode IPC sections. We build a predictive model by using machine learning algorithms like logistic regression, decision trees, and random forests in conjunction with a variety of feature extraction techniques like bag-of-words and tf-idf. Our findings suggest that criminal acts can be predicted with a high degree of accuracy. This makes our tool useful for preventing crimes and helping law enforcement identify and apprehend potential offenders. [22]

Q. Predicting Criminal Recidivism: A Review of Methodologies and Applications.

In this paper, we delve into the pressing issue of criminal recidivism, the likelihood of individuals reoffending after being in the criminal justice system. With recidivism having significant societal and financial costs, accurately predicting it becomes paramount for informed decision-making in sentencing, parole, and intervention strategies. [23] Our comprehensive review covers various prediction methods, from traditional statistics to modern machine learning algorithms, focusing on real-world applications within the criminal justice domain. We address the challenges, such as data bias and model limitations, associated with recidivism prediction. Ultimately, we discuss the far-reaching implications for criminal justice policies and practices, including the potential benefits and obstacles in implementing recidivism prediction models, [24] highlighting the need for future research to validate these models through longitudinal studies.

R. Challenges and Opportunities for Predicting White Collar Crime.

White-collar crime poses a significant societal challenge, often evading detection and prevention. This research paper delves into the realm of predictive analytics as a tool to identify high-risk individuals and organizations involved in white- collar crime. [25] However, this endeavor is met with several challenges. The paper explores data types crucial for predictive analytics, including financial and social media data, and discusses the difficulties associated with their collection and analysis, especially concerning privacy concerns. Challenges encompass limited data access, potential data inaccuracies, and a shortage of data analysis expertise. To predict white- collar crime effectively, various techniques are employed, such as statistical models, machine learning algorithms, and net- work analysis. These methods aid in uncovering patterns and relationships within the data, improving predictive accuracy. Yet, the ethical dimensions of

using predictive analytics for white collar crime prediction come to the forefront. Concerns include the possibility of false accusations, bias in data and models, and potential infringements on individual privacy rights, prompting a critical examination of the ethical implications in this context [26].

S. Justice and Fairness in Cybercrime.

The pressing issue of cybercrime in our digital age, high- lighting its challenges for the justice system. These difficulties include the need to balance the rights of the accused and victims, the difficulty of locating and apprehending cybercriminals, and the cross-border nature of these crimes. Taking a close look at justice and fairness in relation to cybercrime, the paper highlights how conventional justice theories must be modified to meet the difficulties this developing problem presents. [27] Cybercrime, including activities such as hacking, identity theft, and cyberbullying, presents distinctive hurdles to the justice system. This includes the global reach of cybercriminals and the ever-changing landscape of cyber threats. To address these challenges, the principles of justice and fairness must be adapted. For instance, ensuring a fair trial for the accused when they cannot confront their accuser due to geographical barriers or anonymity. [28] Additionally, finding the delicate balance between protecting the rights of victims and the accused, as seen in cases of online harassment, is a critical aspect of addressing cybercrime.

T. Addressing Hate Crimes

Hate crimes are a significant concern with over 7,300 reported incidents in the United States in 2019, primarily driven by factors like race, religion, and sexual orientation. Underreporting remains an issue due to their secretive nature. Identifying and prosecuting these crimes can be complex. Limited resources hinder prevention and education programs. [29] To address this, we must raise awareness through education in schools, communities, and law enforcement. Strengthening hate crime laws, improving law enforcement training, and fostering positive community relationships are key strategies. Education promotes tolerance, while law enforcement investigates and prosecutes these crimes, [30] and builds trust within communities for reporting and supporting victims. A holistic approach is crucial to effectively combat hate crimes.

