



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 10, October 2025

Crime Forecasting and Threat Intelligence (CFTI) for Enhanced Public Safety

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ABSTRACT: Crime Forecasting and Threat Intelligence (CFTI) is the process of predicting potential crime risks and enhancing public safety through intelligent analysis of real-time data. It refers to the process of identifying and mitigating emerging threats in a designated region using IoT and AI-based fusion models. In this paper, the technique presented is for detection and forecasting of anomalies in multi-source datasets. The system detects risks using fuzzy logic, Isolation Forest, and a set of adaptive criteria which help to filter out false alerts. So, the resultant output is a prioritized anomaly map showing critical zones. Crime prediction is done in two steps. The first step detects anomalies automatically, without user interaction, and in the second step; the alerts are visualized through an interactive Streamlit dashboard for analysis and preventive response.

KEYWORDS: Crime forecasting, Threat intelligence, Anomaly detection, Fuzzy logic, Isolation Forest, Machine learning, IoT, Public safety.

I. INTRODUCTION

Crime forecasting is a method for preventing criminal activities or identifying potential threats in public environments. It analyzes the existing or emerging crime patterns so that the predicted outcome appears realistic and actionable. In real world, many agencies need a system to predict and manage criminal activities, emergencies, accidents etc. risks may be due to various reasons like socioeconomic changes, weather conditions or behavioral anomalies etc.

This system could enhance and ensure a safer environment using a technique called Crime Forecasting and Threat Intelligence. Crime forecasting monitors and analyzes multi-source data in an intelligent way, by an observer not familiar with the original event. The technique can be used to forecast risks related to ATM transactions, transport routes, telecom signals etc.

Some regions contain mixed activity-behavioral patterns in which social and economic indicators are combined with location data. Detecting and recognizing these patterns can be very important, and predicting these is important in the context of crime prevention, and for public safety reasons. There are many applications of CFTI ranging from prediction of thefts, frauds, traffic crimes, and environmental hazards such as vandalism, riots, smuggling, cybercrimes etc.

Paper is organized as follows. Section II describes crime forecasting using anomaly detection, fuzzy logic, Isolation Forest and set of selection or rejection criteria. The flow diagram represents the step of the algorithm. After detection of anomalies, how alerts are visualized using a dashboard is given in Section III. Section IV presents experimental results showing system performance tested. Finally, Section V presents conclusion.

II. LITERATURE SURVEY

The concept of crime prediction was first introduced by Sharma and Gupta [1]. The method was inspired by the use of artificial intelligence for predictive policing. The criminal activity patterns collected from urban databases were analyzed using Random Forest and SVM algorithms, which provided accurate but context-limited predictions.

Patel and Mehra [2] proposed a YOLOv5 and LSTM-based real-time system to detect suspicious activity through video analytics. This technique used an approach combining spatial feature extraction with temporal sequence learning and hence produced promising results. In [3], the authors decomposed the dataset into behavioral and geographical layers and then reconstructed patterns separately using clustering and correlation algorithms. Machine learning technique is used to forecast high-risk crime areas presented in [4]. In [5], predictive algorithms were combined with socioeconomic and environmental indicators to form a dynamic risk map that links them. The technique is robust against data imbalance, infrastructure dependency, and computational overheads. The authors in [6] applied adaptive clustering with temporal and social data to detect hotspot shifts, while ensemble-based learning is used for alert generation.

The work in this paper is divided in two stages. 1) Anomaly Detection 2) Forecasting. Anomaly detection is done by applying fuzzy logic and Isolation Forest-based filters and adaptive selection criteria. Thereafter, clustering and classification are applied to identify evolving crime zones followed by pattern correlation and visualization operations. Then, predictive modelling is performed to forecast threats and generate real-time risk alerts. Finally, the visualization layer and dashboards are integrated for decision intelligence.

III. METHODOLOGY

Fuzzy logic-based anomaly detection technique is used for identifying crime-prone regions, which takes behavioral correlation and data synthesis together. The prediction is done in such a manner that it maps the abnormal or high-risk areas in a city, using surrounding demographic and environmental context. The algorithm is based on adaptive, data-driven analysis. First find the target region using preprocessed datasets and then define the boundary of that region. For all the boundary points, it defines a cluster and calculates the priority of these clusters. It starts forecasting from the highest priority cluster by finding the best match from historical patterns. This procedure is repeated until every active region is analyzed and risk zones are classified.

The system automatically generates hotspot maps without user intervention that contain only anomaly-marked regions to be monitored for preventive response and visualization. The model uses fuzzy logic for context adaptation and Isolation Forest for accurate anomaly scoring across heterogeneous data streams.

