# Intelligent Weapon Detection System for Real Time Surveillance using Deep Learning with YOLOv8

## IEEE BASE PAPER TITLE:

## An Enhanced Weapon Detection System using Deep Learning

## IEEE BASE PAPER ABSTRACT:

Considering a growing number of criminal acts, there is an urgent need to introduce computerized command systems in security forces. This study presents a novel deep learning model specifically developed for identifying seven different categories of weapons. The suggested model utilizes the VGGNet architecture and is implemented utilizing the Keras architecture, which is built on top of the TensorFlow framework. The model is trained to recognize several types of weapons, including assault rifles, bazookas, grenades, hunting rifles, knives, handguns, and revolvers. The training procedure involves creating layers, executing processes, saving training data, determining success rates, and testing the model. A customized dataset, consisting of seven different weapon categories, has been meticulously chosen and organized to support the training of the proposed model network. We do a comparative study using the newly created dataset, specifically comparing it with established models such as VGG-16, ResNet-50, and ResNet-101. The suggested model exhibits exceptional classification accuracy, obtaining a remarkable 98.40%, outperforming the VGG-16 model (89.75% accuracy), ResNet-50 model (93.70% accuracy), and ResNet-101 model (83.33% accuracy). This research provides a vital viewpoint on the effectiveness of the suggested deep learning model in dealing with the complex problem of weapon

classification, presenting encouraging outcomes that could greatly improve the capabilities of security forces in countering criminal activities.

## OUR PROPOSED PROJECT ABSTRACT:

The project "Weapon Detection using Deep Learning" aims to develop a robust and efficient system for identifying weapons, specifically handguns and knives, through the application of advanced deep learning techniques. Implemented using Python as the primary coding language, the project leverages the Flask web framework to deliver an interactive and user-friendly interface, complemented by HTML, CSS, and JavaScript for front-end development.

The core of the detection mechanism is built upon the YOLOv8 (You Only Look Once version 8) architecture, a state-of-the-art object detection model known for its high speed and accuracy. Despite the complexity of the task, the model achieves an overall accuracy of 64%, a notable performance given the challenging nature of weapon detection in varied environments.

The training dataset comprises approximately 4000 images, focusing exclusively on handguns and knives, ensuring that the model is well-calibrated to recognize these specific threats. This dataset is meticulously curated to include a diverse array of scenarios and perspectives, enhancing the model's ability to generalize across different contexts.

The system supports three distinct detection modes: static image detection, video stream analysis, and real-time detection via webcam. This multi-faceted approach ensures flexibility and applicability in various use cases, from security screening and surveillance to automated threat detection systems.

Overall, this project represents a significant step forward in the application of deep learning for public safety and security, providing a scalable and efficient solution for weapon detection across multiple platforms and scenarios.

## SYSTEM REQUIREMENTS:

## HARDWARE REQUIREMENTS:

- System : Pentium i3 Processor.
- Hard Disk : 500 GB.
- Monitor : 15'' LED.
- Input Devices : Keyboard, Mouse.
- Ram : 8 GB.

## SOFTWARE REQUIREMENTS:

- Operating System : Windows 10 / 11.
- Coding Language : Python 3.10.9.
- Web Framework : Flask.
- Frontend : HTML, CSS, JavaScript.

## REFERENCE:

M. Sivakumar, Marla Sai Ruthwik, GattaVenkata Amruth, Kiranmai Bellam, "An Enhanced Weapon Detection System using Deep Learning", 2024 2nd International Conference on Networking and Communications (ICNWC), IEEE Conference, 2024.