**A Deep Learning Based Efficient Firearms Monitoring Technique for Building Secure Smart Cities**

**Alternative Title:**

"YOLO v8 Enhanced Firearm and Weapon Detection for Secure Smart Cities: A Deep Learning Approach"

**Aim:**

The aim of this study is to detect weapon by employing YOLO v8, focusing on better accuracy.

**Abstract:**

This research introduces an advanced approach utilizing YOLO v8 for more accurate and efficient firearm and weapon detection in the context of developing secure smart cities. While the existing method, Faster RCNN, effectively detected human faces and guns, this study proposes an upgrade to YOLO v8 for detecting both knives and guns with higher accuracy scores. The proposed method aims to address the limitations of the current techniques to bolster security measures in urban areas.

**Existing Method:**

The existing method in the field of firearm detection relied on the Faster RCNN model, which was proficient in identifying human faces and guns. However, its limitations included lower accuracy in detecting knives and slower processing speeds.

**Problem Definition:**

The existing method using Faster RCNN lacked efficiency in detecting knives and exhibited slower performance in comparison to the required standards for smart city security. This method also faced challenges in accurately identifying weapons beyond firearms.

**Proposed Method:**

The proposed approach utilizes YOLO v8, a state-of-the-art object detection system known for its accuracy and speed. YOLO v8 is implemented to identify both knives and guns with higher precision than the existing Faster RCNN model.

**Advantages:**

* Enhanced Accuracy: YOLO v8 demonstrates improved accuracy in detecting both guns and knives.
* Increased Speed: YOLO v8 is known for its faster processing, enabling real-time detection in smart city environments.
* Expanded Weapon Detection: Unlike the previous model, YOLO v8 has the capability to detect multiple types of weapons, not just firearms.
* Potential for Real-Time Security Response: The quicker and more accurate identification of weapons can aid law enforcement and security measures promptly.

**Disadvantages:**

* Resource Intensive Training: YOLO v8 might demand more computational resources for training compared to some other models.
* Potential False Positives/Negatives: Any detection model may still have limitations in distinguishing weapons in complex scenarios or under certain conditions.

**Module Description**

* Data Collection
* Label Extraction
* Detection

**Data Collection**

 The dataset is collected from kaggle, which is a popular website.

**Label Extraction:**

 In this module, we will be extracting the labels and annotations from xml file to train the yolo v8

**Detection:**

 In this final module, we will be detecting the knife and gun using the trained Yolo v8 model.

**Hardware Requirements:**

* Hard Disk:500GB and Above
* RAM: 4GB and Above
* Processor:I3 and Above

**Software Requirements:**

* Operating System : Windows 10 (64 bit)
* Software:Python-3.6.3
* Tools : Anaconda

**Conclusion:**

The shift from Faster RCNN to YOLO v8 for firearm and weapon detection showcases a significant improvement in accuracy and speed. The upgrade offers a more robust solution for enhancing security measures in urban areas.

**Future Scope:**

* Fine-tuning and Optimization: Further refinement and fine-tuning of the YOLO v8 model to improve accuracy and reduce false positives.
* Integration with Surveillance Systems: Explore integration possibilities with existing surveillance systems and frameworks in smart cities for real-world deployment.
* Expanding Detection Capabilities: Extend the detection capabilities to identify and differentiate between various types of weapons for comprehensive security measures in urban settings.

**Diagram:**

 **Dataset**

**Label Extraction**

**Detection**