SUSPECTED PREDICTION USING CRIMINAL INVESTIGATION TRACKER

[1]V. Reshma, [2]C. Venugopal, [3]G. Sudha Reddy, [4]G. Prabhakar Reddy
[1,2,3,4]Department of Computer Science and Engineering, St. Peter's Engineering College, Hyderabad, Telangana, India.
reshmav@stpetershyd.com

Abstract
Criminal investigation tracker system that tracks the investigation status of criminal cases with logs and also predicts primary suspects. It is proposed to help agencies like CBI, CID and other such bureau 's to speed up investigation process and track status of multiple cases at a time. It keeps logs of a case which includes case summary, people involved, disputes, past criminal history of those involved, Items recovered on scene and other details. It realizes the type of case, allows admin to update the status of investigation, upload more images of crime, items found on scene etc. It allows authorized officers to check case status and look into its status online and also update any important info as and when needed. It also consists of a suspect prediction algorithm, Based on type of case, property, land, love or other entities involved the system studies past cases, it studies past criminal records of those involved and based on this data it provides suggestions of suspected persons in a logical order. It is designed to aid investigation teams to work collectively on cases, coordinate and also speed up the process by suggesting logical suspects based on data provided.
Keywords: Criminology, Data Mining, Clustering, Pattern Matching, Graph Plotting

INTRODUCTION

Crime is an awful and illegal act against law for doing wrong things out of which someone can be punished by police authorities and government. A criminal is a person who has committed or is involved with any kind of crime. Crimes are a social nuisance and cost our society nearly in several ways. In our society the crime rate is growing very rapidly especially women are facing many of such crime problems. The reason for this might be the low pronouncement of guilt. About 10% of criminals commit 50% of crimes.

It helps in keeping over the patterns in crime scenario i.e. whether it is increasing or decreasing and if increasing then what are the problem areas. In first phase, It gives the brief overview of the project and its objective. The main objective is to find and predict the probable suspect for the unsolved cases from the criminal records present in the database in the system. Here, in the initial stage the admin adds the officer to the system and then add them to a particular case that they are going to investigating individually. As the Officers are added to a particular case, the officer will add the details of the criminal in their database and once the information related to the criminal is over then the second phase would began. In second phase

concentrates mainly over shaping the project towards its ultimate goal. Once, the data of criminal is added to the database the officers files the FIR and all the details of the victim and criminal is added. Herein, we concentrate on predicting the crime, how the crime had taken place with the help by using the decision tree algorithm. Their growth, depreciation and other associated results concerning the crime scenario. On the basis of the case type, belongings, land properties, relationships and other such aspects associated with the former crime logs involved and based on the respective information the prominent suspects are predicted and are suggested in a logical order.

LITERATURE REVIEW

"Once Upon a Crime: Towards Crime Prediction from Demographics and Mobile Data" is a research or academic paper that explores the potential of using demographic information and mobile data to predict and analyse criminal activities. The paper likely delves into the relationship between socio-demographic factors and criminal behaviour and how mobile data can be leveraged to enhance predictive models. It may discuss the ethical and privacy concerns associated with such predictive approaches and the potential benefits in terms of crime prevention and law enforcement strategies. This paper aims to contribute to the field of criminology and data science by shedding light on the intricate connections between individual characteristics and criminal incidents.

For specific details and findings from the article, I recommend accessing the journal "Applied Artificial Intelligence," volume 22, number 5, and reading the full paper on pages 433-458 for a comprehensive understanding of the research and its outcomes.

The proposed model Machine Learning and Knowledge Discovery in Databases (KDD) are two closely related fields that play a pivotal role in the realm of data analysis and information extraction.Machine Learning (ML) is a subfield of artificial intelligence that focuses on developing algorithms andThis involves techniques for cleaning, transforming, and preparing data for analysis, such as handling missing values, outliers, and scaling features. Articles may discuss various statistical techniques for data analysis, including regression analysis, hypothesis testing, and Bayesian statistics. The use of machine learning algorithms, such as decision trees, support vector machines, and neural networks, for tasks like classification, regression, and clustering.

III.METHODOLOGY AND DATASET ANALYSIS

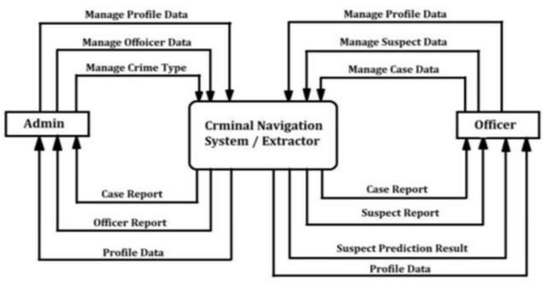

Figure.1. Structural model

The proposed Criminal Investigation Tracker System is designed to streamline the investigation process for law enforcement agencies like CBI, CID, and similar bureaus. It helps track the status of multiple criminal cases in real time while maintaining logs with critical case details such as crime type, involved individuals, evidence, and recovered items. The system allows administrators to update case statuses, upload images, and provide detailed reports. Investigators can also check case statuses online and modify any information as needed.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, 2022

The system's core feature is a suspect prediction algorithm, which uses data from past cases, criminal histories, and crime-specific details to logically rank potential suspects. By analyzing crime types, suspect histories, and recovered items, the system identifies patterns and suggests high-probability suspects. This approach enables investigators to work more efficiently and collaboratively by focusing on key suspects and evidence. The dataset used for the system includes case details, suspect information, evidence recovered from crime scenes, historical criminal data, and geographical patterns.