III. OVERVIEW

The IPC Section Prediction for Crime Classification project aims to develop a web application that revolutionizes crime classification and legal processes in India. Traditional methods of assigning IPC sections to crimes are time-consuming and prone to errors, leading to inefficiencies in the legal system. This project addresses these challenges by leveraging artificial intelligence to provide a reliable, efficient, and user-friendly solution. The traditional methods of crime classification and assigning the appropriate IPC (Indian Penal Code) section are often time-consuming, error-prone, and may not effectively handle the diverse range of crime descriptions encountered by law enforcement agencies and legal professionals in India. This inefficiency can lead to delays in justice delivery, misallocation of resources, and a lack of public confidence in the legal system. To address these challenges, there is a need for a reliable, efficient, and user-friendly solution that leverages to predict the most relevant IPC section(s) for a given crime description. This solution should be adaptable to various types of crime descriptions, including those involving complex legal language or colloquial terms, and should continuously learn and evolve to stay up to date with changes in legal terminology, updates in the IPC, and emerging crime trends.

IV. PROBLEM STATMENT

The traditional methods of crime classification and assigning the appropriate IPC (Indian Penal Code) section are often time-consuming, error-prone, and

may not effectively handle the diverse range of crime descriptions encountered by law enforcement agencies and legal professionals in India. This inefficiency can lead to delays in justice delivery, misallocation of resources, and a lack of public confidence in the legal system.

To address these challenges, there is a need for a reliable, efficient, and user-friendly solution that leverages artificial intelligence (AI) to predict the most relevant IPC section(s) for a given crime description. This solution should be adaptable to various types of crime descriptions, including those involving complex legal language or colloquial terms, and should continuously learn and evolve to stay up to date with changes in legal terminology, updates in the IPC, and emerging crime trends.

V. OBJECTIVE

The project aims to create an AI-driven web application that accurately predicts the most relevant IPC section(s) for a crime description. The application will use machine learning algorithms to process a wide range of crime descriptions. The accuracy and effectiveness of the IPC section prediction model will be evaluated using real-world crime data and expert feedback. The project will also provide comprehensive documentation and user support, collaborate with stakeholders, and continuously refine the application based on user feedback.

VI. SCOPE

The AI-driven IPC Section Prediction for Crime classification project aims to develop a web application that uses artificial intelligence to predict relevant IPC sections for crime descriptions in India. The project involves data collection, preprocessing, model development, web application development, testing and validation, legal and ethical considerations, documentation and support, and collaboration with stakeholders. The AI model is trained to identify patterns and connections between crime descriptions and IPC sections using data gathered from legal databases, law enforcement records, and court documents. The web application is designed for easy data input, result display, and user interaction, and integrated into the backend for real-time prediction. Legal and ethical considerations are addressed, and the project includes monitoring and evaluating the impact of the AI-driven solution on crime classification accuracy, legal process efficiency, resource allocation, and public confidence in the legal system.

VII. OVERVIEW OF REPORT

A. Equations

A straightforward but powerful classification and regression technique, the K-nearest neighbors (KNN) algorithm finds k data points that are similar to a new observation and generates predictions based on those data points.

$$P(y_i|\mathbf{x}) = \frac{1}{K} \sum_{j \in N_K(x)} I(y_j = y_i) \quad (1)$$

Support Vector Machines (SVMs) are robust classification algorithms that use a strategically chosen hyperplane to separate data points into distinct classes, enhancing generalization to unseen data.

$$f(\mathbf{x}) = \text{sign}\left(\sum_{i=1}^{N} \alpha_i y_i K(\mathbf{x}_i, \mathbf{x}) + b\right) \quad (2)$$

Random forests are ensemble learning algorithms that com- bine multiple decision trees trained on different data subsets. They are commonly used for training and testing, with evaluation metrics like classification reports and confusion matrix used to assess model performance.

$$f(\mathbf{x}) = \frac{1}{N_{\text{trees}}} \sum_{k=1}^{N_{\text{trees}}} f_k(\mathbf{x}) \quad (3)$$

Effective algorithms create decision trees, where a prediction is represented by a leaf node and a decision is represented by each node in the tree. They make use

of evaluation metrics, the sklearn-tree library, and the DecisionTreeClassifier() function.

$$f(\mathbf{x}) = \sum_{i=1}^{N_{leaves}} w_i I(\mathbf{x} \in R_i) \quad (4)$$

A supervised learning algorithm called logistic regression is used for classification tasks; it predicts the probability of a class based on the relationship between the independent and dependent variables. For training and prediction, it makes use of the sklearn.linear model library's LogisticRegression() function.

$$P(y = 1|\mathbf{x}) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n)}} \quad (5)$$

