INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

Weapon Detection and Alert System

Nagaraj G B, Ms. Sandya N

Student, Department of MCA, Vishveshwara Technical University, The National Institute of Engineering, Mysuru, India

Assistant Professor, Department of MCA, Vishveshwara Technical University, The National Institute of Engineering,

Mysuru, India

ABSTRACT: Video surveillance is being used for surveillance and to monitor activities i.e. robberies but these cameras still require human supervision and intervention. We need a system that can automatically detect these illegal activities. Despite state-of-the-art deep learning algorithms, fast processing hardware, and advanced surveillance cameras, weapon detection in real-time is still a serious challenge. Observing angle differences, occlusions by the carrier of the firearm and persons around it further enhances the difficulty of the challenge. This work focuses on providing a secure place using surveillance footage as a source to detect harmful weapons by applying the state of the art open-source deep learning algorithms. We have implemented a classification model with different classes of weapons and relevant confusion objects inclusion concept is introduced to reduce false positives and false negatives.

I.INTRODUCTION

Weapon detection and alert systems are an important way to detect the presence of weapons in various contexts. Reception uses advanced sensors, artificial intelligence, and machine learning to improve public safety by quickly identifying potential threats and warning security personnel. Security and safety is an issue that tops the list in today's contemporary world. Any country has to create the base for economic strength by building a safe and secure environment for investors, tourists. Hence, closed-circuit television Mob is installed almost everywhere to keep a watch on the robberies-related activities. They are significant tools of evidence for the police and the courts. Thus, installations of surveillance cameras have increased multi-fold globally. The main objective of automated surveillance is to raise an alarm for the surveillance operators in any dangerous situation. Dangerous condition means People or a group of people attack, spread fear or disrupt with knives or guns. Automated systems will be able to track such situations using object detection algorithms that identify objects in video streams. Our system is envisioned to classify and recognize all arms that would aye in surveillance videos, not excluding knives and different types of guns. If a weapon is detected, it will send an alert to the controller user. Users can also modify the rules by adding as many rules as they like. The project leverages the power of Yolov8, a state-of-the-art deep learning platform known for its exceptional performance in the object recognition industry By training the model on datasets from RoboFlow, the system is able to accurately identify weapons including sticks, grenades, guns, knives and pistols Google Collab integrated for model training and Flask to be used on grid ensures that the system is powerful and simple. These documents will examine various aspects of the project, describing its objectives, problems it solves, existing solutions, proposed policies and the motivations for its development.

II. OBJECTIVES

- Using the advanced capabilities of the YOLOv8 (You Only Look Once version 8) model to achieve high accuracy I real-time weapon recognition from video streams and images.
- Developing robust data preprocessing methods to reduce, optimize and balance data sets, ensure that the model is trained on the best types of data to improve detection performance.
- YOLOv8 model parameters and architecture can be fine-tuned to maximize detection accuracy and reduce false positives and negatives.
- Ensure that the system processes input data in real-time, providing immediate alerts and reducing response time to potential threats.
- Create systems with existing security systems such as surveillance cameras and simple alarm systems to provide a complete security solution.
- Use an automatic alert system that immediately notifies security personnel when a weapon is detected, facilitating quick and effective response.
- Include mechanisms for non-stop studying and development, permitting the version to replace and adapt to new styles of guns and changing danger scenarios through the years.
- Ensure that the system complies with prison and regulatory standards concerning safety and privateness, protects person rights, and keeps powerful surveillance.

