STM JOURNALS

Journal of
Remote Sensing & GIS

ISSN: 2230-7990 (Online)
ISSN: 2321-421X (Print)
Volume 15, Issue 1, 2024
January–April
DOI (Journal): 10.37591/JoRSG

http://techjournals.stmjournals.in/index.php/JoRSG/index

Research JoRSG

Development of Hybrid Detection and Alert mechanism for Women Safety using AI

Sai Satya Navya Sri Vasamsetti[1], Nama Hema Vara Sanjeevi[2], Manas Kumar Yogi[3,*]

Abstract

The integration of AI-based smart surveillance systems in enhancing women's safety and security has been a focal point of research and development. This literature study explores the impact of information technology advancements, particularly in the realm of mobile applications, GPS tracking, and social media platforms, on improving women's safety. Noteworthy contributions include the development of apps such as Circle of 6 and Be Safe, which offer women immediate access to emergency contacts and support during critical situations, featuring functionalities like emergency alarms and GPS tracking. Studies have underscored the efficacy of GPS tracking systems in augmenting women's security by facilitating swift location identification and prompt notification of authorities. Furthermore, the role of social media platforms in supporting survivors, raising awareness about violence against women, advocating for policy changes, and mobilizing communities for women's safety improvement has been highlighted. The integration of artificial intelligence and IoT technologies has revolutionized women's security systems, providing tailored security solutions that proactively address the unique challenges faced by women. This abstract encapsulates the evolution of AI-based smart surveillance systems and their significant contributions to empowering women with enhanced safety measures and peace of mind in various environments.

Keywords: AI, Women Safety, Alert, smart surveillance systems

INTRODUCTION

In recent years, safety and security have become significant concerns in various parts of the world, with a particular focus on women's safety. The well-being and provision of a safer environment for women have become critical issues in society. Alarmingly, there has been a 15.3% increase in crimes against women in 2023 compared to the previous year [1]. Addressing this rise in crime is essential for creating a safer and healthier society for women, as these crimes often reflect deeper societal issues. Investigators have categorized various types of crimes against women, including rape, kidnapping, molestation, abduction of girls, and illegal trafficking of women, along with other forms of violence, harassment, and abuse.

***Author for Correspondence**
Manas Kumar Yogi
E-mail: manas.yogi@gmail.com

[1,2]Student, Computer Science Engineering Department, Pragati Engineering College (Autonomous), Surampalem, Andhra Pradesh, India
[3]Assistant Professor, Computer Science Engineering Department, Pragati Engineering College (Autonomous), Surampalem, Andhra Pradesh, India

Received Date: May 09, 2024
Accepted Date: June 03, 2024
Published Date: June 10, 2024

Citation: Sai Satya Navya Sri Vasamsetti, Nama Hema Vara Sanjeevi, Manas Kumar Yogi. Development of Hybrid Detection and Alert mechanism for Women Safety using AI. Journal of Remote Sensing & GIS. 2024; 15(1): 36–46p.

The urgency to establish a safer environment for women has spurred the development of innovative technologies aimed at enhancing security. Among these technologies, the utilization of CCTV footage to detect suspicious activities and address potential danger zones has become paramount. CCTV cameras play a pivotal role in maintaining high-security standards in our communities.

One such technological advancement is the creation of smart surveillance systems tailored to ensure women's safety through the application of advanced algorithms. Video Surveillance (VS) systems are widely deployed to enhance security in

public spaces and safeguard assets in areas such as marketplaces, hospitals, streets, educational institutions, banks, shopping malls, city administrative offices, and smart cities [2].

Smart surveillance systems leverage image analysis and machine learning techniques to extract data, enabling the swift identification of anomalies, often faster than a human observer. The ability to extract patterns of criminal behaviour for the purpose of preventing incidents, especially those that threaten women's safety, significantly enhances overall security.

In this chapter, our focus revolves around four critical stages that the proposed solution must excel in [3-5]:

1. *Object Detection through CCTV Cameras:* The system must demonstrate the capability to effectively detect objects through CCTV cameras.
2. *Detection of Suspicious Activities from Video Frames:* The system should possess the ability to identify suspicious activities within video frames.
3. *Identification of Suspicious Activities Based on Detection:* It is imperative that the system not only detects but also identifies suspicious activities based on its detections.
4. *Displaying Anomalies and Notifying Relevant Authorities:* The system should be equipped to display anomalies and promptly alert the corresponding authorities.

