Preventing Threats to Women Through Advanced Surveillance

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Abstract - Women's safety in both public and private environments requires intelligent systems capable of detecting threats and enabling rapid response. This paper presents an AI-based Women Safety System designed for real-time violence detection and automated emergency alert generation. The system integrates a YOLO (You Only Look Once) deep learning model with OpenCV to analyze live and recorded video streams for identifying aggressive or abnormal behavior. Upon detecting violent activity above a predefined confidence threshold, the system captures visual evidence and automatically generates a structured emergency alert containing the incident timestamp, geographic coordinates, readable address, and a Google Maps navigation link. The alert, along with the captured screenshot, is securely transmitted via email to authorized administrative personnel. Developed using Python and the Django framework, the system ensures secure authentication, low latency processing, and reliable performance under varying environmental conditions. Experimental evaluation demonstrates accurate threat detection and timely alert delivery, significantly reducing response time. The proposed solution contributes to proactive surveillance and strengthens intelligent safety infrastructure for women.

Key Words: Women safety, intelligent surveillance, violence detection, YOLO, computer vision, automated alert generation.

1. INTRODUCTION

Ensuring women's safety has become a critical societal concern due to the rising incidence of harassment and violence in both urban and rural areas. Although law enforcement and awareness initiatives have improved, delayed intervention remains common because traditional systems rely on manual reporting and passive surveillance. Conventional measures such as helplines are often insufficient during emergencies requiring immediate response.

Recent advancements in artificial intelligence and computer vision enable real-time video analysis for proactive threat detection. AI-based systems can identify abnormal or violent behaviour and trigger automated alerts without human intervention. The proposed Women Safety System is a web-based application developed using Python and the Django framework, integrating a YOLO model with OpenCV for real-time violence detection. Upon identifying a threat, the system captures visual evidence and automatically generates emergency alerts.

2. OBJECTIVES

The primary objective of this project is to design and implement a comprehensive Women Safety System using Python and the Django framework to address real-time safety challenges. The system integrates secure user authentication, AI-based violence detection using a YOLO model with OpenCV, live camera monitoring,

automated emergency alerts, evidence capture, and real-time location tracking into a unified platform. It aims to enable immediate communication with authorized personnel through structured alerts containing incident details and location information. Additionally, the system focuses on preserving visual evidence for investigation and ensuring data privacy through secure access control. Overall, the objective is to reduce response time and enhance women's safety through intelligent, automated surveillance and rapid intervention mechanisms.

3. LITERATURE REVIEW

In the paper titled "Women Security Application Using Smart Emergency Response System and Real-Time Location Tracking" – A. K. Sinha et al. – 2025, the authors proposed a smart emergency framework integrating panic button activation, shake gestures, voice commands, and continuous GPS tracking to ensure reliable distress communication. The system enhances accessibility and emergency awareness; however, it largely depends on user-initiated triggers and stable internet connectivity, limiting its effectiveness when victims are unable to manually activate alerts.

In the paper titled "Quantitative Sentiment Analysis of Women's Safety Using Twitter Data" – P. Patil et al. – 2025, the researchers applied sentiment analysis techniques on large-scale social media data to understand public perception and safety trends. Although useful for identifying high-risk regions and social patterns, the system does not support real-time physical threat detection or immediate intervention.

In the paper titled "Empowering Women's Safety: Deep Learning Approaches to Combat Violence" – B.C.S.N.L.S. Sai Baba et al. – 2025, a multimodal deep learning framework integrating video, audio, and sensor data was proposed for real-time violence detection. Despite achieving improved detection accuracy, the approach requires extensive datasets, high computational resources, and raises privacy concerns due to continuous monitoring.

In the paper titled "Machine Learning-Driven IoT Device for Women's Safety" – R. Islam et al. – 2024, the authors developed a wearable IoT device capable of detecting abnormal motion and proximity patterns with automated alert generation. Collectively, these studies emphasize the necessity for an autonomous, vision-based intelligent surveillance system capable of real-time threat detection and secure alert communication without relying solely on manual activation or wearable devices.

4. METHODOLOGY

The proposed intelligent surveillance system follows a structured methodology integrating computer vision, deep learning, and secure web-based alert mechanisms to detect and respond to violent situations in real time.

(i) **Real-Time Live Camera Processing:** Video frames are captured from the client-side camera and transmitted asynchronously to the server. Frames are decoded into NumPy arrays and processed using OpenCV. A pre-trained YOLO deep learning model analyses each frame to detect violent or aggressive activities, with bounding boxes highlighting identified threats.

(ii) **Person Detection and Tracking:** The system identifies individuals in each frame and tracks their movement across consecutive frames to analyze motion patterns, speed, and interactions, enabling detection of abnormal behavior over time.

(iii) **Evidence Capture and Storage:** When a high-risk event is detected, a screenshot is automatically captured and securely stored, with the file path maintained within the user session for workflow continuity.

(iv) **Secure Framework Design:** Developed using the Django MVT architecture, the system ensures modularity, scalability, and secure authentication with restricted access to critical features.