III. LITERATURE SURVEY

1. Automated Weapon Detection System in CCTV's Through Image processing
2. Weapon Detection in Surveillance System
3. Real Time Weapon Detection and Notification Using Deep Learning for Security Application
4. R-CNN and YOLOV4 based Deep Learning Model for intelligent detection of weaponries in real time video
5. Weapon Detection Using YOLO V3 for Smart Surveillance System
6. Automatic Weapon Detection for surveillance applications
7. Spontaneous Detection of Weapons in ATM Banks
8. Weapon detection system for surveillance and security
9. Improving video surveillance systems in banks using deep learning techniques

IV. METHODOLOGY

The Weapon Detection and Alert System follows a structural approach whereby it develops accurate models for the detection of weapons in real-time with alert-raising. Data collection forms the first step, whereby a diversified dataset of weapon images is sourced from places such as Roboflow, public databases, and security footage to have all weapon types and environments represented. Preprocessing steps involve normalizing pixel values, standardizing image size, and augmenting the dataset by different techniques such as rotation and flipping, hence making the model more robust against these transformations. While extracting features, convolutional layers of YOLOv8 capture edge and pattern features relevant to detection. State YOLOv8 is applied since it supports sophisticated interactions in visual data and works efficiently enough in real-time applications.

V. TOOLS AND TECHNOLOGIES REQUIRED

The report covers hardware and software requirements for the development of Weapon Detection:
1. The programming language python
2.Libraries
- Sk-learn
- Numpy
- TensorFlow
- Pandas
- Keras
3.Additional libraries based on the selected ML algorithms

HARDWARE
1. processor(up to 2.5 GHz)
2. Graphics card (4GB + recommended)
3. Memory (8GB+)

VI. CONCLUSION

The 'Weapon Detection using Yolov8' project was done to avail a resilient and advanced system able to detect some categories of weapons by advanced techniques of deep learning in real-time. It was meant to realize the potentials of the advanced algorithm in Yolov8, further assured to assure high accuracy and reliability in weapon detection, including batons, grenades, guns, knives, and pistols, among others. Set up the latest development environment; training of the model on Google Colab was done. Further, integration had been handled by Flask. The application was live on a server locally. The system was tested in detail for several factors such as functionality, performance, and reliability, amongst many others, through manual testing and functional, non-functional, and user acceptance testing.The web-based interface will allow easy image uploading or video streaming in the frontend, and then at the back end, it will pass through weapon detection to produce results in real-time. Another integration that must be done is with a database, which efficiently store and manage the data of weapons detected for further analysis and reporting.This shows that deep learning and computer vision have potentials for bettering security measures. With the potential to be fully automated in weapon detection, this system is a much more scalable and reliable tool in reinforcing security surveillance and law enforcement agencies toward ensuring citizens' safety.

REFERENCES

1. "Automated Weapon Detection System in CCTV's Through Image Processing" by Dharmapuri Siri, Palle Bhanu Prasad Reddy, S Ritwika, Shivani Sisodia
2. "Weapon Detection in Surveillance System" by Dr N Geetha, Akash Kumar, Akshita B P,Arjun M
3. "Real Time Weapon Detection and Notification Using Deep Learning for Security Application" by S Barath, SKanagathara K P Vijayakumar, K Pradeep, A Balsundaram, A Dhande4.
4. "R-CNN and YOLOV4 based Deep Learning Model for intelligent detection of weaponries in real time video" by KP Vijayakumar, K Pradeep, A Balsundaram, A Dhande
5. "Weapon Detection Using YOLO V3 for Smart Surveillance System" by Sanam Narejo, Bishwajeet Pandey, DorisEsenarro vargas, Ciro Rodriguez
6. Kumar, A., Reddy, V., Patel, P. and Gupta, S., 2020. Real-Time Weapon Detection Using YOLOv3. InternationalJournal of Advanced Computer Science and Applications, 11(8), pp.456-463.
7. "Spontaneous Detection of Weapons in ATM Banks" by N Nandhini, M. Sri Sowmya, P Malarvizhi
8. "Weapon detection system for surveillance and security" by Shehzad Khalid, Abdullah Waqar, Hoor Ul Ain Tahir,Onome Christopher Edo

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

INNO SPACE
SJIF Scientific Journal Impact Factor

doi
cross ref

निस्केयर
NISCAIR

INTERNATIONAL JOURNAL
OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Scan to save the contact details