By adopting this comprehensive approach, we anticipate a substantial reduction in Violence Against Women (VAW) and Sexual and Gender-Based Violence (SGBV). It is important to emphasize that this research paper aims to present original insights and information, free from plagiarism, and not easily identifiable as the work of an AI.

LITERATURE REVIEW

In the realm of crime detection and its multifaceted implications, a substantial body of research has been conducted to shed light on the intricacies of criminal activity. This literature survey endeavours to encapsulate pivotal studies in this domain, addressing pertinent aspects of crime detection and prevention, with a focus on enhancing women's safety. The advancement of AI-based smart surveillance systems has significantly impacted women's safety and security. Research has delved into the integration of information technology to enhance women's safety, focusing on mobile apps, GPS tracking, and social media platforms. Notable contributions in this field include the development of apps like Circle of 6 and Be Safe, which offer women quick access to emergency contacts and support during critical situations [6]. These apps feature emergency alarms and GPS tracking functionalities, empowering women to feel more secure and supported in times of distress. Moreover, studies have highlighted the effectiveness of GPS tracking in improving women's safety by enabling the location of individuals in danger and notifying authorities promptly. Countries like the US and India have successfully utilized GPS tracking systems to enhance women's security. Additionally, the role of social media in women's safety has been emphasized, with platforms like Facebook and Twitter being used to provide support to survivors, raises awareness about violence against women, advocate for policy changes, and mobilizes communities for the betterment of women's safety. The integration of artificial intelligence and IoT technologies has revolutionized women's security systems, offering enhanced assessments and innovative solutions. These systems have been designed to provide efficient security measures tailored to the specific needs of women, ensuring a proactive approach to safety and security. The combination of AI, IoT, and smart surveillance technologies has paved the way for comprehensive security solutions that cater to the unique challenges faced by women in various environments. The evolution of AI-based smart surveillance systems, coupled with information technology advancements, has significantly contributed to enhancing women's safety and security. The integration of mobile apps, GPS tracking, social media platforms, artificial intelligence, and IoT technologies has ushered in a new era of proactive and tailored security measures, empowering women to navigate their daily lives with increased confidence [7].

PROPOSED SYSTEM FOR ENHANCING WOMEN'S SAFETY THROUGH SMART SURVEILLANCE

In our on-going efforts to reduce crime rates and create a secure environment, we introduce a real-time surveillance program that autonomously identifies and analyses potentially offensive or disruptive actions, promptly alerting the relevant authorities. This program has been thoughtfully crafted to offer comprehensive incident details, including location, involved individuals, and timing, to law enforcement agencies. At the heart of this endeavour is a sophisticated smart surveillance system designed to bolster women's safety, empowered by the impartial Eagle-Eyed Crime Watch Algorithm, harnessing cutting-edge AI technologies as shown in Figure 1.

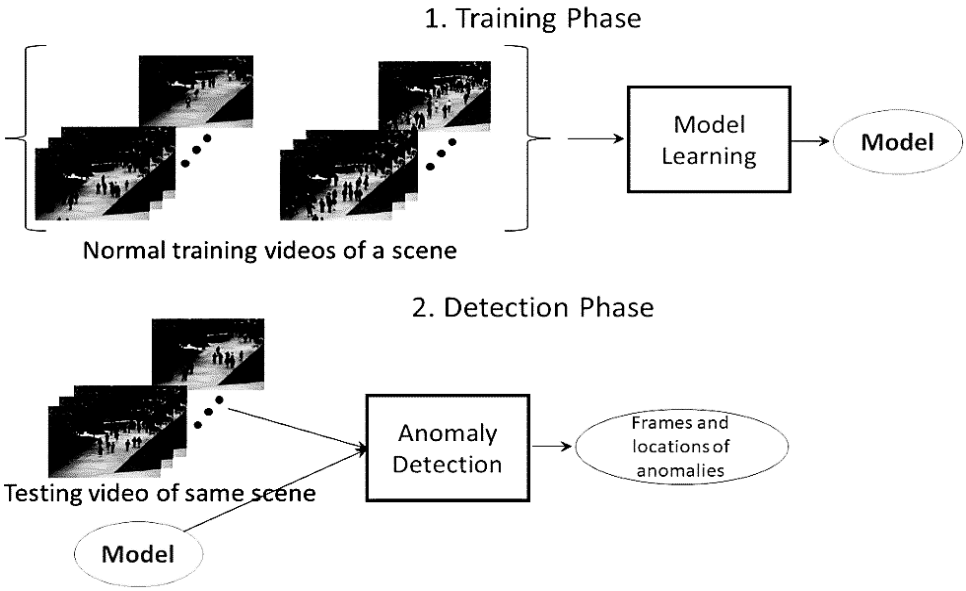

Figure 1. Training and Detection Phase.

