Bhagyashri R. Kasar, 2025, 13:6
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology
An Open Access Journal

AI Based Smart Policing System Using Large Language Models

[1]Bhagyashri R. Kasar, [2]Prashant M. Yawalkar, [3]R. P. Dahake
[1]PG Scholar, 2Professor, 3Associate Professor
[1,2,3]Computer Engg. Dept. MET's IOE, Nashik

Abstract- The need for more sophisticated policing methods is growing as crime rates rise and crime data processing becomes increasingly difficult. In order to increase law enforcement effectiveness, this has prompted the adoption of smart policing systems and predictive policing techniques that make use of artificial intelligence (AI). Among the many AI technologies used, machine learning (ML) is regarded as a powerful instrument for identifying patterns, analyzing crime trends, and predicting criminal activity. LLMs generative AI has recently gained widespread recognition in sectors like agriculture, healthcare, law, and finance. However, the LLM's potential in smart policing and crime prediction is still mostly unrealized. By creating a framework that integrates the most advanced LLMs—BART, GPT-3, and GPT-4—this study seeks to bridge this gap and improve analysis and crime prediction. Using actual crime datasets from San Francisco and Los Angeles, the framework's performance is evaluated using zero-shot prompting, few-shot prompting, and fine-tuning techniques. In the majority of the experimental setups, a comparative analysis between the LLM-based methods and the conventional ML models revealed that GPT models performed better in terms of crime classification. The study offers future paths for AI-driven police and demonstrates how LLMs have the ability to transform contemporary crime analysis.

Keywords - Smart Policing, Predictive Policing, Crime Prediction, Crime Analysis, Artificial Intelligence (AI).

I. INTRODUCTION

Rising crime rates, massive data sets, and the necessity for prompt decision-making are some of the major issues facing modern law enforcement. Technology may greatly improve the effectiveness of law enforcement. Among the advancements are Large Language Models (LLMs), which are sophisticated artificial intelligence (AI) systems capable of comprehending and processing human language. AI is used by a LLM-assisted smart police system to help law enforcement monitor criminal trends, spot risks, and improve public relations. By swiftly processing vast amounts of data, LLMs can support investigations, relay findings, and provide recommendations to ground-based patrolling personnel in real time.

This approach is intended to improve public safety, lower crime, and assist law enforcement in making data-driven decisions. It is founded on the ideas of justice, accuracy, efficiency, privacy, and ethical use. Smart policing techniques make communities safer and better protected.

II. LITERATURE SURVEY

Year	Title	Authors	Summary
2024	A Framework for LLM-Assisted Smart Policing System	Paria Sarzaeim, Qusay H. Mahmoud, Akramul Azim	This study explores the integration of LLMs like BART, GPT-3, and GPT-4 into smart policing for crime prediction. It evaluates methods such as zero-shot prompting, few-shot prompting, and fine- tuning using datasets from San Francisco and Los Angeles, demonstrating the adaptability of LLMs in crime analysis.
2024	LLM-Assisted Crisis Management: Building Advanced LLM Platforms for Effective Emergency Response and Public Collaboration	Hakan T. Otal, M. Abdullah Canbaz	The research introduces a novel approach to identify and classify emergency situations from social media posts and direct emergency messages using an open-source LLM, LLAMA2. It aims to assist public safety telecommunicators during nationwide emergencies by providing relevant instructions and notifying government agencies when necessary.
2024	LLM-Assisted Light: Leveraging Large Language Model Capabilities for Human-Mimetic Traffic Signal Control in Complex Urban Environments	Maonan Wang, Aoyu Pang, Yuheng Kan, Man-On Pun, Chung Shue Chen, Bo Huang	This work introduces an innovative approach that integrates LLMs into traffic signal control systems, harnessing their advanced reasoning and decision- making faculties. The proposed framework demonstrates adaptability to various traffic environments without additional training, highlighting the potential of LLMs in dynamic scenarios.
2024	City-LEO: Toward Transparent City Management Using LLM with End-to-End Optimization	Zihao Jiao, Mengyi Sha, Haoyu Zhang, Xinyu Jiang, Wei Qi	The study proposes a large language model-based agent, "City-LEO," to enhance the efficiency and transparency of city management through conversational interactions. It leverages LLM's logical reasoning capabilities to scope down large-scale optimization problems efficiently, facilitating transparent and interpretable decision-making processes.

III. METHODOLOGY

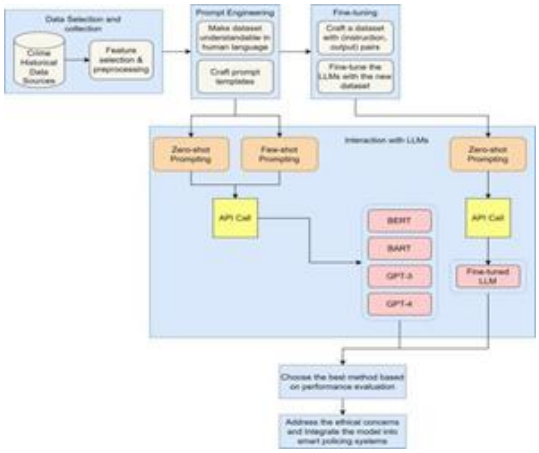

Figure: Architecture of the framework for creating

LLM-assisted tools for smart policing referred by [1]
This chapter describes a new framework design and efforts to improve smart policing using a paradigm of massive language models for tasks like classification and crime prediction. Figure 1 illustrates the concept of incorporating LLMs into predictive analytics. As part of the debate, the study illustrates the crucial adaption procedures needed to successfully integrate LLMs into smart policing, particularly in the area of crime prediction. First, the work of crime prediction requires the careful selection and preparation of a focused data source. Ideally, this guarantees pertinence and maximizes data processing. Datasets of crimes reported by police in various cities or areas can be used as data sources. Following preprocessing, which includes imputation or the elimination

of missing information; rapid engineering is used to transform historical crime data into a format that is simple for people to understand. This implies that every data input now depicts a crime event in plain language. The process of fine-tuning LLMs would then begin when instruction data are built from the fundamental data. Prompt engineering utilizing their API facilitates interaction with those models. Making the model's response fit a certain crime prediction system would require this. Following the collection of the LLMs' responses, a thorough performance analysis was carried out. This would serve as a foundation for incorporating the crime prediction tool into smart police systems and would be crucial in identifying the most effective method for categorizing and forecasting crime.

