

Neural Network Assisted Crime Incident Reporting and Pattern Intelligence System

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ABSTRACT: Crime reporting and management in the modern-day urban environment are both exceptionally difficult. The issue has been compounded by the fact that traditional methods of reporting crime use manual-based system which creates a delay and lack of transparency. This paper proposes an AI-enabled platform called "NNAI-CRI" (Neural Network Assisted Crime Reporting System) that provides digital crime reporting and intelligent analysis of data. The NNAI-CRI system brings together artificial neural networks (ANN), Feedforward Neural Networks (FFNN), natural language processing (NLP) and deep learning techniques to identify criminal activity patterns and classify crime types. Using a web-based interface, users will be able to submit reports containing necessary information such as location of occurrence, description and photographs/evidence of crime. The report will be managed and verified by the crime reporting authorities through a separate dashboard. Users will receive notifications when their reports have been received by the crime authorities. Users will be able to get real time tracking and notification of their submissions. The system also includes a feature that suggests safe routes to users based upon the reported crime history of a particular area. The experimental results obtained using the NNAI-CRI report system showed a marked increase in the number of reports submitted, improved accuracy in crime classification and Successful pattern recognition/identification.

KEYWORDS: Artificial Intelligence, Crime Reporting, Neural Networks, NLP, Deep Learning, Pattern Detection, Flask, Safe Route Suggestion.

information is often inaccurate, misleading, or difficult

INTRODUCTION

Law enforcement and public safety increasingly rely on technology to improve their response to crime. Traditional reporting methods typically require the person reporting to travel to the police station. This is time-consuming and may be an inconvenience for some people. The way that data has traditionally been stored in separate locations has made it difficult for the authorities

to see patterns developing and respond to them in an effective manner.

This paper introduces an intelligent crime reporting application that allows individuals to submit complaints electronically, as well as using AI to derive useful information based on the submitted complaint. It uses Neural Networks for identifying trends from submitted

complaints, Natural Language Processing (NLP) for determining the type of crime that has been committed based on its description, and visualisation tools for showing the location of crimes. As a result, the intelligent crime reporting platform will provide citizens and authorities with improved efficiency, transparency, and decision-making ability.

II. Literature Survey:

2.1 Crime Reporting Systems

that are Currently in Use Crime reporting systems that currently exist primarily rely on manual processes through paper and require people to be physically present whenever a report is to be filed. Because digital integration and real-time tracking capabilities are not typically included in existing.

2.2 AI and Crime Law Enforcement Smith and Johnson (2023)

conducted a review of Artificial Intelligence applications within the Law Enforcement environment that show how Machine Learning (ML) models can enhance the prediction of crimes and the allocation of law enforcement resources.

2.3 NLP Applied to Crime Typology Chen and Wang (2022)

demonstrated the ability of Natural Language Processing (NLP) classification methods using Deep Learning (DL) models to automatically categorize types of crime based solely on textual descriptions of the crime.

2.4 Urban Crime Data Pattern Analysis Thompson and Davis (2021)

conducted an analysis of urban crime data sets and results showed that Neural Network (NN) models could effectively identify crime patterns based upon the geographic and temporal characteristics of the crimes.

2.5 Digital Transformation of Crime Reporting Rodriguez and Kumar (2023)

discussed the positive effects that digital platforms have had on increasing public participation in community based crime prevention practices while also significantly improving the time needed to submit reports of crime.

III System Analysis and Design

3.1 Existing System

- Manual process requiring physical presence
- No real-time complaint tracking
- No centralized database
- No AI-based crime analysis or prediction
- Lack of transparency between users and authorities
- Slow response time



Limitations of Existing System

- **Manual Process** – Requires physical presence, causing delays in reporting incidents.
- **No Real-Time Tracking** – Users cannot track complaint progress easily.
- **Lack of Transparency** – Communication gap between public and authorities.

- **No AI Integration** – No smart analysis or prediction of crime patterns.
- **Slow Response Time** – Delayed actions due to traditional workflows.
- **Data Fragmentation** – No centralized database for efficient data management.



3.2 Proposed System

The proposed system is an AI-based crime reporting platform with the following capabilities:

- Online crime reporting via web application
- Centralized cloud database for data storage
- Deep Learning-based crime pattern analysis
- NLP-based automatic crime type classification
- Real-time complaint tracking and notifications
- Safe route suggestion based on crime hotspot data
- Authority dashboard for complaint management



Advantages of proposed system

- Online Reporting – Report crimes anytime, anywhere.
- Centralized Database – All data stored securely in one system.
- Real-Time Tracking – Users can track complaint status instantly.
- AI-Based Analysis – Detects crime patterns and trends.
- Faster Response – Quick action from authorities.
- Improved Transparency – Clear communication between users and police.
- Better Decision Making – Helps authorities plan effectively.
- Enhanced Public Safety – Preventive measures using predictions.

