

AI-Powered Smart Crime Reporting System

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Abstract: Many areas still rely on manual procedures to manage and report crimes, causing delays, lack of transparency and ineffective case processing. To solve these problems, this paper proposes an AI-Powered Smart Crime Reporting System for Crime Category Prediction and Hotspot Zone Identification. The proposed web-based solution is designed to have MySQL as the database in the center, FastAPI (Python) as the backend, and React JS for the user interface providing a secure and scalable crime management platform. Role-based dashboards allow police officers and administrators to efficiently manage investigations, while citizens can lodge complaints online, attach supporting documentation and track complaint status in real time. The system uses Natural Language Processing (NLP) and Machine Learning to automatically read a complaint's description and predict the correct criminal category and priority level. Interactive visualization and the DBSCAN clustering method can be used by law enforcement organizations to make data-driven decisions for identifying the criminal hotspot zones based on geographic complaint data. Role-based access control, centralized data management, and secure authentication all ensure the integrity and confidentiality of sensitive data. Experimental evaluation shows that the proposed solution is suitable for modern digital policing and intelligent public safety applications by increasing the efficiency of complaint processing, predicting crime categories accurately, identifying hotspots efficiently, and improving transparency over traditional crime reporting systems.

Keywords: DBSCAN, FastAPI, React JS, MySQL, Artificial Intelligence (AI), Crime Reporting System, Natural Language Processing (NLP), Machine Learning, and Crime Hotspot Detection.

1. INTRODUCTION

The management of crimes is crucial to public safety. Digital crime reporting systems have been an effective way of enhancing communication between the public and law enforcement agencies. A smart crime reporting system enables police authorities to efficiently manage investigation on a single platform and allows citizens to report crimes conveniently. Traditional crime reporting techniques are based on manual registration of complaints, physical visits to police stations and documentation in the form of papers which leads to slow response time, lack of transparency and poor case management.

In recent years, artificial intelligence (AI) and machine learning (ML) have received much attention in intelligent crime management systems because of their potential to automate complaint processing and decision-making processes. The AI-enabled crime reporting systems reduce the human effort and improve the operational efficiency by providing the facility of online complaint submission, complaint tracking in real-time, automatic prediction of crime categories, and the crime hotspot identification. However, the effectiveness of many existing systems in modern law enforcement is hampered due to their unavailability of secure role-based access mechanisms, intelligent crime analysis and geographic hotspot detection. In this paper, the AI-Powered Smart Crime Reporting System is proposed for Crime Category Prediction and Hotspot Zone Identification using Natural Language Processing (NLP), Machine Learning, FastAPI, React JS and MySQL for safe complaint management, automated crime category prediction and geographic hotspot analysis. The objectives of the system are to enhance the efficacy of investigations, increase the transparency and support data - driven police and provide the safe digital crime management for the modern smart public safety applications.



A. Contribution

The main contributions of this work include:

- Development of an AI-based web application for smart crime reporting and analysis.
- Implementation of secure user registration and login with role-based access for users, police officers, and administrators.
- Development of a crime complaint management system that supports multiple crime categories such as theft, cybercrime, accidents, missing persons, domestic violence, vandalism, and drug-related crimes.
- Integration of AI and Machine Learning techniques to classify crime reports and predict crime category and priority automatically.
- Implementation of location-based crime reporting with map integration for accurate incident tracking.
- Development of an administrator dashboard for managing users, police officers, complaints, crime reports, and system activities.
- Development of an officer dashboard for viewing assigned complaints, updating case status, and managing investigations.

