Weapon Detection Using Deep Learning Techniques Object Detection Algorithm

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Abstract- *In the current world, every day we are seeing that the expansion of crime percentages. There are numerous sorts of gadgets accessible in market, yet the expenses of gadgets are excessively high. Our project is a cost-effective solution for this problem. Our application simply expects us to take care of the live/disconnected recordings or pictures that is caught from cameras introduced for security reason like CCTV. By utilizing this our application will attempting to recognize the suspicious object which may cause danger to public.*

Keywords- Computer web camera, weapon detection, CCTV, Deep Learning, Artificial Intelligence

I. INTRODUCTION

To address the possible threats, weapons like gun, bomb, missile etc., and additionally unusual events is hard to find out. The existing methodology is that, using metal finder, we can easily find out the if the individual is having the firearm or not, Anomaly conduct is significantly happens in packed regions, for example, shopping malls, theaters, jewelry shops, banking area etc. Rather than using metal identifier, we think of a productive, model in this the dataset, that can be prepared and taken care of extracting the features from images, using appropriate calculation our fundamental concern is to give high security to the public from the suspicious events. Based on deep learning techniques our model is able to predict the accurate weapon within less time. Our project majorly working in two categories of phases

It works in real time-using system camera, if the person is already had a gun and he had come in front of camera it will shows the alert message. 2)we can upload the already captured image or recorded video to this application, within a less time it will identify the suspicious object.

II. LITERATURE SERVEY

Diminishing the life-threating acts and giving high security are difficulties at each spot. Thusly, various analysts have added to observing different exercises and practices utilizing object identification. As a general rule, a structure of shrewd reconnaissance framework is created on three levels: initially , to extricate low-level data like highlights designing and article following; also , to distinguish surprising human exercises ,conduct , or discovery of any weapon ; lastly , the undeniable level is about dynamic like unusual occasion identification or any inconsistency. The most recent abnormality location procedures can be isolated into two gatherings, which are object-focused strategies and incorporated techniques. The convolution neural organization (CNN) spatial-transient volumes framework is simply applied to spatialworldly volume of interest (SVOI), diminishing the expense of handling. In the reconnaissance recordings of complex scenes, scientists in [14] proposed an apparatus for recognizing and discovering odd exercises. By leading spatialtransient convolution layer, this design assists one with catching items from both time area and recurrence space, subsequently extricating both the presence and movement information encoded in ceaseless edges. To do conventional capacities to neighborhood clamor and further develop location accuracy, spatial-transient convolution layers are just executed inside spatial-worldly amounts of evolving pixels. Analysts proposed peculiarity presented learning strategy for identifying strange exercises by creating multi-example learning diagram based model with unusual and typical bimodal information, featuring the positive occurrences via preparing coarse channel utilizing piece SVM classifier and producing further developed word reference learning known as anchor word reference learning. Consequently, anomaly is estimated by choosing the scanty remaking cost which yields the examination with different strategies including using strange data and decreasing time and cost for SRC. Hu et al. [15] have contributed in recognizing different items in rush hour gridlock scenes by introducing a strategy which distinguishes the articles in three stages. At first, it distinguishesthe items, perceives the articles, lastly tracks the articles moving by predominantly focusing on three classes of various articles including vehicles ,cyclists, and traffic signs. In this way, every one of the articles are recognized utilizing single learning-based recognition structure comprising of thick component extraction and trifocal class identification. Also, thick highlights are extricated and imparted to the remainder of identification which heads to be quicker in speed that further should be assessed in testing stage Therefore, infraclass variety of articles is proposed for object sub categorization with cutthroatexecutiononafewdatasets.

III. PROBLEM SOLUTION

Nowadays, Identification of suspicious object is very difficult. Instead of scanning the individual persons in different fields (shopping malls, jewelry shops, bank). So that we come up with a model of taking categories of videos or images ,extract its features , analyze and predict the suspicious object using deep learning techniques such as RCNN, Faster-RCNN and YOLO algorithm.

IV. PROPOSED SOLUTION

In This Proposed Solution we created the dataset for the object and train the after model the model is generated the frame extraction will be done by using detection algorithm to check whether is any suspicious object the result will be compared with the existing dataset then it will be detecting the object with the efficient speed and accuracy, and it"s also given the alert message and initiated way to detecting the object then it will be saving the time and money.

4.1 DATASET DESCRIPTION

We are collecting the image dataset from module training such as gun or any other suspicious object (gun, knife), the image in the dataset is downloaded from the internet and some of images are manually added, it consists of different category of images and which are divided into multiple classes it has types of handgun images and knife in surveillance video, deep learning techniques based on YOLO and RCNN algorithm can be trained to detect this type of object.