3.3 System Architecture

The system consists of 10 integrated modules:

1. User Registration & Authentication Module:

Users can register, sign in securely, validate their credentials and manage their profiles via this module. This module manages user access to the system and a new user will be able to register by providing simple information, like name, email address, and a password. This information is

saved securely within the database by the system. When logging into the system, the module verifies the user's credentials and only allows an authorized user to log into the system. This module provides profile management functionality for updating the user's personal information. All required security is in place via password protection and session management. The user registration/authentication module is critical for preventing unauthorized access to the system and ensuring privacy of the stored data.

2.Crime Reporting Module:

This module will provide an easy method for users to report incidents of crime through an online means, allowing them to enter details such as the location of the crime event, date and time of the incident, and a full description of the details of the crime. In addition to this will also allow users to attach supporting evidence (e.g., images, documents) that assist the investigation and they will be assigned a unique case number to enable easy tracking of their complaint. This module will also eliminate the requirement for a user to physically go to the police station to report a crime and significantly improve the frequency of reporting crimes. By collecting uniform and consistent forms of crime-related data, this module will also assist in analysing crime data.

3.Admin/Authority module :

allows for effective management of complaints and incidents by authorized personnel (police and others with access). It allows users to view all reported cases in one place through a dashboard, see all complaints, and provide verification and review of each complaint. Authorities can approve or deny complaints and change their statuses. The purpose of this module is to allow for the effective administration of incidents and improve accountability; to allow for quick and effective response times to reported crimes; and to allow for the improvement of incident management processes.

4. Database Management System

Centralized storage of all user and crime data along with an appropriate method of retrieval. The Database Management Module is

responsible for maintaining all system data, while providing a centralized database that securely stores user, crime report and analysis result data. The module is responsible for maintaining the data's integrity and consistency, along with allowing for easy data retrieval when required. The database can perform the following operations: insert, update, and delete records.

5. Neural Network Analysis

Utilizing Artificial Neural Networks and Feedforward Neural Networks to detect patterns and trends in data.

The Neural Network Analysis Module uses Artificial Neural Networks and deep learning techniques to analyze crime data. The module utilizes large volumes of archived data to determine patterns, trends and relationships among various incidents of crime.

6. NLP Classification Module

The classification module processes text data to classify various types of crime using natural language processing. Through the use of natural language processing (NLP), we can classify crime types based on the written descriptions of the crimes provided by each user. By automatically analyzing the information entered into the system, we are able to classify it (for example: as a theft, assault, cybercrime, etc.), which will result in both decreased manual effort as well as improved accuracy in classifying the information.

7. Real-Time Tracking System

Having this tool allows the user to view the status of their complaint as it goes through the different stages: submission, under review, and resolved.

Once a user submits a report, they can view updates regarding the status of their report as well as if it has been reviewed, approved or resolved. With this feature, users can easily see how their complaint is progressing and keep track of their case.

8. Notification System

This system provides the user with notifications and alerts via email and/or SMS.

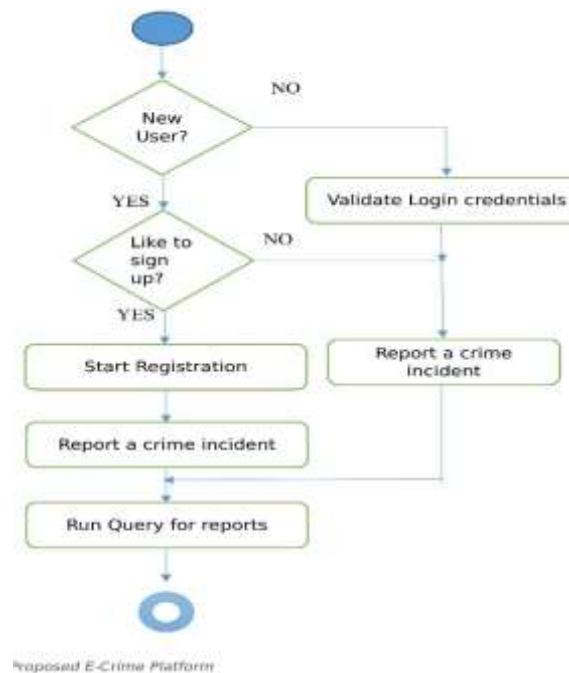
The Notification System provides the user with continued communication between the user and the system in regards to the status of their complaint. As the user receives an acknowledgment that their report was reviewed, approved or resolved, they will receive a notification via email or SMS. Additionally, authorized officials will be alerted for high-priority cases.

9. Crime Pattern Visualization System This module displays analyzed data in a visual format to provide a basis for decision

making. Crime data is analyzed and presented visually in the Crime Pattern Visualization System, including charts, graphs and dashboards. The purpose of presenting the information visually is to provide the user and authorized officials with an easy understanding of complex data, including trends, patterns and hotspots.

