PREDICTION AND IDENTIFICATION OF UNUSUAL WEAPONS OR ITEMS BY USING YOLO ALGORITHM

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ABSTRACT
Due to an increase in crime at packed events and unsettling lonely regions, security is always a top issue in all fields. Computer vision is widely used in abnormal detection and monitoring to solve various issues. Due to the increasing need to defend human safety, security, and property, video surveillance systems that can identify and decipher scene and anomaly occurrences are essential for intelligence monitoring. Using a yolo method, this project implements automated gun (or) weapon detection. The suggested implementation employs two different datasets. One dataset had photographs that were already labeled, whereas the other contained images that needed to be manually labeled. The results are accurately tabulated; however their use in practical circumstances can be based on the trade -off between speed and accuracy.
Keywords: YOLO algorithm, Armament detection, region convolution neural networks, single shot detection

INTRODUCTION

The discovery of irregular, unexpected, unforeseen, uncommon occurrences or things—which are not thought of as regularly occurring events or regular items in a pattern or items included in a dataset and are thus distinct from current patterns—is known as purpose weapon or anomaly detection. A pattern that deviates from a set of expected patterns is called an anomaly. Anomalies therefore rely on the phenomena under study. In order to identify occurrences of different categories of items, object detection employs feature extraction and learning techniques or models. Implementation ideas emphasize precise gun detection and categorization. Accuracy is also a worry since a false warning might trigger unfavorable reactions. Making the optimal trade-off between accuracy and speed required selecting the appropriate strategy. Frames are extracted from the input video. Frame differencing algorithm is applied andbounding box created before the detection of object. Dataset is created, trained and fed to objectdetection algorithm. Based on application suitable detection algorithm (SSD or fast RCNN) chosen for gun detection. The approach addresses a problem of detection using various machine learning models like region Convolution Neural Network (RCNN), Single Shot Detection. 1.2 Scope In this project, we have created models based on Artificial Intelligence. Later on, it can be implemented for larger Datasets by training using GPUs and high-end DSP, FPGA kits. GPU: Whendoing image processing, we need fast access to pixel values. GPUs are designed for graphical purposes, and one of them is texturing, therefore the hardware for accessing and manipulating pixels is well optimized. DSP and FPGA: DSP functions are commonly implemented on two types of programmable platforms: Digital Signal Processors and Field Programmable Gate Arrays (FPGAs).DSPs are a specialized form of microprocessor, FPGAs are form of highly configurable hardware.

SYSTEM DESIGN

Frame Extraction

Frame extraction is a powerful tool that implements video content by selecting aset of summary key frames to represent video sequences. Most of the existing key frames extraction methods are not suitable for video copyright protection, as they do not meet specific requirements**.**

Boundary Tracking:

Boundary tracing, also known as contour tracing, of a binary digital region can be thought of as a segmentation technique that identifies the boundary pixels of the digital region. Boundary tracing is an important first step in the analysis of that region. In comparison to an image edge, which is typically defined

as an abrupt variation in low- level image characteristics such as brightness in color, the boundary of an image isa contour? The latter signifies a change in the pixel ownership from the surface of one object to another.

Frame Differencing

Frame differencing is a technique where the computer checks the difference between two video frames. If the pixels have changed there apparently was something changing in the image (moving for example). Most techniques work with some blur andthreshold, to distinct real movement from noise.

Detection of Objects

Object detection is branch of computer vision, in which visually observable objects that are in images of videos can be detected, localized, and recognizedby computers. An image is a single frame that captures a single-static instance of a naturally occurring event. Specialized algorithms have been developed that can detect, locate and recognize objects in images and videos, some of which includeRCNNs, SSD, Retina Net, YOLO, and others.

