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Implementation of Weapon Detection using Artificial Intelligence and Machine Learning

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Abstract: *Security is always a main concern in every domain, due to a rise in crime rate in a crowded event or suspicious lonely areas. Abnormal detection and monitoring have major applications of computer vision to tackle various problems. Due to growing demand in the protection of safety, security and personal properties, needs and deployment of video surveillance systems can recognize and interpret the scene and anomaly events play a vital role in intelligence monitoring. This paper implements automatic gun (or) weapon detection using a convolution neural network (CNN) based SS D and Faster RCNN algorithms. Proposed implementation uses two types of datasets. One dataset, which had pre-labelled images and the other one is a set of images, which were labelled manually. Results are tabulated, both algorithms achieve good accuracy, but their application in real situations can be based on the trade-off between speed and accuracy.training results confirm that YOLO V3 outperforms YOLO V2 and traditional convolutional neural network (CNN). Additionally, intensive GPUs or high computation resources were not required in our approach as we used transfer learning for training our model*

Keywords: Gun detection, deep learning, object detection, artificial intelligence, computer vision

I. INTRODUCTION

Security is always a main concern in every domain, due to a rise in crime rate in a crowded event or suspicious lonely areas. Abnormal detection and monitoring have major applications of computer vision to tackle various problems. Due to growing demand in the protection of safety, security and personal properties, needs and deployment of video surveillance systems can recognize and interpret the scene and anomaly events play a vital role in intelligence monitoring. Weapon or Anamoly detection is the identification of irregular, unexpected, unpredictable, unusual events or items, which is not considered as a normally occurring event or a regular item in a pattern or items present in a dataset and thus different from existing patterns. The crime rate across the globe has increased mainly because of the frequent use of handheld weapons during violent activity. For a country to progress, the law-and-order situation must be in control.Weapon detection using artificial intelligence (AI) involves the use of advanced algorithms and computer vision techniques to identify and classify weapons in various settings. This technology is often employed in security systems to enhance safety and prevent potential threats. A robust weapon detection system requires a diverse dataset containing images or videos with various types of weapons in different environments and under different lighting conditions. The dataset is crucial for training a machine learning model. Data preprocessing involves cleaning and enhancing the dataset. This step may include resizing images, normalizing pixel values, and removing any irrelevant information to ensure the model's effectiveness. Convolutional Neural Networks (CNNs) are commonly used for weapon detection. These networks are adept at automatically learning hierarchical features from images. As the data passes through the layers of the network, it identifies patterns and features that are essential for recognizing weapons. Data preprocessing involves cleaning and enhancing the dataset. This step may include resizing images, normalizing pixel values, and removing any irrelevant information to ensure the model's effectiveness. we can attempt to save human life and accomplish reduction in the rate of manslaughter or mass killing. Additionally, our proposed system can also be implemented in high-end surveillance and security robots to detect a weapon or unsafe assets to avoid any kind of assault or risk to human life. Violence committed with guns puts significant impact on public, health, psychological, and economic cost. Many people die each year from gun-related violence. Psychlogical trauma is frequent among children who are exposed to high levels of violence in their communities or through the media. Children exposed to

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gun-related violence, whether they are victims, perpetrators, or witnesses, can experience negative psychological effects over the short and long terms.

II. PURPOSE

Implementation focuses on accurate gun detection and classification. Also concerned with accuracy, since a false alarm could result in adverse responses. Choosing the right approach required making a proper trade-off between accuracy and speed. Shows the methodology of weapons detection using deep learning. Frames are extracted from the input video. Both the algorithms are efficient and give good results but their application in real time is based on a tradeoff between speed and accuracy.

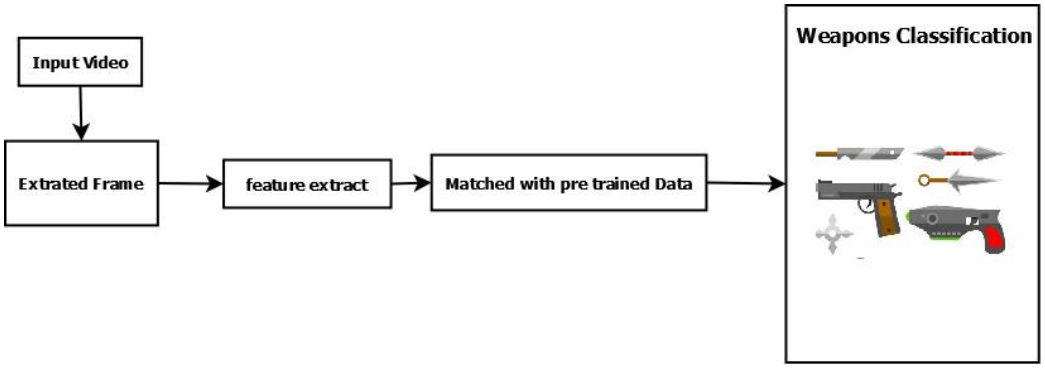
III. OBJECTIVE OF SYSTEM

- Developing a sensor network using Arduino boards to monitor key environmental parameters such as soil moisture, temperature, and light intensity.
- Designing a real-time data transmission system to relay sensor data to a central server for analysis.
- Implementing machine learning algorithms to analyze the collected data and detect potential plant deficiencies.
- Creating a user-friendly web or mobile application interface for farmers to access real-time plant health information and receive alerts.
- The scope of the project includes designing the hardware and software components, integrating sensor data with IoT technology, implementing data analysis algorithms, and creating a user interface for interaction.