4.2 OBJECTIVES

To develop a model for object detection.
To predict the given object image are useful to check whether there is an abnormal event.
To classify whether there are any abnormal images through object classification techniques.

V. METHODOLOGY

5.1. SYSTEM ARCHITECHURE

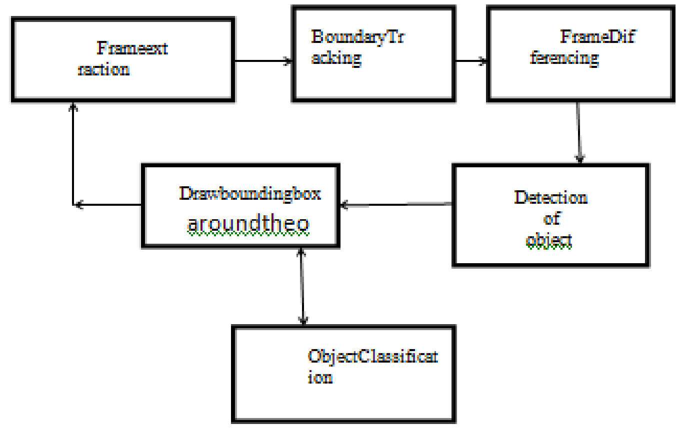
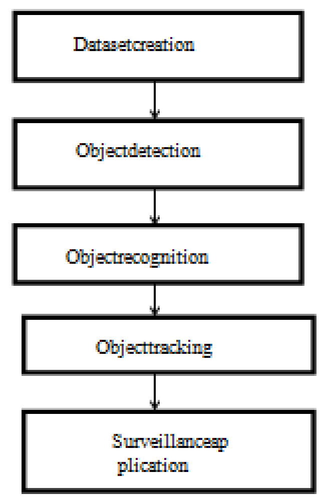


Figure 1: It shows the procedure of weapon location using deep leaning. Edges are removed from the capture video. Edge differencing calculation is applied and bouncing box made before the identification of object.



V2. MODEL DESCRIPTION

Browse System Videos: Using this model application permit user to transfer any video from his framework and application will associate with that video and begin playing it, while playing assuming application identify any object, it will check that object with bouncing boxes, while playing video in the event that user needs to quite following ,he need to squeeze „q" key from console to stop video playing.

Start Webcam Video Tracking: Using this model application associate itself with inbuilt framework webcam and start video real time, while real time assuming application recognize any object, it will encompass that item with bounding boxes , while playing press „q" to stop webcam streaming.

V3. MODEL DESIGN

UML is an abbreviation that represents Unified Modelling Language. Basically, UML is an advanced way to deal with demonstrating and archiving programming. Indeed, it"s perhaps the most famous business measure demonstrating strategies. It depends on diagrammatic portrayals of programming parts. As the old saying says:"words usually can"t do a picture justice". By utilizing visual portrayals, we can all the likely comprehend potential blemishes or mistakes in programming or business measures.

V4. FEATURE EXTRACTION

The weapon detection in surveillance system using yolov3 algorithm where the given dataset is recognised within the bounding box and stated as given image data in the extraction. The detection will be perform after the featureextraction andthe frame will be extracted within the bounding box then the label is concealed.

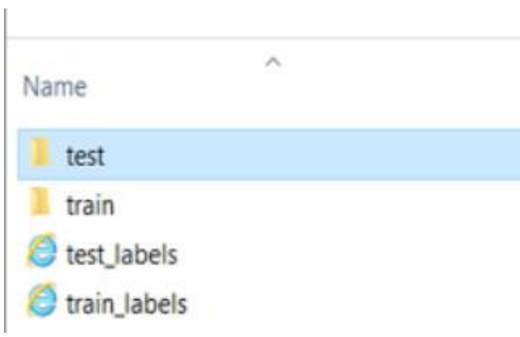


Fig shows 5.4: Folder with test and train labels.

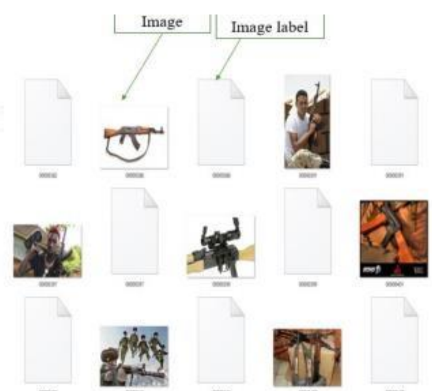


Fig shows 5.5 Image along with label XML data is converted in CSV file by executing this command.