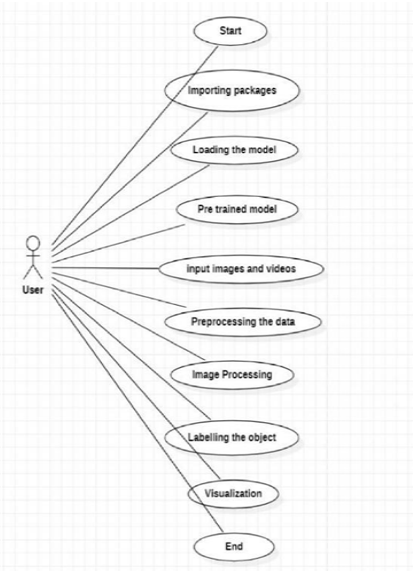
Draw bounding box around object

In object detection, we usually use a bounding box todescribe the spatial location of an object. The bounding box is rectangular, which is determined bythe xx and yy coordinates of the upper-left corner ofthe rectangle and such coordinates of the lower-rightcorner. Another commonly used bounding box representation is the (x , y) (x , y)- axis coordinates of the bounding box center, and the width and heightof the box. A bounding box is an imaginary rectanglethat serves as a point of reference for object detectionand creates a collision box for that object. Data annotators draw these rectangles over images, outlining the object of interest within each image bydefining its X and Y.

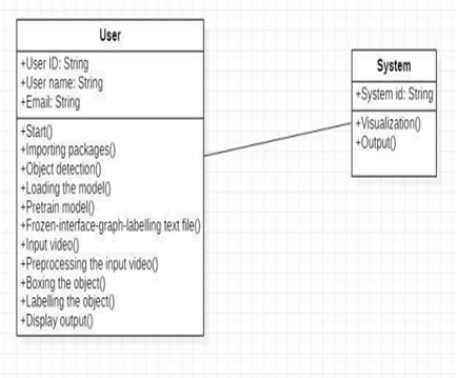
Object Classification

Object-based or object-oriented classification uses both spectral and spatial information for classification. Object- based classification is a two-step process, first the image is segmented or broken into discrete objects or features with and then each object is classified.