B. Testing and Evaluation of Parameters

Machine learning model performance on the test set is crucial for its generalization to new data. Common metrics include confusion matrix, precision, recall, accuracy, and F1 score. A confusion matrix displays how many of a model's predictions were accurate and inaccurate. Recall measures the fraction of actual positives predicted positive, whereas precision measures the fraction of positives that are actually positive. Although accuracy can be deceptive in cases of imbalanced data, it measures the percentage of all predictions that are accurate. The model's overall performance is measured by the F1 score, which is a harmonic mean of precision and recall. An elevated F1 score, which is frequently employed to assess machine learning models on unbalanced datasets, signifies both accuracy and comprehensiveness in forecasts.

TABLE I

Performance Evolution Results

Model	Accuracy	Recall	F1 Score	Precision
Logistic Regression	0.99	0.98	0.98	0.99
KNN	0.78	0.74	0.72	0.73
Random Forest	0.77	0.68	0.68	0.70
SVM	0.85	0.83	0.84	0.85
Decision Tree	0.54	0.57	0.57	0.57

The implementation of the proposed Justice: A Predicting Criminal Acts According to IPC Section was carried out using the following tools and technologies:

Programming Language

- Python

Integrated Development Environments (IDEs)

- Jupyter Notebook

Libraries and Frameworks

- NumPy
- Streamlit
- scikit-learn (version 1.3.0)
- NLTK (Natural Language Toolkit)
- Pandas

VIII. FUTURE WORK

By improving crime prevention and reducing the burden on the justice system, we can ensure that justice is served for those who have already committed a crime and prevent the occurrence of future criminal acts. The development of a predictive model for predicting criminal acts according to IPC section using machine learning techniques is an important and timely topic that requires further research and development.

IX. CONCLUSION

The IPC Section Prediction for Crime Classification project represents a groundbreaking initiative with far-reaching implications for the legal and law enforcement sectors in India. Its adaptability, continuous learning capabilities, efficiency, and positive societal impact make it an asset for law enforcement agencies, legal practitioners, and the public. By revolutionizing crime classification and legal pro- cesses, this project has the potential to enhance transparency, effectiveness, and public trust in the Indian legal system.

X. REFERENCES

[1] V. DN, K. Vidyashree, A. P. J. TS, K. D. Gupta, and R. Sahana, "Paper on different approaches for crime prediction system."

[2] J. Azeez and D. J. Aravindhar, "Hybrid approach to crime prediction using deep learning," pp. 1701–1710, 2015.

[3] N. Shah, N. Bhagat, and M. Shah, "Crime forecasting: a machine learning and computer vision approach to crime prediction and prevention," Visual Computing for Industry, Biomedicine, and Art, vol. 4, pp. 1–14, 2021.

[4] K. Jha, A. Doshi, P. Patel, and M. Shah, "A comprehensive review on automation in agriculture using artificial intelligence," Artificial Intelligence in Agriculture, vol. 2, pp. 1–12, 2019.

[5] K. Jenga, C. Catal, and G. Kar, "Machine learning in crime prediction," Journal of Ambient Intelligence and Humanized Computing, vol. 14, no. 3, pp. 2887–2913, 2023.

[6] A. J. F. ABBAS, "A survey of research into artificial neural networks for crime prediction," epce ay, vol. 33, 2019.

[7] N. A. K. Rosili, N. H. Zakaria, R. Hassan, S. Kasim, F. Z. C. Rose, and T. Sutikno, "A systematic literature review of machine learning methods in predicting court decisions," IAES International Journal of Artificial Intelligence, vol. 10, no. 4, p. 1091, 2021.

[8] D. M. Katz, M. J. Bommarito II, and J. Blackman, "Predicting the behavior of the supreme court of the United States: A general approach," arXiv preprint arXiv:1407.6333, 2014.

[9] M. Matveeva, "Monitoring of law-making: the problem of theoretical justification," Proc. Russ. Acad. advocacy, vol. 2, pp. 44–47, 2014.

[10] N. Aletras, D. Tsarapatsanis, D. Preo ¸tiuc-Pietro, and V. Lampos, "Predicting judicial decisions of the european court of human rights: A natural language processing perspective," PeerJ computer science, vol. 2, p. e93, 2016.

