JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Crowd Monitoring and Alert System

Sanket Kshirsagar
SITS Narhe

Rushikesh Matele
SITS Narhe

Atharva Patil
SITS Narhe

Prof. B.B. Waghmode
SITS Narhe

ABSTRACT
In today's rapidly evolving technological landscape, ensuring public safety in crowded spaces has become a critical concern. This study presents an advanced Suspicious Activity and Crowd Monitoring Alert System designed to enhance security measures in various public environments. Leveraging cutting- edge technologies such as artificial intelligence and machine learning, the system provides real-time video surveil lance and intelligent analysis capabilities. By employing sophisticated algorithms, the system can differentiate between normal crowd behavior and suspicious activities, enabling prompt detection and response to potential threats. The integration of behavioral analytics and anomaly detection techniques further enhances the system's accuracy in identifying abnormal patterns. The system generates instant alerts when suspicious activities are detected, facilitating swift actions by security personnel and law enforcement agencies. Additionally, the system ensures compliance with data privacy regulations and emphasizes responsible data handling practices. Through comprehensive literature review, this research explores the evolution of crowd monitoring systems, highlighting key challenges, ethical considerations, and emerging trends in the field. The results of this study contribute to the ongoing efforts to create safer public spaces, thereby enhancing overall public safety and security.

Keywords
Suspicious and Crowd Monitoring, Public Safety, Security System, Machine Learning (ML), Real-time Monitoring, Threat Detection, Alert System, Crowd Management, Rapid Response, Public Events, Surveillance, Risk Mitigation,

1. INTRODUCTION
In recent years, the advancement of technology has significantly impacted various aspects of our lives, including security and surveillance. With the rise in population density and the increasing frequency of public events, ensuring the safety and security of people has become a paramount concern. Traditional surveillance methods are often insufficient to handle large crowds and identify suspicious activities in real-time. This has led to the development of advanced systems that can monitor crowds, detect suspicious behavior, and alert authorities promptly. The Suspicious and Crowd Monitoring and Alert System is an innovative solution designed to address these challenges. This system leverages cutting-edge technologies such as artificial intelligence, machine learning, computer vision, and data analytics to enhance public safety and security. By continuously monitoring crowded areas, public events, transportation hubs, and other high-traffic locations, this system can identify unusual or suspicious activities, enabling a quick response from law enforcement agencies and security personnel. In summary, the Suspicious and Crowd Monitoring and Alert System represents a significant advancement in the field of public safety and security. By harnessing the power of technology, this system provides a proactive approach to threat detection, enabling swift responses and ultimately creating safer environments for everyone.

2. METHODOLOGY
The development of the Suspicious and Crowd Monitoring and Alert System follows a comprehensive methodology. Begin9ning with an extensive literature review, key challenges, ethical considerations, and emerging trends are identified. Clear objectives are defined, guiding the selection of cutting-edge technologies such as artificial intelligence, machine learning, computer vision, and data analytics. Diverse data from crowded environments is collected, preprocessed, and used to train sophisticated algorithms for activity detection and anomaly identification. The integration of technologies ensures seamless communication, while ethical considerations prioritize privacy regulations. Continuous training, user feedback, and iterative improvements lead to a robust system deployed in real-world scenarios, enhancing public safety and security with adaptability and responsiveness.

3. BACKGROUND

3.1 Python
Python 3 emerges as a dominant programming language in the development of the Suspicious and Crowd Monitoring and Alert System. Renowned for its versatility, readability, and extensive library support, Python 3 is well-suited for implementing artificial intelligence and machine learning components. Its simplicity facilitates efficient development, while its extensive ecosystem streamlines integration with

various technologies, contributing to the overall adaptability and effectiveness of the system.

3.2 SQLite

The choice of SQLite as the database management system for the project is grounded in its lightweight nature, ease of integration, and suitability for the specific requirements of the Suspicious and Crowd Monitoring and Alert System. SQLite provides efficient data management capabilities, supporting seamless storage and retrieval of information critical to the system's functionality. The synergy between Python 3 and SQLite ensures a cohesive and efficient integration, enhancing the overall performance and responsiveness of the surveillance system.