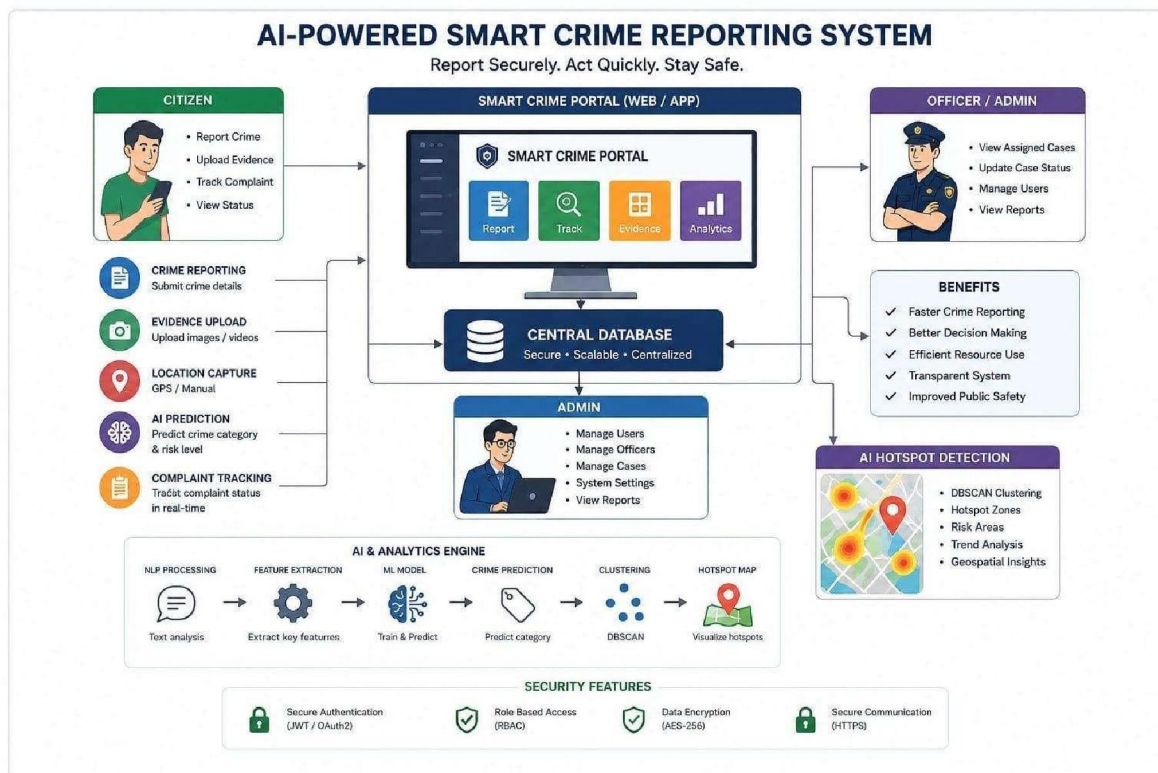


Figure1: Ai-Powered Smart Crime Reporting System

- Generation of crime reports and analytics to assist in monitoring complaint trends and improving decision-making.
- Implementation of the system using Python, FastAPI, React.js, MySQL, HTML5, CSS3, Bootstrap, JavaScript, Machine Learning, and NLP.

Overall, the proposed system provides an efficient, secure, and user-friendly platform for digital crime reporting, enabling citizens to report incidents easily while assisting law enforcement agencies in faster complaint management, crime analysis, and decision-making.



II. RELATED WORK AND RESEARCH GAP

The use of Artificial Intelligence (AI), Machine Learning (ML), and web technologies has significantly improved modern

crime reporting and management systems. Traditional crime reporting methods require citizens to visit police stations and submit complaints manually, making the process time-consuming, inconvenient, and less accessible. To address these challenges, many researchers have developed online crime reporting systems that enable citizens to register complaints through web or mobile applications. These systems improve accessibility and reduce paperwork while allowing law enforcement agencies to manage complaints more efficiently.

Many existing crime reporting systems focus on digitizing the complaint submission process by allowing users to report incidents online. Although these systems reduce manual work, they often rely on manual classification and prioritization of complaints. As a result, police officers must spend additional time reviewing each complaint before assigning it to the appropriate department, which can delay response times.

Recent research has explored the use of Artificial Intelligence (AI), Machine Learning (ML), and Natural Language Processing (NLP) to automate crime analysis. These techniques help classify crime reports, identify crime categories, and prioritize complaints based on their severity. Some systems also provide crime trend analysis and data visualization to support decision-making. However, most of these applications focus only on a specific feature, such as crime prediction, complaint management, or crime mapping, rather than providing a complete crime reporting and management solution.

Despite these advancements, many existing systems still have several limitations. Most applications lack intelligent complaint prioritization, automated crime categorization, role-based dashboards, location-based reporting, and integrated complaint tracking. Features such as secure user authentication, officer complaint assignment, AI-based analysis, and centralized administration are often unavailable or implemented separately.

Research Gap

From the literature survey, it is evident that existing crime reporting systems primarily focus on online complaint registration and basic complaint management. While these systems simplify complaint submission, they provide limited support for intelligent crime classification, automated priority prediction, efficient officer management, and comprehensive administrative monitoring. Most available applications implement only one or two functionalities instead of offering an integrated platform.