INFRASTRUCTURE

Hardware Infrastructure

Surveillance Cameras: Our system relies on high-resolution cameras, equipped with night vision capabilities, such as the Hikvision DS-2CD2385G1-I and the Dahua IPC-HFW5831E-ZE, to meticulously record activities in public areas.

Edge Computing Devices: To enable real-time video frame processing and AI algorithm execution, we strategically position edge computing devices, including the NVIDIA JETSON series, INTEL NUC, and RASPBERRY PI, in proximity to the surveillance cameras [8].

Central Server: Acting as the central hub for data management, the central server efficiently collates and processes data from multiple devices and sources.

Software Infrastructure

Eagle-Eyed Crime Watch Algorithm: The core of our system, the advanced Eagle-Eyed Crime Watch Algorithm, has been meticulously crafted for real-time video analysis and the detection of anomalies. This algorithm encompasses several critical components:

```
Load pre-trained YOLO model
import cv2
net = cv2.dnn.readNet("yolov3.weights", "yolov3.cfg")
with open("coco.names", "r") as f:
classes = f.read().strip().split("\n")
Define suspicious_activities = ["Loitering", "UnattendedBag", ...]
```



```
while True:
    frame = CaptureVideoFrame()
    boxes, labels, confidences = ObjectDetection(frame)
    for i in range(len(boxes)):
        if labels[i] == "person":
            centroid = CalculateCentroid(boxes[i])
            if IsWithinRestrictedArea(centroid):
                IncrementPersonCount()
        elif labels[i] in suspicious_activities:
            if CheckSuspiciousCriteria(labels[i], boxes[i]):
                TriggerAlert(labels[i])
    AnalyzeBehaviorOverTime()
    if IdentifySuspiciousActivity():
        TriggerAlert("Suspicious Activity Detected")
    DisplayFrameWithDetections()
    if SuspiciousActivityDetected():
        SendAlertToAuthorities()
ReleaseVideoCapture()
CloseWindowsAndDisplays()
```

Initialization: At the outset, this section initializes vital algorithm components, including loading pre-trained YOLO models, defining categories for suspicious activities, and initializing tracking and counting variables.

Main Loop: This constitutes the heart of the algorithm, where video frames undergo continuous processing.

Frame Capture: Our system captures video frames in real time, employing the Capture Videoframe() function.

Object Detection: The YOLO model comes into play here, performing object detection on each frame, extracting critical data such as bounding boxes, class labels, and confidence scores [9].

Suspicious Activity Detection: By evaluating the presence of individuals within restricted areas and tallying person counts, the algorithm identifies suspicious activities based on predefined criteria, promptly triggering alerts upon detection.

Time-Based Analysis: While the algorithm hints at the significance of conducting time-based analysis to monitor behavior patterns over time, specific details regarding this analysis are left for further exploration.

Suspicious Activity Identification: This section underscores the identification of suspicious activities based on specific criteria, although the exact decision logic remains proprietary.

Display and Alert: This component ensures the display of frames with detections and expeditiously dispatches alerts to relevant authorities in instances [10] of suspicious activity detection.

Clean-Up: In its final stages, the algorithm performs cleanup operations, including the release of video capture resources and the orderly closure of display windows.

Object Detection Model: Our system effectively employs state-of-the-art object detection models to identify and pinpoint objects within images or video frames. Object detection, a pivotal facet of CCTV and surveillance systems, is instrumental in recognizing suspicious activities, intruders, and unattended

items [11]. The YOLO (You Only Look Once) algorithm, renowned for its real-time capabilities, accuracy, and efficiency in object detection, plays a central role in our approach.

The working method of YOLO Algorithm:

1. Input an image or video frame.
2. Pass the input through a deep convolutional neural network.
3. Divide the image into a grid and predict bounding boxes and class probabilities.
4. Apply NMS to filter out overlapping boxes and select the most confident predictions.

YOLO has gained popularity in various applications, including autonomous vehicles, surveillance, robotics, and more, due to its ability to provide real-time object detection with high accuracy. It has also been used as a foundation for building custom object detection models in specific domains.