IV. EXPERIMENTAL RESULTS

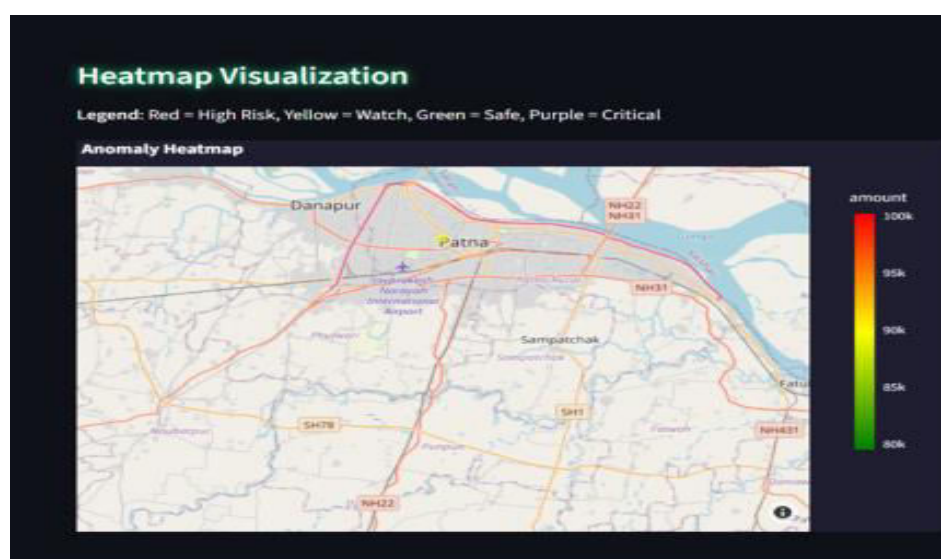


Fig. 1. Real-Time Anomaly Heatmap



Fig. 2 Weather Bar Chart

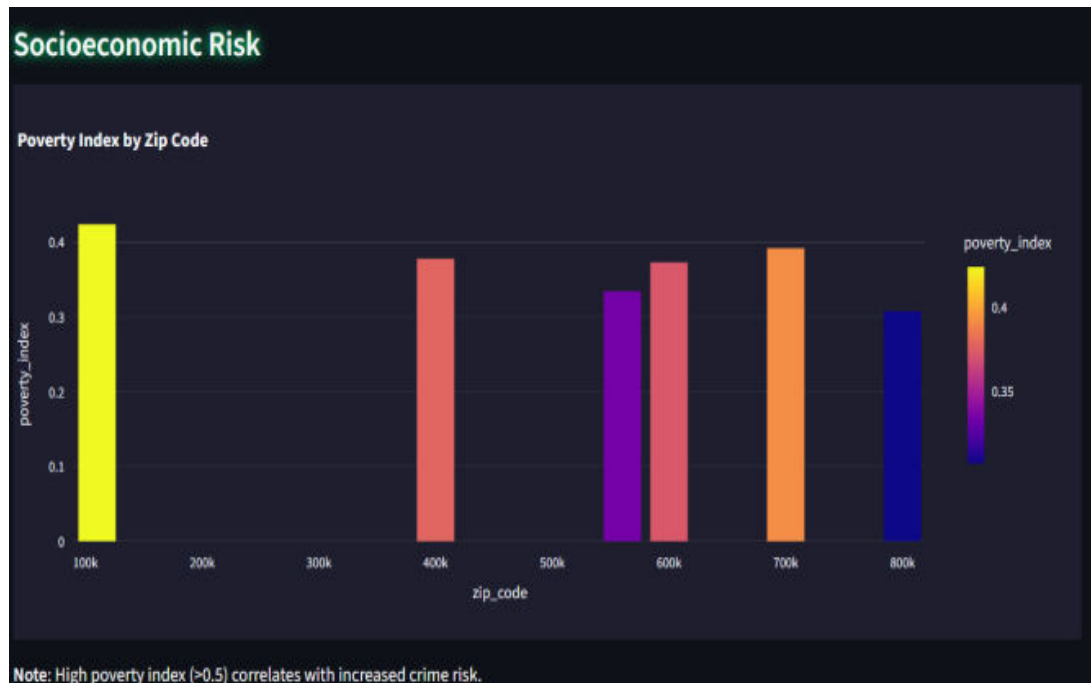


Fig. 3 Socioeconomic Bar Chart



Fig. 4 User-Friendly Dashboard

V. CONCLUSION

We have implemented an automatic crime forecasting and threat intelligence technique for public safety. Our algorithm successfully detects the anomaly regions from datasets that consist of mixed behavioral, socioeconomic, and environmental factors. We have applied our model using fuzzy logic and Isolation Forest algorithms and found that it successfully identifies the high-risk and anomaly-prone regions for preventive action.

REFERENCES

1. Safat, W., Asghar, S., & Gillani, S. A. (2023). Empirical Analysis for Crime Prediction and Forecasting Using Machine Learning and Deep Learning Techniques. IEEE Access, Vol. 11.
2. Middha, K., Goyal, S., Malhotra, A., & Jain, N. (2024). Anomaly Detection in CCTV Surveillance. IJFMR, Vol. 6(1).
3. Sathish, S., & Varadhan, S. (2024). Location-Based Crime Prediction Analysis Using Machine Learning. International Journal of Research Publication and Reviews, Vol. 5(4).
4. A. Javed, M. A. Khan, S. Irtaza, M. S. Khan, U. Qamar, and S. Mehmood, "Community-based crime prediction using deep learning," IEEE Access, vol. 7, pp. 139941–139951, 2019.



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