	A	B	C	D	E	F	G	H
1	filename	width	height	class	xmin	ymin	xmax	ymax
2	00000022.	600	450	ak47	142	197	567	300
3	00000028.	600	439	ak47	251	11	388	392
4	00000030.	600	900	ak47	90	221	467	374
5	00000034.	500	389	ak47	56	42	444	322
6	00000038.	600	450	ak47	19	9	597	402
7	00000039.	600	600	ak47	160	240	380	382
8	00000039.	600	600	ak47	245	288	400	434
9	00000039.	600	600	ak47	6	160	367	381
10	00000052.	600	438	ak47	325	11	388	101
11	00000052.	600	438	ak47	383	1	435	191
12	00000055.	482	200	ak47	263	147	318	180
13	00000079.	480	480	ak47	2	332	480	436
14	00000079.	480	480	ak47	1	198	478	310
15	00000098.	240	240	ak47	5	94	235	147
16	00000099.	600	427	ak47	259	73	417	206
17	00000112.	600	800	ak47	175	258	494	503
18	00000112.	600	800	ak47	1	200	293	323
19	00000112.	600	800	ak47	379	293	545	587
20	00000121.	600	376	ak47	1	46	599	259
21	00000122.	300	257	ak47	119	54	200	103
22	00000127.	380	570	ak47	195	218	372	570
23	00000130.	480	480	ak47	21	246	176	295
24	00000130.	480	480	ak47	11	12	194	70
25	00000130.	480	480	ak47	13	87	158	165
26	00000144.	600	450	ak47	21	19	597	359
27	00000147.	360	170	ak47	8	59	344	163
28	00000151.	600	337	ak47	1	43	305	301
29	00000163.	600	963	ak47	238	423	419	869
30	00000169.	480	480	ak47	4	132	478	330

test_labels

The CSV file of test and training dataset faster RCNN algorithm with train loss less than0.1

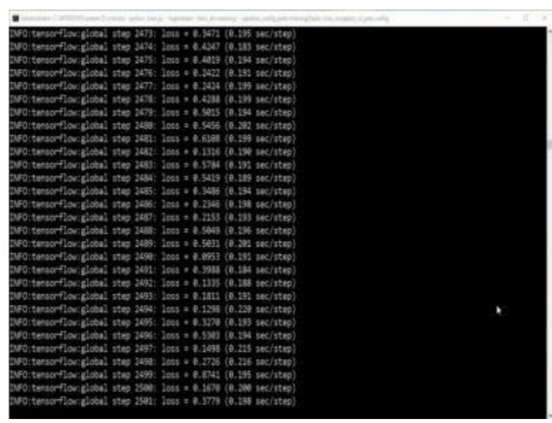


Fig 5.7 Training of Faster R-CNN

Object Detection and Recognition

• To make sure the object is detected, changes are made in the label map and tf_record file.

• Label map is the file which stores the total numbers of total numbers that will detected. Gun is the added in label map.

• The images are converted into tf_record format in Tensor flow so that they can processed in batches.

B. Detection pre-labelled using Faster R-CNN
Case1:Usingpre-labelledimagedataset

Fig shows 5.b Detection of gun using faster RCNN

Fig Shows detection using R-CNN using accuracy 99%showsthesuspiciousbehaviour

Case 2: Using self-created dataset

TABLE I. PERFORMANCE ANALYSIS: FASTER R-CNN ALGORITHM

Gun Type	Average Accuracy	Speed (S)	Gun Detection	Correct Classification
AK-47	94%	1.28	Yes	Yes
Colt M1911	74%	1.63	Yes	Yes
S&W Model 10	91%	1.74	Yes	Yes
UZI Model	88%	1.49	Yes	No
Remington Model	76%	1.89	Yes	No

Fig 5.8 Detection of a gun using algorithm. Accuracy of detection . Further accuracy can be increased by increasing more number training samples

C. Performance Analysis

Faster R-CNN

From Table 1: it shows that highest average accuracy obtained for pre labelled dataset with obtained accuracy of 79% and 91% this conclude the pre labelled dataset provides the better accuracy. Table 2 shows the YOLO algorithm performance analysis

Gun Type	Average Accuracy	Speed (S)	Gun Detection	Correct Classification
AK-47	80%	0.67	Yes	Yes
Colt M1911	70%	0.89	Yes	Yes
S&W Model 10	66%	0.78	Yes	Yes
UZI Model	81%	0.61	Yes	No
Remington Model	72%	0.73	Yes	No

From table 2: it shows the faster R-CNN shows the accuracy of 79% YOLO algorithm shows the better accuracy 92% provides the better performance.

IV. CONCLUSION

In this proposed system work we propounded and implemented gun classification and detection approach for surveillance. The system includes application of various models of R-CNN and YOLO algorithm giving the best results. Our system can be discerning the existence of numerous guns in real time and it robust across the variation in affine, scale, rotation and partial closure or occultation. Although, we presume the performance of our system can be refined and its real time processing like complexity of space and time can be diminished

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