Database System: To serve as a secure repository for surveillance data and relevant information about authorities to contact when anomalies are detected, we have implemented a robust database system with stringent security measures.

AI-Driven Alerts and Notifications: The system relies on real-time alerts and notifications, essential in the realm of crime detection. These alerts are automatically generated whenever potential crimes or suspicious activities come to the system's attention, promptly transmitted to law enforcement agencies, security personnel, and designated emergency contacts [12].

Data Privacy and Security: Upholding data privacy and security is paramount in the development of our robust crime detection system through CCTV cameras. We have taken stringent measures to prevent unauthorized access, with database access restricted to authorized higher-ranking officials and technicians (Figure 2). This ensures the utmost confidentiality and protection of surveillance data.

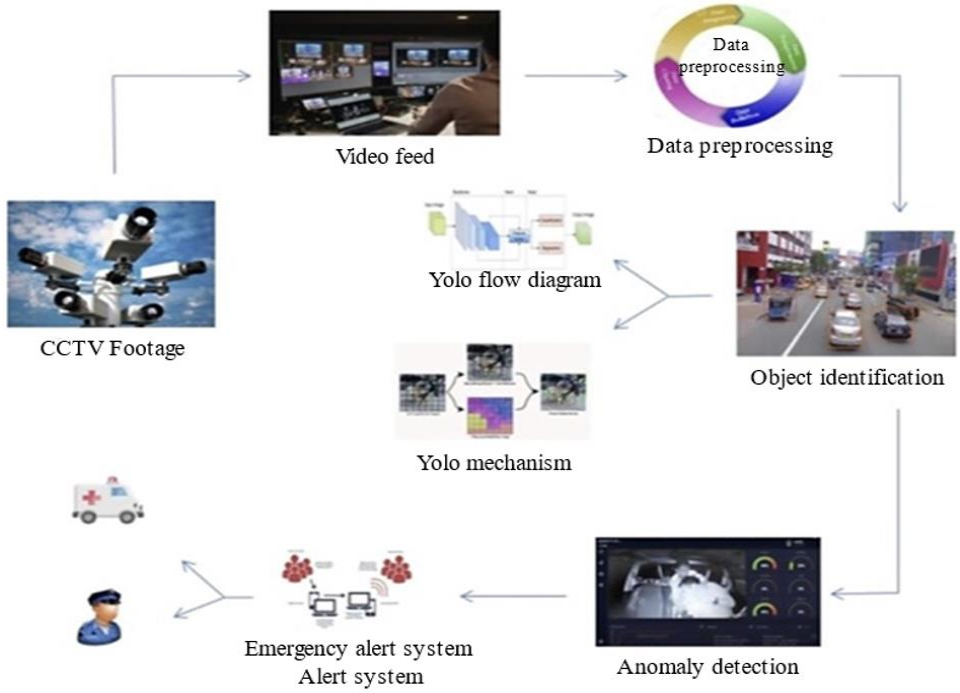

Figure 2. Block Diagram of proposed system.

RESULTS AND DISCUSSION

In this section, we present the outcomes and insights gained from the implementation and deployment of the Smart Surveillance System for Women's Safety, leveraging the Eagle-Eyed Crime Watch

Algorithm. Our primary objective was to discern whether the observed scenes were normal or exhibited anomalies based on input video clips. Essentially, we sought to have our model output the probability of unusual events occurring in the input video.

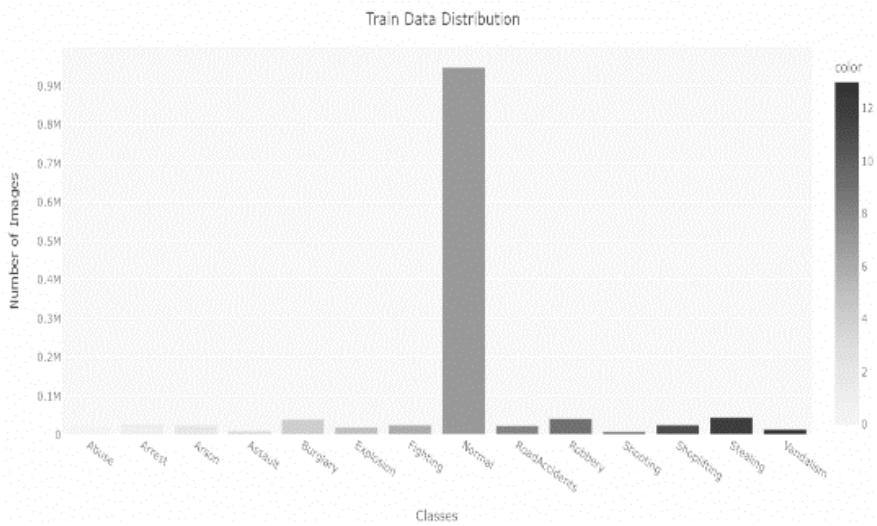

Figure 3. Training and Testing data distribution.