DOMAIN-SPECIFIC APPLICATIONS:
Crime Prediction: LLMs are able to predict potential crime scenes and times by utilizing past crime data. This would make it possible for law enforcement to more strategically put officers in locations with increased likelihoods of criminal activity, hence enabling proactive preventive measures.

Crime Report Analysis:
LLMs can be used to automatically analyze incident logs and crime reports, extracting important details such as the time, place, and type of crime.
This reduces the amount of time an officer must spend reading through reports and speeds up their response to new trends or patterns.

Automated Case & Incident Summarization:
Police reports, case files, and witness statements are long documents that can be condensed into brief, essential highlights by Large Language Models (LLMs).

By doing this, officers can shorten the time it takes to conduct investigations and make wise case management choices because they no longer have to spend as much time going over lengthy, in-depth reports.

Predicting Criminal Activity:
In order to find the most recurrent patterns in past crime data and forecast the likelihood of future criminal activity, LLMs will be able to do just that.
In addition to preventing such incidences from happening, this aids the police in more effectively deploying patrols, focusing on areas with higher crime risks.

Profiling of Suspects:
LLMs are capable of processing and analyzing a vast array of data sources, including news articles, public records, and social media activity, in order to create

profiles of individuals of interest or convicted criminals.
During investigations, this enables the police to identify links and trends, which aids in deciding which questions to ask based on the leads that are already available.

Analysis of Surveillance Footage:
In a security camera system, the LLMs might be quite useful. It automatically analyzes video footage to identify individuals, keep an eye out for odd behavior, and possibly spot trends that could be useful for an investigation. It speeds up the analysis of surveillance footage and assists investigators in generating more insightful leads from large amounts of data.

Monitoring Public Sentiment:
To find out how the public feels about police activities or particular occurrences, LLMs can look through and evaluate news sources, forums, and social media posts. By doing this, law enforcement organizations are able to stay up to date on public opinion and resolve complaints before they become serious issues.

Organizing and Managing Evidence:
The sorting and management of various items of evidence—such as papers and photos— associated with investigations could be automated by LLMs.
Improved evidence organizing by LLMs would make it easier for investigators to locate and examine pertinent material, reducing the likelihood that they would overlook important information.

Another Technique
Facial recognition and biometrics
AI-powered face recognition is used in modern policing to identify people captured on surveillance footage. The technology will assist in locating the suspects and verifying their identities by cross-checking their faces against huge databases. Fingerprint and retina scans are biometric authentication methods that improve suspect identification accuracy. These technologies are used in real-time law enforcement operations using body-worn cameras, CCTV networks, and mobile devices.

Internet of Things & Smart Surveillance Systems
Real-time surveillance is enabled via the combination of CCTV cameras, drones, and a traffic monitoring system via Internet of Things (IoT).
AI-powered smart cameras can detect suspicious activity and promptly notify law enforcement.
Gunshot detection devices, such as ShotSpotter, detect gunshot sounds and notify police officers about shootings, allowing for quick reactions.

Law enforcement surveillance using drones and robotics
AI-powered drones provide aerial surveillance and situational awareness in high-crime regions.
Autonomous robotic patrols will assist in the maintenance of safe and secure public spaces. Used for search and rescue efforts, as well as crowd control during public disturbances.

Block chain for Data Security
It provides permanent record-keeping for criminal databases, evidence logs, and law enforcement operations.
It makes it easier to track the chain of custody. Forensic evidence remains unaltered.
This would improve data security by reducing the possibility of breaches and unauthorized changes.

IV. CONCLUSION

This leads to the conclusion that the LLM- based Smart Policing System is a modern solution for law enforcement processes. Its content abstract and introduction highlight how it can help with crime prevention and response. The literature study examines how the LLM has been successfully applied in a variety of fields, and it could provide as a starting point for its usage in police. The approach outlines how the models use data to make judgments. It was a domain-specific program that focused on areas like crime prediction and criminal investigation. It was further enhanced with additional approaches such as natural language processing and machine learning. The policing strategy will make the system far more efficient than previously.

REFERENCES

1. Sarzaeim, P., Mahmoud, Q. H., & Azim, A. (2024). A Framework for LLM-Assisted Smart Policing System. IEEE Access.
2. Otal, H. T., Stern, E., & Canbaz, M. A. (2024, June). Llm-assisted crisis management: Building advanced llm platforms for effective emergency response and public collaboration. In 2024 IEEE Conference on Artificial Intelligence (CAI) (pp. 851-859). IEEE.
3. Wang, M., Pang, A., Kan, Y., Pun, M. O., Chen, C. S., & Huang, B. (2024). LLM-assisted light: Leveraging large language model capabilities for human-mimetic traffic signal control in complex urban environments. arXiv preprint arXiv:2403.08337.
4. Jiao, Z., Sha, M., Zhang, H., Jiang, X., & Qi, W. (2024). City-LEO: Toward Transparent City Management Using LLM with End-to-End Optimization. arXiv preprint arXiv:2406.10958.