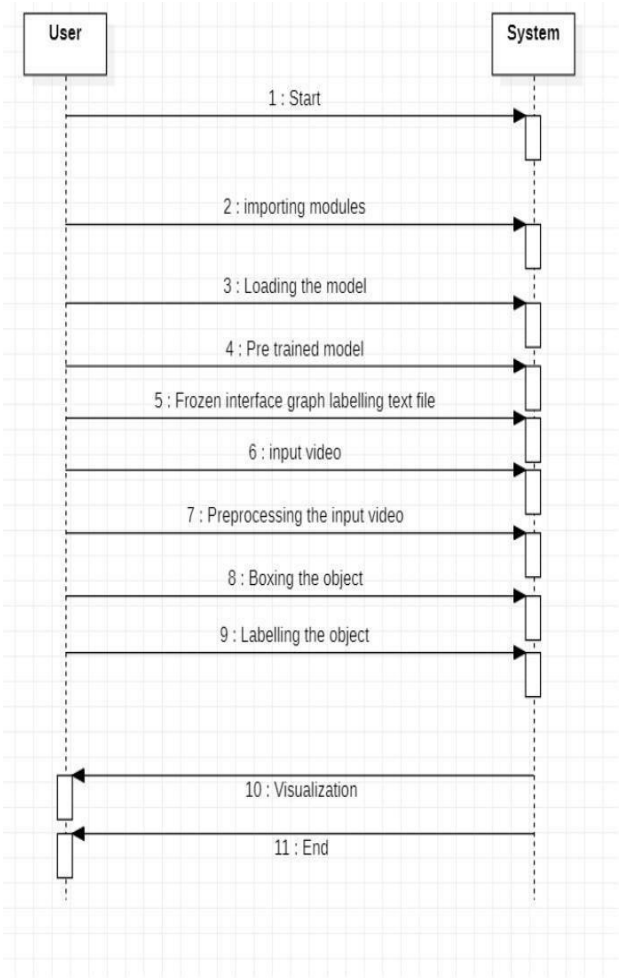
USE CASE DIAGRAM

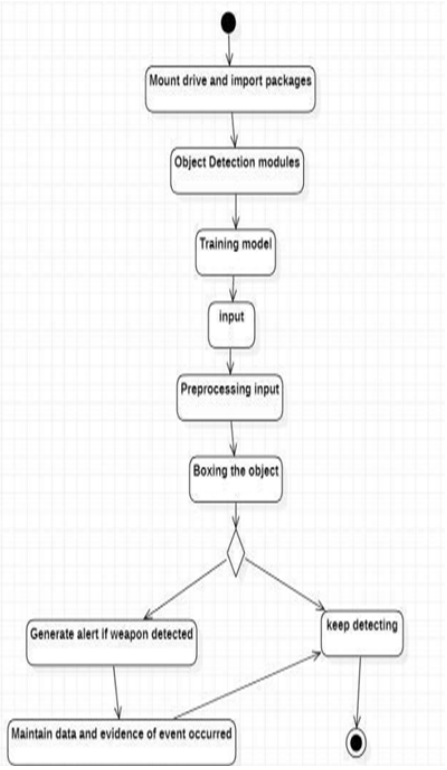


CLASS DIAGRAM:


User
+User ID: String
+User name: String
+Email: String
+Start()
+Importing packages()
+Object detection()
+Loading the model()
+Pretrain model()
+Frozen-interface-graph-labelling text file()
+Input video()
+Preprocessing the input video()
+Boxing the object()
+Labelling the object()
+Display output()
System
+System id: String
+Visualization()
+Output()

ACTIVITY DIAGRAM:





SCREENSHOTS:

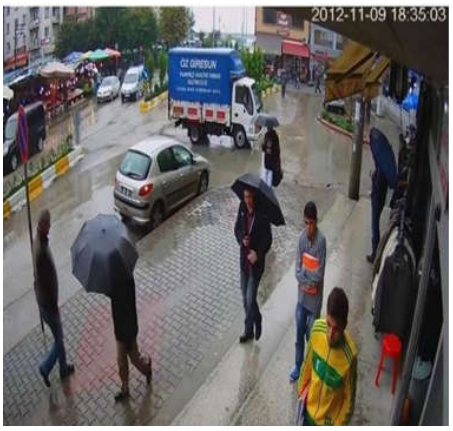
Represents the anaconda command prompt, which we areusing to execute our code.

Executing the code:

After the code execution we getthe following outupts.

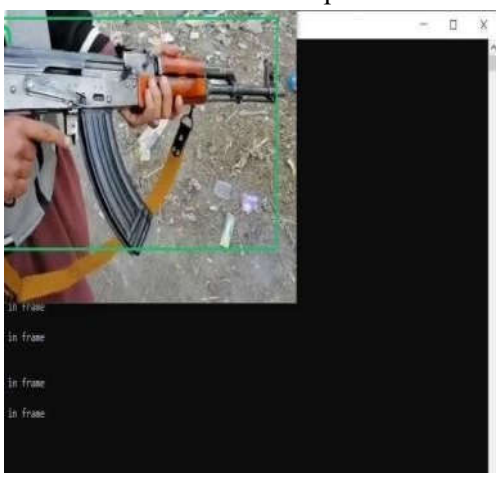
OUTPUT:

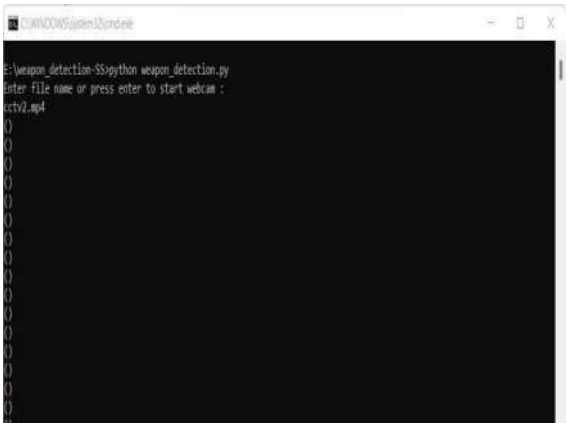
The below image is the CCTV video which does not containany weapon.



CCTV Video:

The below image is the result of theabove CCTV video input.





Conclusion

YOLO is a futuristic recognizer that outperforms current detectors in terms of accuracy and FPS. The detector may be upgraded and utilized on a regular GPU, allowing for widespread deployment. The classifier and detector's accuracy is improved by new characteristics in YOLOv4, which may also be applied to other types of study.

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