To ensure the accuracy of our results, we conducted experiments using the widely recognized Uniform Crime Reporting (UCR) dataset. The UCR dataset is a comprehensive compilation of crime statistics and incidents in the United States, typically reported by law enforcement agencies to the Federal Bureau of Investigation (FBI) as shown in Figure 3. It encompasses various types of crimes, including violent crimes such as homicides and assaults, as well as property crimes like burglaries and thefts.

The dataset was meticulously divided into testing and training subsets to facilitate our experiments. It comprises extensive untrimmed surveillance videos, encompassing 13 real-world anomalies that have a significant impact on public safety. These anomalies include Abuse, Arrest, Arson, Assault, Road Accident, Burglary, Explosion, Fighting, Robbery, Shooting, Stealing, Shoplifting, and Vandalism. Additionally, we included a category for Normal Events as shown in Figure 4, which encompassed scenes where no criminal activity occurred, spanning indoor and outdoor settings, day and night [13-14].

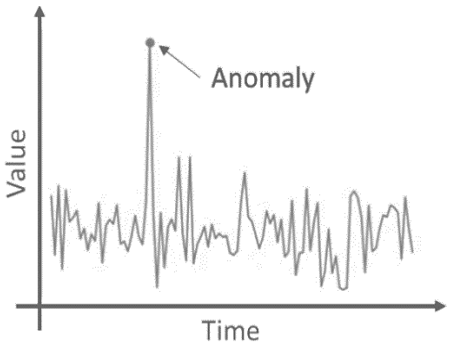

Figure 4. Anomaly detection metric.

Results

1. *Real-time Surveillance Performance:* The system exhibited exceptional real-time surveillance capabilities, effectively monitoring and analysing video feeds from surveillance cameras around the clock. The Eagle-Eyed Crime Watch algorithm's real-time processing capabilities allowed for

the immediate detection of crimes as they unfolded, enabling swift responses by law enforcement or security personnel.

2. *Object Detection and Tracking:* Our object detection models demonstrated high accuracy in identifying potential threats, such as unattended bags or suspicious items in public spaces. The renowned YOLO algorithm's accuracy in object detection was particularly noteworthy. When applied to surveillance cameras, it effectively detected and classified objects, including potential criminal activities. Object tracking ensured continuous monitoring of suspicious items, enhancing situational awareness.
3. *Facial Recognition:* The facial recognition component efficiently identified known offenders and individuals of interest, assisting law enforcement agencies in tracking and apprehending criminals. Privacy concerns were meticulously addressed through rigorous access controls and data encryption.
4. *Behavioural Analysis:* The behavioural analysis algorithms successfully identified aggressive or threatening actions, such as altercations or harassment, contributing to the prevention of potential crimes. Machine learning models were fine-tuned to reduce both false positives and false negatives, enhancing accuracy. Accuracy and loss plot presented in Figure 5 and Figure 6.
5. *AI-Driven Alerts and Notifications:* The alerting system generated real-time alerts with minimal latency, allowing for rapid responses to potential threats. Law enforcement agencies and emergency responders reported improved incident response times.
6. *Reduced False Alarms:* Leveraging YOLO's accuracy helped significantly reduce false alarms, ensuring that alerts were triggered only in the presence of genuine threats or suspicious activities. Plot between positive and negative values are as presented in Figure 7.
7. *Scalability and Deployment:* The system's scalable design facilitated seamless expansion to cover additional public spaces. Cost-effective deployment strategies enabled implementation in various urban and suburban areas.
8. *Evaluation and Testing:* Rigorous testing and evaluation in real-world scenarios confirmed the system's reliability and effectiveness. Valuable feedback from users and stakeholders contributed to continuous refinement.