[11] E. Fersini, E. Messina, D. Toscani, F. Archetti, M. Cislaghi et al., "Semantics and machine learning for building the next generation of judicial court management systems." in KMIS, 2010, pp. 51–60.

[12] D. M. Katz, M. J. Bommarito, and J. Blackman, "A general approach for predicting the behavior of the supreme court of the United States," PloS one, vol. 12, no. 4, p. e0174698, 2017.

[13] T. W. Ruger, P. T. Kim, A. D. Martin, and K. M. Quinn, "The supreme court forecasting project: Legal and political science approaches to predicting supreme court decision-making," Columbia law review, pp. 1150–1210, 2004.

[14] A. Zavrs ˇnik, "Criminal justice, artificial intelligence systems, and human rights," vol. 20, no. 4, pp. 567–583, 2020.

[15] G. V. Travaini, F. Pacchioni, S. Bellumore, M. Bosia, and F. De Micco, "Machine learning and criminal justice: A systematic review of advanced methodology for recidivism risk prediction," International journal of environmental research and public health, vol. 19, no. 17, p. 10594, 2022.

[16] K. P. Linthicum, K. M. Schafer, and J. D. Ribeiro, "Machine learning in suicide science: Applications and ethics," Behavioral sciences & the law, vol. 37, no. 3, pp. 214–222, 2019.

[17] G. Sukanya and J. Priyadarshini, "A meta-analysis of attention models on legal judgment prediction system," International Journal of Advanced Computer Science and Applications, vol. 12, no. 2, 2021.

[18] H. Zhong, Z. Guo, C. Tu, C. Xiao, Z. Liu, and M. Sun, "Legal judgment prediction via topological learning," pp. 3540–3549, 2018.

[19] R. M. Aziz, A. Hussain, P. Sharma, and P. Kumar, "Machine learning- based soft computing regression analysis approach for crime data prediction," Karbala International Journal of Modern Science, vol. 8, no. 1, pp. 1–19, 2022.

[20] P. Das and A. K. Das, "Application of classification techniques for prediction and analysis of crime in india," pp. 191–201, 2019.

[21] A. Bogomolov, B. Lepri, J. Staiano, N. Oliver, F. Pianesi, and A. Pent- land, "Once upon a crime: towards crime prediction from demographics and mobile data," pp. 427–434, 2014.

[22] U. Thongsatapornwatana, "A survey of data mining techniques for analyzing crime patterns," pp. 123–128, 2016.

[23] H. Adel, M. Salheen, and R. A. Mahmoud, "Crime in relation to urban design. case study: The greater cairo region," Ain Shams Engineering Journal, vol. 7, no. 3, pp. 925–938, 2016.

[24] J. L. LeBeau, "The methods and measures of centrography and the spatial dynamics of rape," Journal of quantitative criminology, vol. 3, pp. 125–141, 1987.

[25] R. Iqbal, M. A. A. Murad, A. Mustapha, P. H. S. Panahy, and N. Khanah- madliravi, "An experimental study of classification algorithms for crime prediction," Indian Journal of Science and Technology, vol. 6, no. 3, pp. 4219–4225, 2013.

[26] S. Shiju, M. Devan, and S. S. Gangadharan, "Crime analysis and prediction using data mining," pp. 406–412, 2014.

[27] S. Yadav, M. Timbadia, A. Yadav, R. Vishwakarma, and N. Yadav, "Crime pattern detection, analysis & prediction," vol. 1, pp. 225–230, 2017.

[28] K. B. S. Al-Janabi, "A proposed framework for analyzing crime data set using decision tree and simple k-means mining algorithms," Journal of Kufa for Mathematics and Computer, vol. 1, no. 3, pp. 8–24, 2011.

[29] A. Singh, N. Thakur, and A. Sharma, "A review of supervised machine learning algorithms," pp. 1310–1315, 2016.

[30] D. Varshitha, K. Vidyashree, P. Aishwarya, T. Janya, D. G. KR, and R. Sahana, "Paper on different approaches for crime prediction system," International Journal of Engineering Research and Technology (IJERT), 2017.