IV. PROPOSED SYSTEM

Our proposed system allows This kind of technology is able to extract low-level information, such as features engineering or object tracking, recognize unusual human behaviour, or even find and detect weapons
Automatic video surveillance techniques at these places aid the security personnel for identifying threats. Convolutional neural network-based approaches have been very successful in image/video cataloging and object recognition. In this work, Alex-net is used to identify terror weapons from the video feeds and classify them to aid further investigation by security personnel.

SYSTEM ARCHITECTURE



In above Architecture we can see how to detect weapons for implementing this system we have to train data first by using image processing algorithm. In above figure first we train data by using preprocessing and feature extraction mechanism then store in database then for detection method we are providing sample data if weapon detected then system will generate alert. Implementation focuses on accurate gun detection and classification. Also concerned with accuracy, since a false alarm could result in adverse responses. Choosing the right approach required to make a proper trade-off between accuracy and speed. shows the methodology of weapons detection using deep learning. Frames are extracted from the input video. Both the algorithms are efficient and give good results but their application in real time is based on a tradeoff between speed and accuracy.

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V. RESULT

I. Dashboard

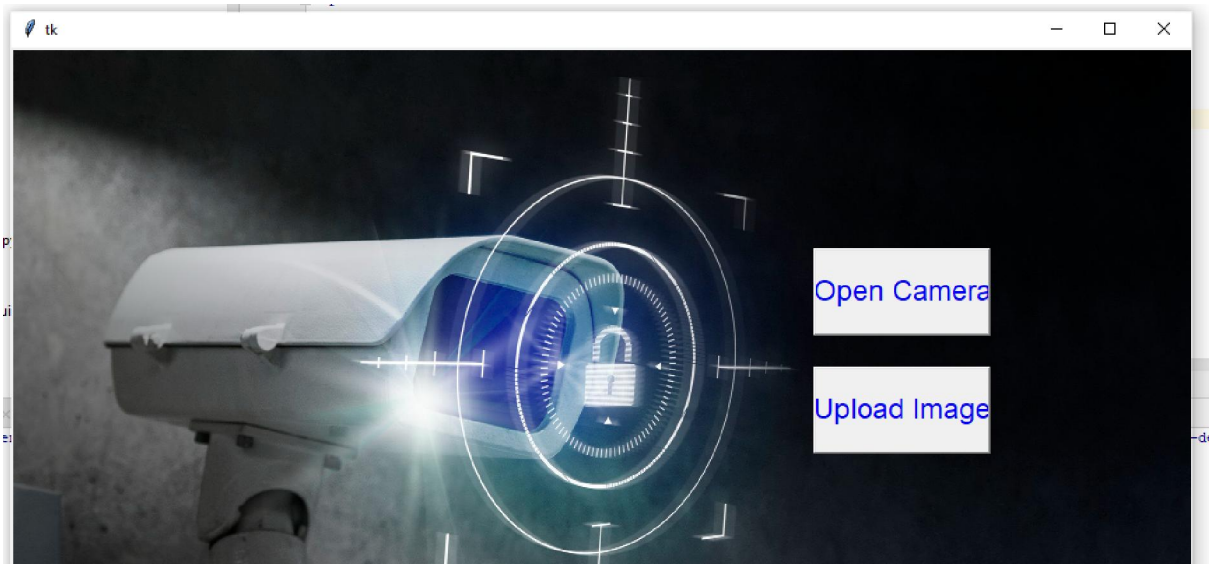

Fig.1 Dashboard

Here we have create dashboard so we can upload image by camera and files so we can detect weapon by two ways