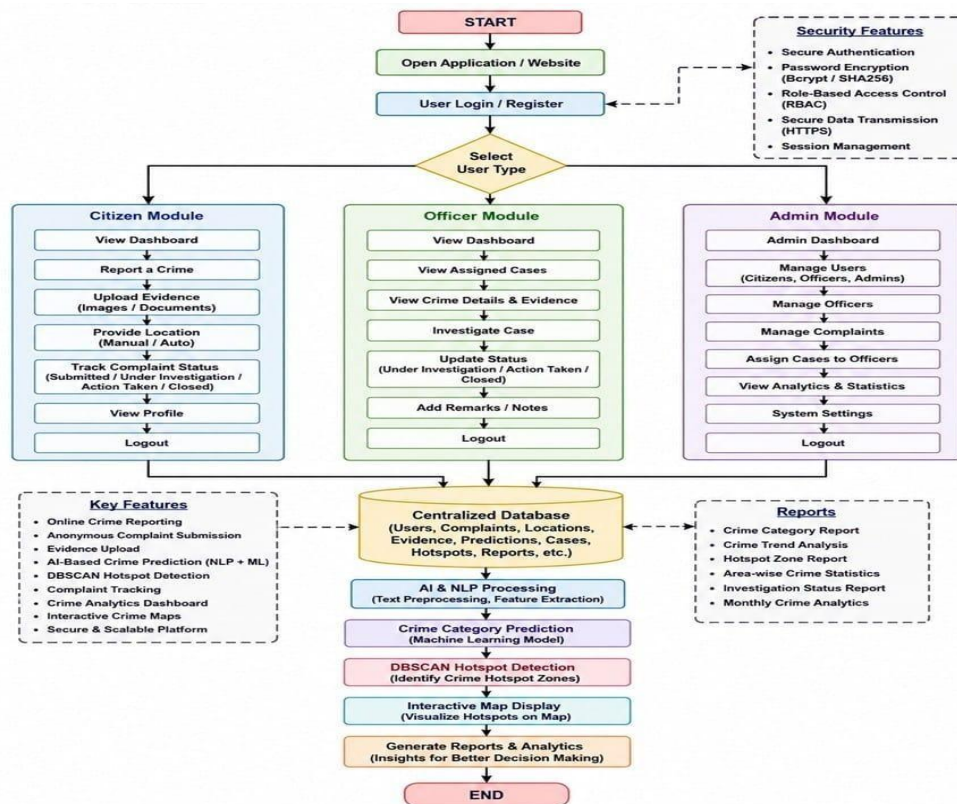
To overcome these limitations, the proposed Smart Crime Reporting and Analysis System integrates secure user authentication, AI-based crime category and priority prediction, location-based crime reporting, role-based dashboards for users, police officers, and administrators, complaint tracking, and centralized management within a single web-based application. The system also enables administrators to manage users, officers, complaints, and reports efficiently while allowing officers to update investigation progress and case status.

By combining these features into one platform, the proposed system provides a secure, intelligent, efficient, and user-friendly solution that enhances digital crime reporting, supports faster complaint processing, and improves decision-making for law enforcement agencies while offering a convenient reporting experience for citizens.

III. METHODOLOGY

The proposed Smart Crime Reporting and Analysis System is designed to provide a secure, intelligent, and user-friendly platform for online crime reporting and management. The system enables citizens to report crimes digitally, while Artificial Intelligence (AI) and Machine Learning (ML) techniques automatically analyze complaints to predict the crime category and priority.





System Architecture of “AI-Powered Smart Crime Reporting System”

The system also supports complaint tracking, officer assignment, and case management through dedicated dashboards for users, police officers, and administrators.

3.1 User Registration and Authentication

Users register by providing their personal details and securely log in to the system. Different roles, including User, Police Officer, and Administrator, are provided with role-based access to ensure secure and authorized system usage.

3.2 Crime Complaint Registration

Registered users can submit crime complaints by selecting the appropriate crime category, entering incident details, providing the location of the incident, and uploading supporting images if available. The complaint details are securely stored in the MySQL database for further processing.

3.3 Data Preprocessing

The submitted complaint description is cleaned by removing unnecessary characters, extra spaces, and invalid inputs. The text is standardized to improve the performance of the AI model used for crime classification and priority prediction.

