## **Project Title: “Weapon Detection in Surveillance Cameras”**

### **Abstract:**

### **Project Objectives:**

This project develops a **weapon detection system** to identify dangerous objects like guns and knives from pre-segmented images and frames. Using deep learning and computer vision, it analyses data from the **"Weapons in Images Segmented Videos"** dataset on Kaggle. While this version processes pre-recorded frames, future improvements may include real-time surveillance through live camera integration. The system focuses on achieving high detection accuracy with minimal false positives for security applications.**Methodology:**

**Dataset Acquisition and Pre-processing:**

* Dataset contains segmented video frames with labeled weapons.
* Images are resized to 416×416 and augmented using rotation, flipping and contrast.

#### **Model Selection and Training:**

* **YOLOv5s is** selected for speed and accuracy.
* Transfer learning is applied using COCO pre-trained weights.
* Model is trained on Google Colab with GPU acceleration.

#### **Testing and Evaluation:**

* Model us evaluated using mAP, precision and recall.
* It is Optimized to minimize false positives for reliability.

### **Key Findings:**

The system processes pre-segmented frames effectively. Future enhancements can enable real-time surveillance by integrating live camera feeds and generating real-time alerts.

### **Step-wise Solution Approach:**

**Step 1:** Dataset Collection and Pre-processing

* Dataset is sourced from **Kaggle**.
* Images are resized and augmented for model improvement.

**Step 2:** Model Selection and Training

* YOLOv5s is fine-tuned with COCO pre-trained weights.
* Training is conducted on Google Colab with GPU.

**Step 3:** Real-Time Inference and Deployment

* OpenCV processes video frames.
* Future versions may integrate Flask or FastAPI for alerts.

### **Reference:**

### [1] Jain, H., Vikram, A., Kashyap, A., & Jain, A. (2020). Weapon detection using AI and deep learning for security. In 2020 ICESC, IEEE.

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