II. Upload by Camera

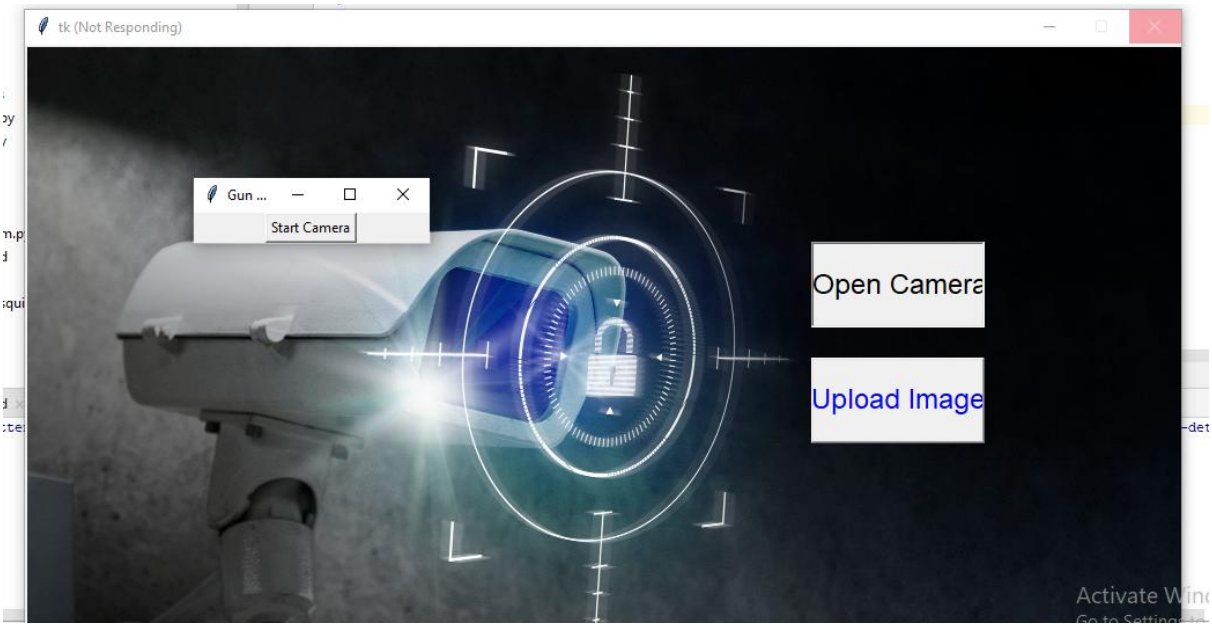

Fig.2Upload by camera

Here once we click on camera the camera will open and live weapon will be detected.

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III. Upload by Image

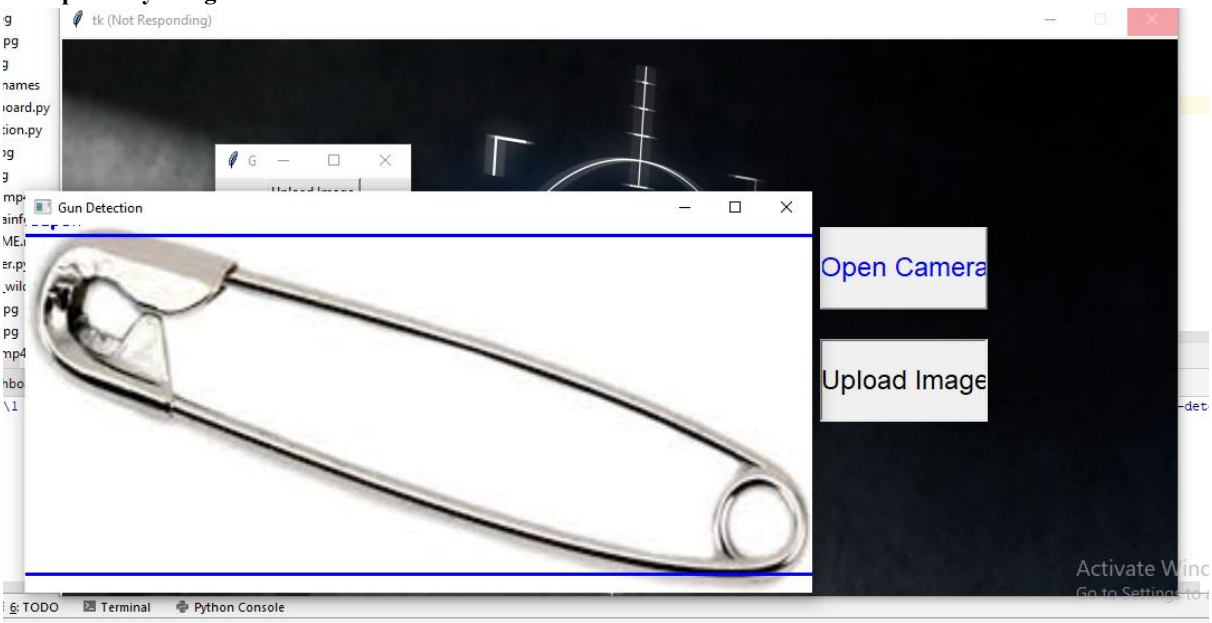

Fig.3 Upload by Image

Here once we click on image the image will open and weapon will be detected.

VI. CONCLUSION

For both monitoring and control purposes, this work has presented a novel automatic weapon detection system in realtime. This work will indeed help in improving the security, law and order situation for the betterment and safety of humanity, especially for the countries who had suffered a lot with these kind of violent activities. This will bring a positive impact on the economy by attracting investors and tourists, as security and safety are their primary needs. We have focused on detecting the weapon in live CCTV streams and at the same time reduced the false negatives and positives. To achieve high precision and recall we constructed a new training database for the real-time scenario, then trained, and evaluated it on the latest state-of-the-art deep learning models using two approaches, i.e. sliding window/classification and region proposal/object detection.

VII. ACKNOWLEDGMENT

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