3.4 AI-Based Crime Analysis

The processed complaint is analyzed using Machine Learning and Natural Language Processing techniques. Based on the complaint content, the system automatically predicts the crime category and assigns a priority level (High, Medium, or Low). This enables police authorities to identify urgent complaints and respond more efficiently.

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3.5 Complaint Management and Tracking

The administrator reviews all submitted complaints and assigns them to the appropriate police officers. Officers can access assigned complaints, update the investigation status, and add remarks. Users can log in at any time to track the current status of their complaints.

3.6 Dashboard and Report Management

The system provides separate dashboards for Users, Police Officers, and Administrators. The administrator manages users, officers, complaints, and system activities, while officers manage assigned cases. The system also generates complaint reports and maintains records for future analysis, improving transparency and efficient crime management. This methodology accurately reflects the features implemented in your Smart Crime Reporting and Analysis System.

IV. MODELING AND ANALYSIS

Sl. No.	Material / Tool	Purpose / Usage
1	Python (FastAPI)	Backend development and API implementation
2	React.js	Frontend development and user interface design
3	MySQL	Database for storing users, complaints, and system records
4	Scikit-learn prediction	Machine Learning model for crime category and priority Check
5	Natural Language Processing (NLP)	Processing and analyzing complaint text
6	HTML5, CSS3, Bootstrap	Designing responsive web pages
7	JavaScript	Client-side functionality and user interactions
8	Visual Studio Code	Code development and debugging
9	Git & GitHub	Version control and project management
10	Postman	API testing and validation

V. RESULTS AND DISCUSSION

The proposed Smart Crime Reporting and Analysis System was successfully developed and evaluated using Python (FastAPI), React.js, MySQL, Machine Learning, and Natural Language Processing (NLP). The experimental results demonstrate that the system effectively enables secure online crime reporting, AI-based crime category and priority prediction, complaint assignment, status tracking, and role-based management for users, police officers, and administrators. The integrated AI model accurately analyzes complaint descriptions and classifies them into appropriate crime categories while assigning suitable priority levels, thereby reducing manual effort and improving response time. The system was tested with various crime categories, including theft, cybercrime, accidents, missing persons, domestic violence, assault, drug-related crimes, and vandalism, and performed efficiently in managing complaints and maintaining records. Overall, the proposed system enhances transparency, simplifies complaint management, reduces paperwork, supports faster decision-making by law enforcement agencies, and provides a secure, reliable, and user-friendly platform for digital crime reporting and analysis.

VI. FUTURE WORK

The Smart Crime Reporting System can be enhanced with several advanced features in the future. A mobile application can be developed to make crime reporting more convenient. Artificial Intelligence and Machine Learning models can be improved for more accurate crime prediction and analysis. Real-time notifications through SMS and email can keep users informed about complaint updates. The system can also be integrated with CCTV surveillance, GPS tracking, and emergency services for faster response. Advanced analytics and dashboards can help police authorities identify crime



trends and make better decisions. These enhancements will improve the efficiency, security, and reliability of the crime management system.

VII. CONCLUSION

The AI-Powered Smart Crime Reporting System for Crime Category Prediction and Hotspot Zone Identification offers an intelligent and efficient solution to the problems encountered by the traditional crime reporting and management systems. The system is centralized web based platform for citizens to report crimes online, upload supporting evidences and track complaint status in real time. Police officers and administrators can conduct investigations more efficiently. Artificial Intelligence (AI), Natural Language Processing (NLP), Machine Learning (ML) are used in combination for automation of prediction of crime categories which reduce manual effort in addition to accuracy and speed of complaint processing. In addition, the DBSCAN clustering algorithm is also utilized to identify the crime hotspot areas, which assist law enforcement agencies in understanding the crime patterns and improving the allocation of resources for better public safety.

The proposed system, therefore, enhances transparency, improves the efficiency of investigations, cuts down paperwork and enable data driven decision making by means of intelligent crime analysis and interactive hotspot visualizations. It fills the gaps in existing crime management systems and provides strong base for future improvements such as mobile applications, predictive crime forecasting, emergency alert system, integration of IoT, GIS based advanced analytics and smart city public safety solutions. Hence AI-Powered Smart Crime Reporting System for Crime Category Prediction and Hotspot Zone Identification is a modern, safe and scalable platform which plays a vital role in effective law enforcement and safer communities.

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