4. RELATED WORK

4.1 Literature Survey

Kshitij Barsagade, Sumeet Tabhane et al. [1] have classified human activities into two: Normal and Suspicious. Normal activities include sitting, walking, jogging, hand waving, etc. Suspicious activities include running, boxing, fighting, etc. We achieve this classification by using convolutional neural networks. First, the convolutional neural network is used to extract high level features from images. The convolutional network classification is taken into account, the final pooling layer result is extracted and the final prediction is made.

Dr. Sachin. S. Gurav, V.V. Khandare et al. [2] focuses on the performance evaluation of suspicious activity detection of video data is shown. The proposed method of combination of GLCM, harries corner detection, speeded up robust features, shows average 96% percent accuracy of suspicious activity detection on self-designed dataset

Aqil Shamnath, Meena Belwal et al. [3] have implemented the problem with ensemble learning techniques which will detect suspicious activities. An automated alert system is also set up to detect, record and report suspicious activities to the concerned authorities. Therefore, the anomalous activity detection system will provide a basic surveillance system with an alarm which will help for safety of the public along with lesser costs and more security.

Sivasakthi. T, Dr. Brindha. S, Hariharasudhan. S. M, Vishal.V. S, Priyadharsan. M et al. [4], proposed a new method to improve the surveillance system. It can be used in several public places like banks, railway stations etc. It is done with the ML models which can be created with the help of Teachable Machine.

Nizar Masmoudi, Wael Jaafar et al. [5] proposes a complete UAV framework for intelligent monitoring of post COVID-19 outdoor activities. Specifically, the author proposes a three-step approach. In the first, captured images are analyzed using machine learning to detect and locate individuals.

5. CROED MONITORING SYSTEM

A crowd monitoring system can be realized as a combination of image/signal data, storage database, learning and decision support, modeling and analysis. A generalized representational model of a crowd monitoring system for the purpose of explanation. Initially, the crowd data is directly/ indirectly acquired using devices such as camera, smartphones, sensors, GPS etc. The crowd data can be an image, sequence of images, or signals. Data pertaining to crowd is usually stored using several identification factors (location, device number, time-stamp, etc.), so that it can be easily retrieved.

5.1 Crowd Recognition

This section elaborates on the techniques used to recognize individuals in crowd or the crowd as a single entity. For example, recognizing an individual through body features. Some use cases for crowd recognition may include crowd counting, preparing crowd time series, forecasting crowd count/ density, checking abnormal densities, evacuation, crowd control, crowd modeling, identifying crowd attributes, and image labelling.

5.2 Crowd Tracking

Crowd tracking may be comprehended as recognition of an individual through consecutive image frames or a continuous localization in time and space. Some possible use cases for crowd tracking could be individual tracking, surveillance, security, parameter breach detection, crowd learning pedestrian flows, and estimation of crowd velocity.

6. SUSPICIOUS ACTIVITY DETECTION

Camera surveillance system is used to capture image from camera. After detection of image the image is preprocessed. Then pre-processed image is compressed in order to reduce its size and improve performance. Then compressed image set is used to train a machine learning model so that image classification could be made. In proposed research the objective is to detect the suspicious activity such as suspicious human being, activity or object.

7. PROBLEM STATEMENT

To ensuring the safety and security of public spaces, crowded events, and high-traffic areas is a paramount concern. Traditional surveillance methods often fall short in effectively monitoring large crowds and identifying suspicious activities in real-time. The lack of a comprehensive and intelligent system results in delayed response times, inefficient use of resources, and increased vulnerability to various security threats.