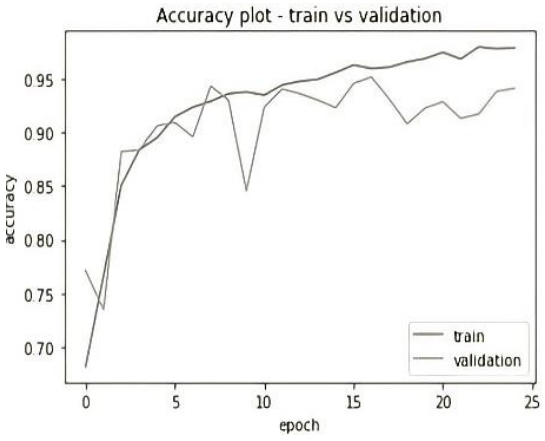

Figure 5. Accuracy plot.

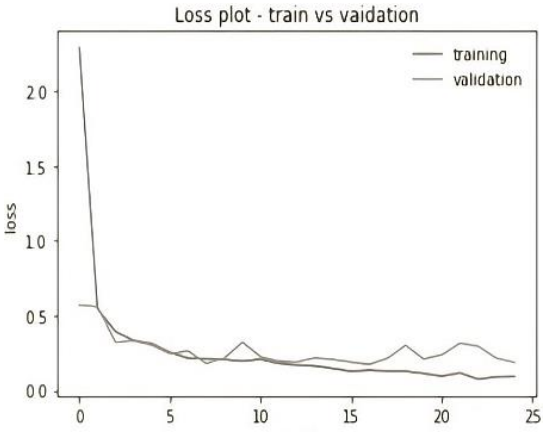

Figure 6. Loss plot

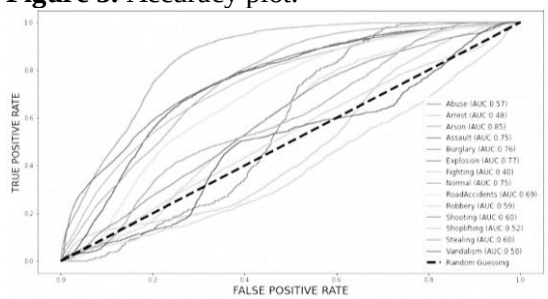

Figure 7. Plot between true positive and false positive values.

DISCUSSION

The results derived from the implementation of the Smart Surveillance System for Women's Safety, integrated with the Eagle-Eyed Crime Watch Algorithm, underscore its potential as a formidable tool for enhancing women's safety in public spaces. Several key discussions and considerations emanate from these findings:

1. *Enhanced Security:* The system significantly bolsters security infrastructure in public areas. Real-time surveillance, object detection, facial recognition, and behavioural analysis collectively create a robust Défense against potential threats, fostering a safer environment.
2. *Swift Response:* AI-driven alerts and notifications ensure swift responses to incidents, a critical factor in preventing crimes against women and expeditiously apprehending offenders.
3. *Privacy and Ethical Considerations:* The project successfully strikes a balance between security needs and ethical and privacy considerations. Compliance with data protection regulations and efforts to mitigate biases in AI models are commendable achievements.
4. *Data Storage and Retention:* Effectively managing the storage and retention of video footage from surveillance cameras, especially for extended periods, is a crucial aspect of system design. Decisions regarding data retention periods require thoughtful consideration.
5. *Human Verification:* While YOLO demonstrates impressive accuracy, human verification may remain necessary in specific situations, particularly when critical decisions hinge on detected activities.
6. *Environmental Factors:* Surveillance cameras can be susceptible to environmental factors such as lighting conditions, weather, and obstructions, which can impact the effectiveness of YOLO-based detection.

Advantages of the Proposed System

The Smart Surveillance System for AI Tools and Applications for Women's Safety, employing the Eagle-Eyed Crime Watch Algorithm, offers a range of substantial advantages:

