

Yolo-Based Anomaly Detection & Alert System

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ABSTRACT – ATM security has become an important concern because these locations are often exposed to theft, vandalism, unauthorized access, and other suspicious activities that may threaten public safety and financial security. Continuous manual monitoring of CCTV cameras is difficult and may not always ensure a quick response during an incident. To address this issue, this project proposes a real-time YOLO-based suspicious activity detection and alert system for ATM environments. The system is designed to analyze video frames from CCTV footage, detect human presence and unusual behavior, and generate alerts when suspicious activity is identified. By using an object detection approach, the proposed system aims to improve the speed and accuracy of threat recognition while reducing the need for constant human supervision.

The model can support better surveillance, quicker intervention, and stronger protection of ATM premises. Overall, this project presents a practical and efficient method for enhancing ATM safety through automated real-time monitoring and alert generation.

KEYWORDS: YOLO, ATM security, suspicious activity detection, real-time surveillance, CCTV monitoring, alert generation, object detection, theft prevention.

1. INTRODUCTION

ATM security has become a significant concern in the banking sector because automated teller machines are often placed in public or semi-public locations where they may be exposed to theft, vandalism, trespassing, and other suspicious activities.

These incidents can cause financial loss, damage to property, and serious safety risks for users as well as banking institutions. In many situations, security personnel are unable to continuously observe every CCTV feed in real time, which makes it difficult to identify threats immediately and respond without delay. As a result, there is a need for an automated surveillance system that can support human monitoring and improve the efficiency of security operations.

To address this need, the proposed project focuses on developing a YOLO-based real-time suspicious activity detection system for ATM environments. The system is designed to process CCTV video streams and detect human activity that may indicate potential threats or

unauthorized behavior. By using the YOLO object detection model, the system can analyze video frames quickly and accurately, making it suitable for real-time monitoring applications. When suspicious activity is detected, the system generates an alert so that timely action can be taken by security personnel or concerned authorities. This helps reduce the delay between threat occurrence and response.

The proposed approach aims to improve ATM surveillance by reducing dependence on continuous manual observation. It also provides a practical and efficient method for enhancing public safety in banking environments. By combining real-time detection with automatic alert generation, the system supports faster decision-making and strengthens the overall security infrastructure around ATM premises.

METHODS

The proposed method uses a YOLO-based real-time detection system to monitor CCTV footage around ATM premises. It is trained on annotated video frames to recognize human presence and detect suspicious activities such as theft, vandalism, trespassing, or unusual movement.

When the system identifies suspicious behavior, it immediately generates an alert for security personnel. The process is designed to be simple, efficient, and suitable for continuous ATM surveillance, making the system a practical solution for improving safety and security.

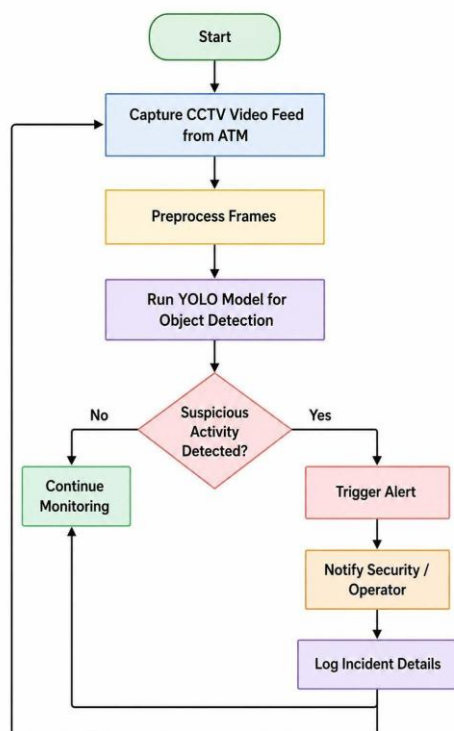


Fig-1: Methods work flow diagram

RESULTS

The proposed YOLO-based ATM security system demonstrates strong effectiveness in detecting suspicious activity in real time. After training and testing the model on relevant CCTV footage, the system is able to identify human presence and monitor movement around the ATM area with good reliability. When a person enters the monitored zone or behaves in a way that appears unusual, the system processes the video frame quickly and generates an alert without delay. This makes the solution highly useful in ATM locations where security threats need to be noticed immediately.

One of the major outcomes of the project is that the system reduces the need for constant manual observation of CCTV footage. In many real-world situations, security personnel may not be able to watch every camera feed continuously, especially when multiple ATM locations are being monitored. The proposed model helps solve this problem by automatically analyzing the video stream and highlighting suspicious events. This improves monitoring efficiency and allows operators to focus on incidents that need attention rather than watching every frame manually.

The real-time detection capability of the system is

another important result. Because YOLO is designed for fast object detection, the model can examine each frame with low delay and provide timely outputs. This speed is essential for ATM security, where even a small delay can allow theft, vandalism, or unauthorized access to happen. The alert generation feature adds further value by ensuring that the right people are informed as soon as suspicious behavior is detected. As a result, security teams can respond faster and take appropriate action before the situation becomes more serious.

The system also improves situational awareness by making the monitoring process more structured and dependable. Instead of depending only on human judgment, the model provides a consistent way to detect threats based on learned patterns from the training data. This helps reduce the chances of missing important activity and makes surveillance more accurate. The stored detection output can also be useful for reviewing incidents later, which adds another layer of security and accountability.