8. ARCHITECTURE

Convolutional Neural Networks (CNNs) are employed in crowd monitoring by analyzing video frames. CNNs automatically learn hierarchical features, capturing spatial patterns in crowded scenes. The algorithm processes input frames through convolutional layers, extracting features like crowd density and movement dynamics. These learned features enable accurate detection of crowd anomalies, such as sudden density changes or unusual behavior. CNNs excel at recognizing complex patterns, enhancing the efficiency of crowd monitoring systems by providing real-time insights, ensuring public safety, and enabling swift responses to potential threats in crowded environments.

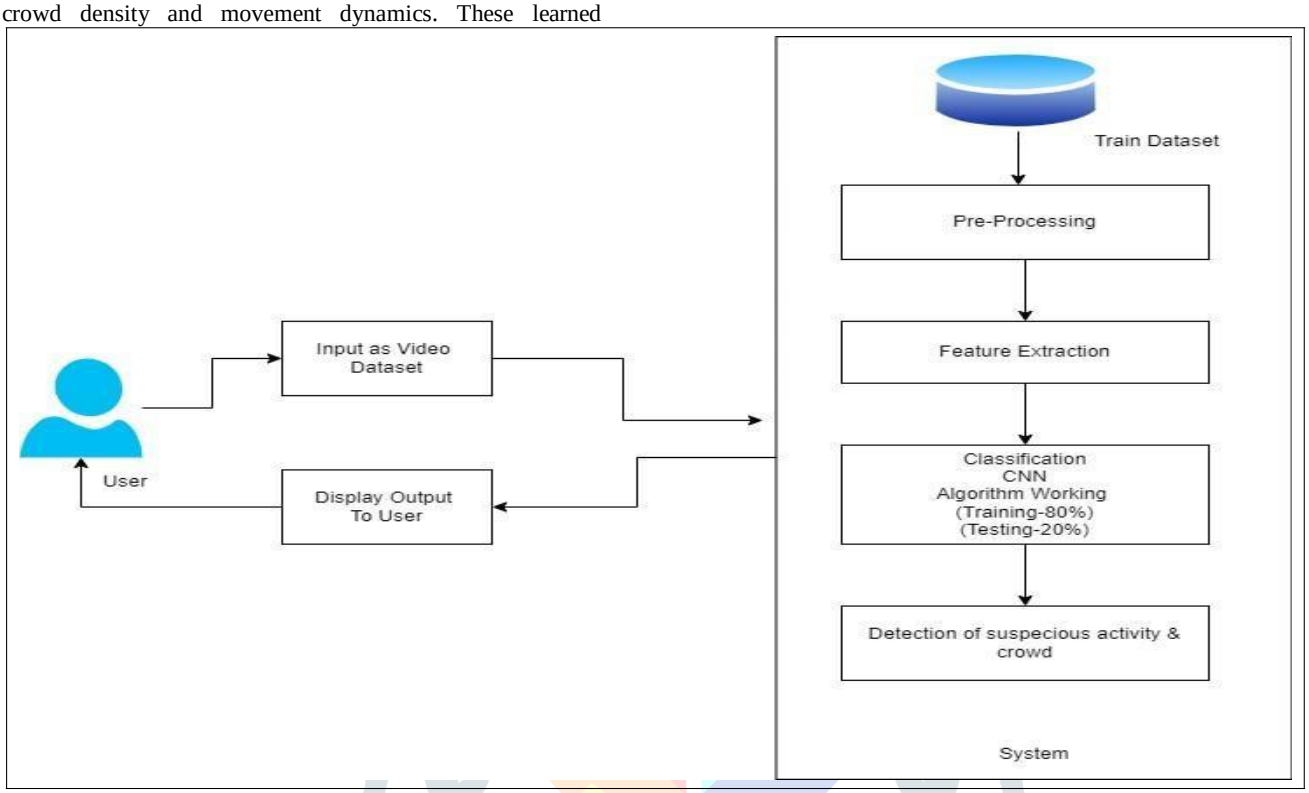

Fig 1: System Architecture Diagram

9. RESULT

The study introduces an advanced Suspicious Activity and Crowd Monitoring Alert System in machine learning. It enhances public safety by swiftly detecting and responding to potential threats in crowded spaces, ensuring compliance with data privacy regulations.