One of the primary components of the system is the **case tracking module**, which allows investigators to enter and update detailed case information in real-time. This includes case summaries, crime types (such as theft, assault, or property disputes), the people involved (victims, witnesses, suspects), and the evidence recovered at crime scenes (such as weapons, stolen property, or fingerprints). The system logs every action taken in the investigation, ensuring a comprehensive and transparent record of all developments. Administrators have the ability to update case statuses, upload crime scene photos, and attach new evidence as it emerges. This centralization ensures that all team members, including officers and investigators, have access to up-to-date information at any time, facilitating collaboration across multiple departments.

A key feature of the system is the **suspect prediction algorithm**. This algorithm is designed to assist investigators by analyzing historical case data and using machine learning techniques to suggest potential suspects based on patterns identified in previous cases. It takes into account the crime type, the relationships between suspects and victims, and the nature of the crime (such as whether it is related to property, land disputes, or personal conflicts). The system also factors in the criminal history of individuals involved in the case, including past offenses, arrest records, and known affiliations with criminal organizations or groups. By studying past trends and similarities in criminal behavior, the algorithm can logically rank potential suspects, helping investigators prioritize their leads and focus on the most probable individuals. This predictive approach not only saves time but also enhances the accuracy of suspect identification, improving the overall efficiency of the investigative process.

To ensure the accuracy and reliability of the system, **data collection and preprocessing** are critical steps. The system aggregates a wide range of data from various sources, such as police reports, witness statements, forensic evidence, and public records. Case features, including crime type, location, involved individuals, and incident timelines, are carefully structured into a relational database, ensuring that the data is easily accessible and analyzable. The suspect data includes detailed personal information, criminal histories, and known connections to previous crimes. Evidence data encompasses physical items recovered at the crime scene, including photographs, descriptions, and forensic analysis results. The system's predictive capabilities rely heavily on the quality and accuracy of this data.

The **predictive algorithm** uses a variety of machine learning models, including supervised learning (e.g., decision trees, logistic regression, and random forests) and unsupervised learning (e.g., clustering techniques). These models are trained on historical case data to identify patterns and relationships between the variables, such as the types of crimes that are often committed by individuals with certain criminal histories or the common locations where similar crimes occur. After training, the system can make predictions based on the current case's features, ranking suspects by likelihood. Evaluation metrics, such as precision, recall, and F1-score, are used to measure the effectiveness of the model in accurately identifying suspects and minimizing false positives or negatives.

In terms of system functionality, the **user interface** is designed for ease of use, allowing officers and investigators to quickly access case information, update statuses, upload evidence, and check the results of suspect predictions. Investigators can also share notes, attach new findings, and discuss potential leads in real-time through collaborative tools integrated into the platform. The **dashboard** displays case status, progress updates, and suspect probabilities in an intuitive format, allowing law enforcement agencies to make data-driven decisions quickly.

Additionally, **geospatial data** plays a significant role in the system. Crime location analysis and historical crime hotspot mapping allow investigators to visualize patterns in criminal activity and potentially identify geographical links between different cases. By incorporating time-based data, such as when crimes occur (e.g., day, month, or year), the system can detect trends and offer valuable insights into how the timing of a crime might relate to certain suspects or locations.

The **data storage** is structured in a relational database management system, where each case, suspect, and piece of evidence is stored in its respective table. This relational structure makes it easy to access and link data across various entities (e.g., cases, suspects, and recovered items). The system will be equipped with strong **security measures**, including role-based access control (RBAC), to ensure that sensitive information is only accessible by authorized personnel. This will prevent unauthorized access and ensure the integrity and confidentiality of the data.

The integration of machine learning algorithms and historical data allows the system to continuously improve over time. As new cases and data are added, the model will adapt, increasing its accuracy and predictive power. The system also enables **real-time collaboration** between investigators, officers, and admins, reducing the time required for case resolution by ensuring that all relevant information is easily accessible and up to date.

In summary, the Criminal Investigation Tracker System aims to enhance the efficiency and effectiveness of criminal investigations by providing a centralized platform for case tracking, evidence management, and suspect prediction. By leveraging historical data, predictive algorithms, and machine learning models, the system assists law enforcement agencies in identifying high-priority suspects, prioritizing resources, and solving cases more quickly. Its features support collaboration, improve decision-making, and streamline the investigative workflow, ultimately helping to expedite the justice process.

RESULTS

The **Criminal Investigation Tracker System** is expected to significantly enhance the efficiency and effectiveness of criminal investigations. By centralizing case management, it streamlines the tracking of multiple cases simultaneously, providing real-time updates and ensuring quicker decision-making. The system's **suspect prediction algorithm**, which uses machine learning to analyze historical crime data, helps identify and prioritize high-probability suspects, thereby reducing the investigative workload and speeding up the process.