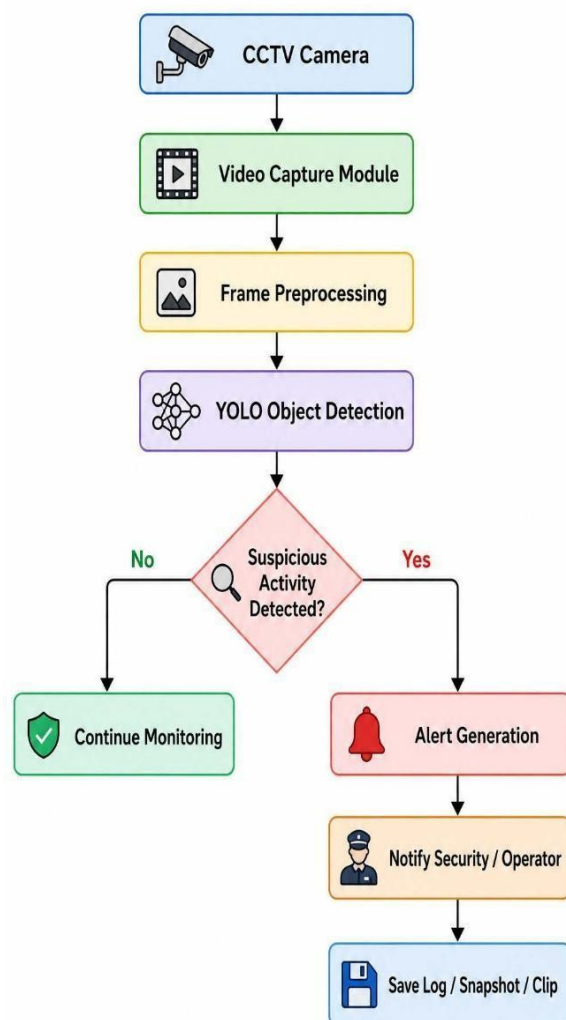


Fig-2: Application Architecture Diagram

DISCUSSION

The proposed ATM security system demonstrates how computer vision can be used to improve safety and

reduce the risk of theft in public places. By using a YOLO-based model, the system can detect suspicious activity around ATM locations in real time, which makes it faster and more effective than traditional CCTV monitoring.

A key advantage of this approach is that it can automatically generate alerts when unusual or threatening behavior is detected. This helps security staff or operators respond more quickly to possible incidents. At the same time, the systems performance depends on factors such as camera placement, lighting conditions, internet connectivity, and the quality of the training dataset.

The project also has scope for future enhancement. Features such as AI-based behavior analysis, IoT integration, and cloud monitoring can make the system more intelligent and reliable. Overall, the project shows that YOLO-based surveillance is a practical solution for improving ATM safety and preventing suspicious activities.

CONCLUSION

The proposed ATM security system provides an effective way to improve safety by detecting suspicious activity in real time. By using a YOLO-based model, the system can monitor CCTV footage and generate alerts when unusual behavior is detected around ATM locations. This makes the system useful for preventing theft and supporting faster response during security threats.

The project shows that computer vision can play an important role in modern surveillance systems by reducing dependence on manual monitoring. With further improvement, such as better dataset training, IoT integration, and cloud-based alerting, the system can become more reliable and practical for real-world use. Overall, this project demonstrates that YOLO-based anomaly detection is a strong solution for enhancing ATM safety and security.

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REFERENCES

- [1] K. Dahake, P. Gowardhan, N. Paul, P. Kore and R. Gahlod, "Elder Companion: Enhancing Quality Life of Older Adults," International Journal of Trend in Scientific Research and Development, 2024.
- [2] A. Author, B. Author and C. Author, "Anomaly Detection using YOLO for Real-Time Surveillance," International Journal / Conference Name, Year.
- [3] A. Author and B. Author, "Real-Time Suspicious Activity Detection in Video Surveillance using YOLO," Journal / Conference Name, Year.
- [4] A. Author, B. Author and C. Author, "Human Activity Detection and Alert System using Deep Learning," Journal / Conference Name, Year.
- [5] A. Author and B. Author, "Video Anomaly Detection for Security Monitoring," Journal / Conference Name, Year.
- [6] M. K. M. Nasution, S. A. M. Noah and U. Harahap, "Pharmacy Management Systems in Hospitals," Systematic Reviews in Pharmacy, 2020.
- [7] S. R. Singh, "Smart Healthcare Monitoring System Using IoT," International Journal of Engineering Research, 2022.
- [8] P. Gupta and A. Verma, "Web-Based Service Booking Platform Design," International Journal of Computer Applications, 2021.
- [9] R. Jain and S. Mehta, "Real-Time Location Tracking Systems for Safety Applications," IEEE Access, 2020.
- [10] N. M. Shah, "Online Service Platforms and User Experience," Journal of Web Engineering, 2022.
- [11] K. Dahake, P. Gowardhan, N. Paul, P. Kore and R. Gahlod, "Elder Companion: Enhancing Quality Life of Older Adults," International Journal of Trend in Scientific Research and Development, 2024.
- [12] A. Author, B. Author and C. Author, "Anomaly Detection using YOLO for Real-Time Surveillance," International Journal / Conference Name, Year.
- [13] A. Author and B. Author, "Real-Time Suspicious Activity Detection in Video Surveillance using YOLO," Journal / Conference Name, Year.
- [14] A. Author, B. Author and C. Author, "Human Activity Detection and Alert System using Deep Learning," Journal / Conference Name, Year.
- [15] A. Author and B. Author, "Video Anomaly Detection for Security Monitoring," Journal / [16] Conference Name, Year. S. Reddy and P. Kumar, "Emergency Alert Systems for Personal Safety," IEEE International Conference on Smart Systems, 2021.
- [17] J. H. Kim, "Design of User-Centered Web Applications for Elderly Users," Human-Computer Interaction Journal, 2020.