9.1 Main Page

The main page of the system features essential functionalities, including login, registration, and an exit button. Users can securely access the platform through login credentials or register for a new account. The exit button ensures a convenient and user-friendly exit from the system, enhancing overall user experience and system accessibility.

Fig 2: Main Pain

9.2 Crowd Page

The crowd monitoring page in the system serves as a central hub for real-time monitoring of crowded spaces. It displays comprehensive data on crowd density, movement dynamics, and identifies anomalies through sophisticated algorithms. Users can efficiently manage and analyze crowd behavior, ensuring public safety. Advanced features include threat detection, instant alerting, and seamless integration with surveillance technologies, offering a user-friendly interface for monitoring and responding to potential security concerns in high-traffic locations. The crowd page enhances situational awareness, facilitating swift actions by security personnel and law enforcement agencies in crowded environments.

Fig 3: Crowd Detection Page

9.3 Suspicious Activity Page

The Suspicious Activity Detection page incorporates two key functionalities: the "Suspicious Activity Detection" button and the "Exit" button. Users can initiate suspicious activity monitoring by selecting the "Suspicious Activity Detection" button, which accepts video input. The system employs advanced algorithms to analyze the video for potential threats like fighting, murder, robbery, and suspicious objects such as bombs. The system enhances public safety by promptly identifying and alerting authorities to potential security risks. The "Exit" button ensures a seamless exit from the suspicious activity detection feature, providing a user-friendly interface for efficient system navigation.

Fig 3: Suspicious Activity Detection Page

10. ACKNOWLEDGMENTS

We express This gratitude to my guide Prof. B. B. Waghmode for her competent guidance and timely inspiration. It is This good fortune to complete This Project under her able competent guidance. This valuable guidance, suggestions, helpful constructive criticism, keeps interest in the problem during the course of presenting this Crowd Monitoring and Alert System project successfully.

11. CONCLUSION

The Suspicious Activity and Crowd Monitoring Alert System presents a groundbreaking solution to the evolving challenges of public safety. By integrating cutting-edge technologies, including artificial intelligence and machine learning, the system offers real-time surveillance and intelligent analysis capabilities. Its ability to distinguish normal crowd behavior from suspicious activities, coupled with instant alert generation, ensures swift responses by security personnel. The study emphasizes ethical considerations and compliance with data privacy regulations, contributing to the ongoing efforts to create safer public spaces. Ultimately, this innovative system marks a crucial step forward in enhancing overall public safety and security in the face of modern security challenges.

12. FUTURE SCOPE

The scope of the Crowd Monitoring and Alert System project is Develop a comprehensive system architecture for suspicious and crowd monitoring, including hardware components, software interfaces, and data storage solutions. Deploy high-quality surveillance cameras and sensors in strategic locations to ensure comprehensive coverage of crowded areas. Implement machine learning algorithms to analyze crowd behavior and differentiate between normal activities and suspicious actions.

13. REFERENCES

[1] Kshitij Barsagade, Sumeet Tabhane, Vishal Satpute Vipin Kamble: Suspicious Activity Detection Using Deep Learning Approach, 2023.

[2] Dr.Sachin.S. Gurav, V.V. Khandare Kariyawasam: Performance Evaluation of Automatic Suspicious Activity Detection Method, 2023

[3] Aqil Shamnath, Meena Belwal: Human Suspicious Activity Detection Using Ensemble Machine Learning Techniques, 2022

[4] Sivasakthi. T, Dr. Brindha. S: Suspicious Activity Detecting Camera, 2022.

[5] Nizar Mas-moudi, Wael Jaafar: UAV-Based UAV Based Crowd Surveillance in Post COVID-19 Era, 2021

[6] Nipunjita Bordoloi, Anjan Kumar Talukdar, Kandarpa Kumar Sarma: UAV Based Suspicious Activity Detection from Videos using YOLOv3, 2020