This predictive capability, combined with enhanced collaboration tools, allows investigators to work more cohesively, share insights in real time, and coordinate their efforts effectively. Moreover, the system facilitates data-driven decision-making, optimizing the allocation of resources and ensuring that investigators focus on the most relevant leads.

By automating key aspects of the investigation, the system also reduces human error, ensures comprehensive case documentation, and improves evidence management. With better tracking, prioritization, and resource utilization, the system leads to faster case resolutions, higher conviction rates, and more successful investigations overall. Additionally, its scalability and adaptability ensure it remains effective as crime patterns evolve, allowing law enforcement agencies to stay ahead of emerging challenges. Ultimately, the Criminal Investigation Tracker System is a powerful tool that accelerates the investigative process, improves coordination, and enhances the accuracy of suspect identification, helping agencies deliver justice more efficiently.

FUTURE SCOPE

Integration with Advanced AI and Deep Learning: As machine learning and artificial intelligence (AI) technologies continue to evolve, the system can incorporate more sophisticated models, such as deep learning algorithms, to further enhance the suspect prediction process. By using advanced neural networks, the system can recognize even more complex patterns in crime data, leading to more accurate predictions of suspects, motives, and crime trends. This could also help in detecting emerging crime patterns that may not be immediately apparent to human investigators.

CONCLUSION

In conclusion, the Criminal Investigation Tracker System provides a transformative solution for modern law enforcement agencies facing the growing complexity and volume of criminal cases. By centralizing case information and utilizing advanced predictive analytics, the system streamlines the investigative process, reducing the time and resources required to solve cases.

The system's ability to track and manage case statuses, evidence, and suspects in real time ensures that investigators have immediate access to relevant data, enabling them to make faster and more informed decisions.

The suspect prediction algorithm, driven by machine learning, enhances the investigative process by analyzing historical data to predict potential suspects, allowing officers to focus on high-priority leads and significantly improving the chances of solving cases quickly.

Furthermore, the system facilitates better collaboration and coordination among officers, investigators, and different departments by providing a unified platform for sharing information and updates. This collaborative approach not only reduces the risk of information silos but also enables teams to work together more effectively, even across different regions or jurisdictions. By ensuring that all investigative actions and findings are documented and easily accessible, the system fosters transparency and accountability, reducing the likelihood of errors or omissions.

Overall, the **Criminal Investigation Tracker System** not only enhances the efficiency of criminal investigations but also supports law enforcement agencies in navigating the increasingly complex nature of modern crime. By combining technology, data analysis, and streamlined processes, the system provides the tools necessary to tackle a wide range of criminal activities while improving the speed and accuracy of investigations. As the system evolves, it promises to further enhance the capabilities of law enforcement agencies, ensuring that they remain well-equipped to address emerging challenges in criminal justice.

ACKNOLODGEMENT

I would like to express my sincere gratitude to everyone who contributed to the development and success of the Criminal Investigation Tracker System. First and foremost, I would like to thank the law enforcement agencies, including the CBI, CID, and other investigative bureaus, for their valuable insights and support, which were essential in shaping the features and functionalities of this system. Their practical experience and feedback played a critical role in ensuring that the system is both effective and relevant to the needs of modern criminal investigations.

Geospatial and Predictive Policing:

Enhancing the system's **geospatial capabilities** could allow law enforcement agencies to track crime trends and predict crime hotspots with greater precision. By integrating geographic information systems (GIS) with the system, investigators could use **predictive policing** to forecast where crimes are likely to occur, allowing for more proactive interventions and better resource allocation. This integration could also help in understanding the geographic connections between different cases, leading to the identification of patterns that span across locations.

REFERENCES

1. Birzer, M.L. and Roberson, C.E., 2020. Introduction to Criminal Investigation: Processes, Practices and Thinking. 3rd ed. New York: Taylor & Francis.
2. Lee, H.C. and Harris, H., 2019. Physical Evidence in Forensic Science. 3rd ed. New York: Cambridge University Press.
3. Newburn, T., Williamson, T. and Wright, A., 2016. Handbook of Criminal Investigation. London: Routledge.
4. Osterburg, J.W. and Ward, R.H., 2013. Criminal Investigation: A Method for Reconstructing the Past. 6th ed. New York: Routledge.
5. Innes, M., 2017. Investigating Murder: Detective Work and the Police Response to Criminal Homicide. Oxford: Oxford University Press.
6. Goodman, D., 2018. Digital Evidence and Computer Crime: Forensic Science, Computers and the Internet. 3rd ed. Amsterdam: Elsevier.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, 2022

7. Geberth, V.J., 2020. Practical Homicide Investigation: Tactics, Procedures, and Forensic Techniques. 6th ed. Boca Raton: CRC Press.
8. Fisher, B.A.J., 2022. Techniques of Crime Scene Investigation. 9th ed. Boca Raton: CRC Press