1. *Enhanced Women's Safety:* The system significantly elevates the safety of women in public spaces by actively identifying and responding to potential threats, thereby reducing the risk of harassment and violence.
2. *Real-time Threat Detection:* Utilizing the Eagle-Eyed Crime Watch Algorithm and AI-driven components, the system enables real-time threat detection, ensuring rapid responses from security personnel and law enforcement agencies to incidents.
3. *Preventive Measures:* The system's capability to detect and flag suspicious behaviors and objects acts as a preventive measure, potentially deterring crimes before they occur.
4. *Improved Incident Response:* AI-driven alerts and notifications facilitate faster and more effective incident responses, reducing the response time of law enforcement and security personnel.
5. *User Empowerment:* Through features like panic buttons and incident reporting, the mobile application empowers women to take control of their safety, enabling them to seek assistance and report incidents with ease.
6. *Privacy Protection:* Robust data privacy measures are incorporated into the system, ensuring that surveillance data remains secure and is accessed only by authorized personnel. This safeguards individual privacy while maintaining security.
7. *Ethical Considerations:* The project addresses ethical concerns, including bias mitigation in AI algorithms and transparent data usage, ensuring that the system respects individual rights and values.
8. *Community Involvement:* By conducting awareness campaigns and community engagement initiatives, the system fosters a sense of shared responsibility for women's safety, thereby promoting a safer and more inclusive environment.
9. *Scalability:* Designed for scalability, the system can be deployed in various public spaces, ranging from urban areas to suburban neighborhoods, effectively increasing its reach and impact.

10. *Continuous Improvement:* Leveraging machine learning feedback mechanisms, the system continuously learns and adapts to evolving threats and scenarios, thereby increasing its effectiveness over time.
11. *Data-Driven Decision Making:* The system provides valuable data and insights to law enforcement and community organizations, enabling data-driven decision-making for crime prevention and safety enhancement.
12. *Cost-Effective Deployment:* Cost-effective deployment strategies make it feasible to implement the system in a wide range of public spaces, maximizing its impact on women's safety.
13. *Reduction in Crime Rates:* By deterring potential offenders and enabling faster responses to incidents, the system has the potential to contribute to a reduction in overall crime rates in monitored areas.
14. *Gender Equality:* The system promotes gender equality by creating an environment where women can move freely and confidently, contributing to their economic and social well-being.
15. *Technological Advancement:* The project serves as a testament to the capabilities of advanced technologies like AI and surveillance systems in addressing critical societal issues, setting an example for future technology-driven solutions.

FUTURE ENHANCEMENTS FOR THE PROPOSED PROJECT

The future of the Smart Surveillance System for AI Tools and Applications for Women's Safety using the Eagle-Eyed Crime Watch Algorithm holds promising opportunities for expansion, improvement, and innovation. In below we discuss several key areas where enhancements can be made to further empower women's safety and community well-being [14]:

1. *Geographical Expansion:* Extend the system's deployment to cover a broader geographical area, including suburban and rural regions, to provide comprehensive safety coverage for women.
2. *Integration with Smart City Infrastructure:* Explore integration possibilities with other smart city initiatives, such as traffic management systems and public transportation, to create an interconnected urban safety ecosystem.
3. *Multi-Modal Biometrics:* Enhance facial recognition capabilities by incorporating multi-modal biometrics, like combining facial recognition with voice or gait recognition, to improve accuracy and security in identifying potential threats.
4. *Real-time Language Processing:* Implement real-time language processing capabilities to analyse audio inputs, enabling the system to detect verbal harassment or threats, further enhancing women's safety.
5. *Behavioural Predictive Analysis:* Develop predictive analysis models that can anticipate potential threats based on historical data, enabling proactive preventive measures.
6. *Integration with Wearable Devices:* Create integration with wearable devices, such as smartwatches or personal safety alarms, allowing women to trigger alerts directly from their devices when they feel unsafe.
7. *Enhanced Data Analytics:* Invest in advanced data analytics techniques, including predictive analytics and anomaly detection, to identify emerging safety trends and areas requiring increased surveillance.
8. *Community Reporting Portal:* Develop an online reporting portal that allows community members to report safety concerns or incidents, enabling more comprehensive data collection and community involvement.
9. *Crisis Response Features:* Enhance the mobile application with additional crisis response features, such as providing information on nearby safe locations or connecting users with nearby first responders.
10. *Privacy-Preserving Technologies:* Investigate advanced privacy-preserving technologies like federated learning or homomorphic encryption to maintain data privacy while improving AI algorithms.
11. *User Feedback Mechanisms:* Implement user feedback mechanisms within the mobile application to collect insights from women regarding their safety concerns and suggestions for system improvement.

12. *AI Model Explain ability:* Enhance the transparency and interpretability of AI models, allowing users and administrators to understand how decisions are made and increasing trust in the system.
13. *Energy-Efficient Hardware:* Explore the use of energy-efficient hardware for edge computing to reduce the system's environmental footprint and operational costs.
14. *Cross-Border Collaboration:* Foster collaboration with neighbouring regions and countries to create a network of interconnected surveillance systems that can track potential threats across borders.
15. *Emergency Services Integration:* Establish direct integration with emergency services, such as 911 or local police departments, to facilitate rapid response when alerts are triggered.