(v) **Location and Alert Generation:** Upon detection, real-time location coordinates are obtained, converted into a readable address, and included in a structured email alert containing timestamp, Google Maps link, AI-generated summary, and visual evidence. The alert is securely sent to authorized personnel for rapid response.

5. SYSTEM ARCHITECTURE AND IMPLEMENTATION

The proposed Women Safety System adopts a modular and layered architecture integrating artificial intelligence, computer vision, and secure web technologies to enable real-time violence detection and automated alert generation. Developed using Python and the Django framework, the system follows the Model–View–Template (MVT) architecture to ensure scalability, maintainability, and secure data handling. Secure user authentication restricts access to authorized users, protecting sensitive features such as live monitoring and emergency alerts.

Video input is obtained from live camera streams or uploaded files and passed through a preprocessing module using OpenCV, where frames are resized and normalized to meet YOLO model requirements. The core processing unit employs a pre-trained Ultralytics YOLO deep learning model to analyze frames and detect violent or aggressive behavior. When the detection confidence exceeds a defined threshold, the system classifies the event as violent, highlights it with bounding boxes, and captures a timestamped screenshot as evidence.

Upon detection, real-time geographic coordinates are retrieved through browser-based geolocation and converted into a readable address using reverse geocoding. A structured email alert containing incident details, timestamp, Google Maps link, and visual evidence is automatically sent to authorized administrators. Additionally, detected incidents are logged with metadata such as confidence score and alert status to ensure accountability and system continuity. Proper session management and resource handling maintain stable and uninterrupted system performance.

6. BLOCK DIAGRAM

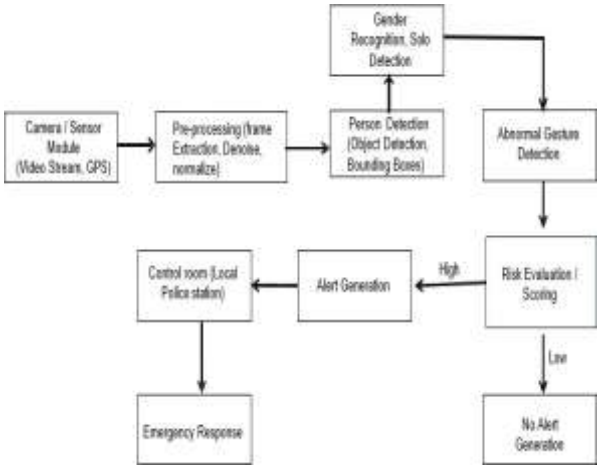

Fig-2: Figure

7. TECHNOLOGY STACK

The Women Safety Application is developed using Python 3.8+ as the core programming language, providing strong support for artificial intelligence and web development. The backend is built using the Django framework, following the Model–View–Template (MVT) architecture to ensure secure, scalable, and maintainable development. For artificial intelligence and violence detection, a YOLO (You Only Look Once) deep learning model is integrated using TensorFlow and Keras. OpenCV and NumPy are utilized for real-time video processing, frame extraction, image preprocessing, and numerical computations. SQLite is used as the development database, while MySQL or PostgreSQL is recommended for production deployment. Django's built-in authentication system ensures secure user management and session handling. Email alerts are implemented using the SMTP protocol, and SMS notifications are supported through third-party APIs. The application can be deployed on Windows, Linux, or macOS environments.

8. OUTPUT AND RESULT

The Automated Emergency Email Alert Generation Module delivers real-time notifications to authorized personnel when violent activity is detected by the AI-based monitoring system. Upon detection, the system automatically generates a structured email alert using a predefined template and sends it securely via SMTP.

The alert includes:

- Emergency title and incident description
- Latitude and longitude coordinates
- Converted readable address
- Timestamp of detection
- Clickable Google Maps link
- Attached screenshot as visual evidence

This fully automated process ensures minimal response delay and enhances situational awareness in high-risk environments.

Fig-2: Output

Fig-3: Output

The results demonstrate the effectiveness and reliability of the proposed AI-based surveillance system for enhancing women's safety. The YOLO-based detection model achieved high accuracy across varying lighting and crowd conditions, effectively identifying violent and suspicious behaviors in real time. The system successfully differentiated between normal activities and high-risk situations such as aggressive behavior or isolation scenarios. Live testing through the secure control room interface confirmed accurate detection, precise location reporting, and proper display of timestamped visual evidence.

9. CONCLUSION

The Women Safety System provides an effective and technology-driven approach to enhancing women's safety through real-time monitoring and intelligent threat detection. By leveraging YOLO-based person detection and behavioral analysis, the system accurately identifies violent and high-risk situations as they occur. Detected incidents are securely displayed on a registered web-based control room platform, ensuring restricted and authorized access to sensitive surveillance data. Automated email alerts containing precise location details, time stamps, and visual evidence enable faster decision-making and coordinated emergency response. By combining artificial intelligence, secure communication mechanisms, and centralized monitoring, the system significantly reduces response time and strengthens the overall efficiency of public safety infrastructure. The proposed solution demonstrates how intelligent surveillance technologies can be strategically deployed to prevent violence and enhance protective measures for women.

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