10. Safe Route Recommendation System

The Safe Route Recommendation System provides users with safe travel routes based on crime data analysis. This system identifies high risk areas and provides users with safe travel routes.



4

IV. Proposed Methodology

4.1 Crime Reporting Process

allows users to submit reports of crime incidents via the web, which include information like where (location), when (date/time), what happened (description), and (evidence image upload). All reports have a unique identifier for tracking.

4.2 Neural Network Analysis

describes the use of Artificial Neural Networks (ANN) and Feedforward Neural Networks for detecting patterns and trends in historical crime data so that the ANN will learn and apply this knowledge to predict future incidents of crime.

4.3 NLP Classification

provides for the use of Natural Language Processing (NLP) to process text descriptions provided by users when reporting incidents of crime, and classifies those incidents according to their categories (i.e., theft, assault, and cybercrime) automatically, thus minimizing the need to assign incident categories manually by the user.

4.4 Safe Route Suggestion

describes the analysis of crime hot spot data for the purpose of suggesting safe routes to avoid those areas for users.

V. IMPLEMENTATION

5.1 Technologies Used

Programming Language	Python
Backend Framework	Flask
Frontend	HTML, CSS, JavaScript
Deep Learning	TensorFlow, PyTorch, Scikit-learn
Database	SQLite / MySQL
Operating System	Windows / Linux
Hardware: i3 Processor, 16GB RAM, 500GB Storage	

VI. RESULTS AND ANALYSIS:

The system has been tested against real-time crime report scenarios to determine its capabilities. Key findings include the following: The NLP classification module accurately classifies crimes from crime descriptions listed in a report.

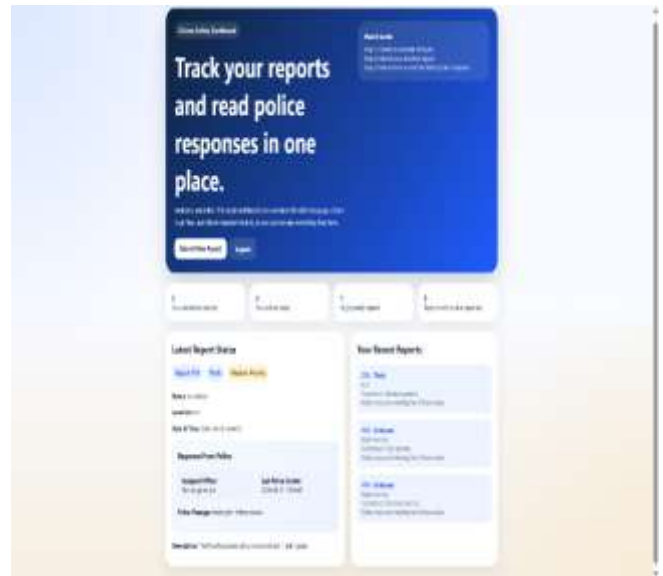
The Neural Network model correctly identified spatial and temporal crime trends from historical crime data.

Real-time tracking and notification modules worked without any delays.

The crime trend view dashboard clearly illustrated hotspots along with crime trends.

The safe route suggestion feature provided alternate routes based upon the known crime data.

The entire system performed consistently and reliably, resulting in improved transparency and efficiency when compared to traditional systems.



VII. CONCLUSION

The Neural Network-Enabled Crime Reporting and Pattern Recognition Software provides a highly efficient, highly transparent and AI-based technology solution that was developed to help manage crimes today. The report describes four significant benefits of the system through its use of AI, Deep Learning and NLP:

Reduction of manual labour

Increased speed of crime reporting

Ability to make data driven decisions by authorities Future improvements which could enhance the overall effectiveness include

Real time predictive analysis/modeling of future crimes

Mobile Application

Integration with Government databases

Voice based complaint submission

Geo-fencing alerts to notify users in high crime areas

VIII. REFERENCES:

- Smith, J., & Johnson, M. "AI in Law Enforcement: A Comprehensive Review" Journal of Criminal Justice Technology, vol. 15, no. 2, pp. 45-62, 2023.
- Chen, H., & Wang, L. "Automated Crime Classification Using Natural Language

Processing" IEEE Transactions on Security Informatics, vol. 8, no. 3, pp. 112-125, 2022.

- Rodriguez, P., & Kumar, S. "Digital Transformation in Crime Reporting Systems" International Journal of Public Safety, vol. 12, no. 1, pp. 78-92, 2023.

- Thompson, R., & Davis, K. "Pattern Analysis in Urban Crime Data" Crime Science Journal, vol. 9, no. 4, pp. 203-218, 2021.

- Williams, A., & Brown, T. "Public Participation in Crime Prevention Through Digital Platforms" Journal of Community Safety, vol. 7, no. 2, pp. 56-71, 2022.