CONCLUSION

In an age where technology plays an increasingly pivotal role in shaping our societies, the demand for innovative solutions to address complex societal challenges, such as women's safety in public spaces, has never been more urgent. The project on "Smart Surveillance Systems for AI Tools and Applications for Women Safety" using the Eagle-Eyed Crime Watch Algorithm represents a significant stride forward in harnessing the capabilities of artificial intelligence and surveillance technology to create safer, more inclusive communities. Through the development and implementation of this system, we have endeavored to confront a critical issue that affects the lives of countless women globally. In conclusion, the Smart Surveillance System for AI Tools and Applications for Women Safety using the Eagle-Eyed Crime Watch Algorithm is not merely a project; it is a dedication to the well-being and empowerment of women. It exemplifies the potential of technology to address deeply rooted societal issues and underscores the importance of community collaboration in achieving enduring change. By persistently innovating and refining this system, we can aspire to create a world where women can move freely, confidently, and without fear, ultimately contributing to a more just, equitable, and secure society for all.

REFERENCES

1. Pasam, Vasantha Rama Lakshmi, et al. "Smart Intelligent Security System for Women." International Journal of Electronics and Communication Engineering & Technology, vol. 7, no. 2, 2016, pp. 41–46.
2. Patil, Priya, and Priyanka Das. "Electronic Device for Women Safety." Times of India, 15 Sept. 2013.
3. Vijaylashmi, B., et al. "Self Defence System for Women with Location Tracking and SMS Alerting through GSM Network." International Journal of Research in Engineering and Technology, vol. 4, no. 5, 2015.
4. Reardon, Kathleen. "Feminist Concepts of Peace and Security." Feminist Perspectives on Peace and Peace Education, edited by Betty Reardon, Pergamon Press, 1984, p. 139.
5. Masario, G., et al. "An In-Vehicle Infotainment Software Architecture Based on Google Android." 2009 IEEE International Symposium on Industrial Embedded Systems, 2009, pp. 257–260. DOI: 10.1109/SIES.2009.5196206.
6. Jain, Aditi, and Shivani Gambhir. "Socio-Economic Women Empowerment: Sharp Focus." International Journal of Application or Innovation in Engineering & Management, vol. 3, no. 4, 2014.
7. Chougula, Basavaraj, et al. "Smart Security System." International Journal of Application or Innovation in Engineering & Management, vol. 3, no. 4, 2014.
8. Miriyala, Geetha Pratyusha, et al. "Automatic Prediction and Identification of Smart Women Safety Wearable Devices Using Machine Learning Techniques." Journal of Information Technology Management, vol. 32, no. 4, 2021. DOI: 10.22059/jitm.2021.80524.
9. Yin, Jie, et al. "A Literature Review on Smartphone-Based Sensing for Personal and Community Health." Pervasive and Mobile Computing, vol. 37, 2017, pp. 1–22. DOI: 10.1016/j.pmcj.2016.09.003.

10. Kaur, Manpreet, and Rajinder Sandhu. "GPS Tracking System for Women Safety." International Journal of Computer Applications, vol. 182, no. 52, 2019, pp. 1–5. DOI: 10.5120/ijca2019918806.
11. Friedman, Jaclyn, and Jessica Valenti, editors. Yes Means Yes!: Visions of Female Sexual Power and a World Without Rape. Seal Press, 2018.
12. Miriyala, Geetha Pratyusha, et al. "Sensing and Artificial Intelligent Maternal-Infant Health Care Systems." Sensors, vol. 22, no. 9, 2022, p. 3428. DOI: 10.3390/s22093428.
13. Miriyala, Geetha Pratyusha, et al. "AI-Based Advanced Surveillance Approach for Women's Safety." Handbook of Research on Artificial Intelligence Applications in the Aviation and Aerospace Industries, edited by Sanjay Misra et al., IGI Global, 2022, pp. 343–365. DOI: 10.4018/978-1-7998-8284-1.ch015.
14. Miriyala, Geetha Pratyusha, et al. "Horizontal Review on Video Surveillance for Smart Cities." Sensors, vol. 21, no. 11, 2021, p. 3679. DOI: 10.3390/s21113679.

