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Weapon Detection Using FRCNN

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Abstract: Due to the increase in crime in remote and congested places, security is a top priority in all fields. Computer vision is having numerous uses for abnormal objects recognition and monitoring to deal with an array of scenarios. It's necessary for video surveillance systems to be employed as a way to fulfil the growing need and the protection of individual's financial assets, safety, and security, and to enhance having the capacity to detect and assess unusual events, is necessary for intelligence monitoring.This enables the utilization of FRCNN machine learning that autonomously identify weapons. Two different types of datasets will be utilized in the provided implementation. A pair of datasets can be downloaded, one with labelled photos and the second with a combination of manually labelled photos. In almost all of the aforementioned scenarios, algorithms gather precise data; nevertheless, how well speed and precision coincide could impact how algorithms are used in real-life instances.
Keywords: Machine learning, FRCNN, Computer vision

I. INTRODUCTION

Firearm detection is the process that recognizes abnormal, uncommon objects that deviate from established patterns and cannot be considered as regular elements within an object set. The extraction of features and learning models are implemented in the recognition of objects for determining occurrences of different object categories. Since an error in detection could cause unfavourable reactions, the suggested procedure concentrates on accurate weapon identifying and labelling. From the input video, frames are clipped off. Bounding boxes are produced and the frame differencing procedure is executed before an object is detected. In this particular instance, an object detection algorithm is trained on the created dataset. It addresses the identification issues using multiple machine learning models, including the Region Restrained Deep Neural Network (RCNN).

II. RELATED WORK

1) Algorithms for matching and feature extraction in image processing: performance study and simulation Applications:

Extracting and matching of the features has the fields ranging from different researches like biomedical to exploratory research. It has several applications in present world that is moving at a breathtaking pace towards automation. The techniques for feature extraction used may not provide the same degree of performance for detection of lanes as they do for face recognition. The outputs are the integration of SURF and MSER. When a picture is rotated and scaled, they surpass a replacement algorithm combinations. Proper thresholding of 'Match Threshold', 'Reject Ratio', and 'Inlier Threshold' must be carried out through trial-and-error method to get better results.

2) Video Surveillance Object Detection Algorithm Emulation Applications:

The plan is to establish high-quality visual information in integrated system and also detects weapons quickly and efficiently. The melding of deep learning and neural networks opens the option of using ARM-based vision algorithms and strategies for optimization to spot anomalies. The entire system uses a deep convolutional neural network(DCNN) to analyze live broadcasts that it has captured. High-level, deeper features that established are to address algorithmic problems can be learned using models based on deep learning. Deep learning-based object detection frameworks use CNN layers for better understanding of object detection. The rate of crime in unknown areas are been reduced as a consequence of detection of weapon. Because of the growing rate of human safety protection, privacy and integration of live broadcasting systems can detect and analyse images. The SSD algorithm utilized for this procedure is to accomplish object and weapon detection automatically.

3) Gaussian Mixture model-based modelling of background approaches for distraction recording and identifying:

Sports backdrop modelling and foreground identification have been accomplished by ingenious methods such as creating a model of a background from video by inferring frames, comparing this model to each new frame, and then deleting the background region from each frame to leave the foreground discovered.

Certain obstacles include shadowing, occlusions and illumination changes are addressed. The designed algorithms are tested against group of performance parameters for the datasets using MATLAB. When object motion and Kalman filter are the techniques used, for example, 100%, 84%, and 100% of the results are obtained.

4) Performance Evaluation of Traffic Surveillance Algorithms for Detection of Object and Tracking:

The object detection techniques are been performed utilizing the ideas of convolution layers. The input, hidden, and output layers are maybe a small group of the layers that make up a neural network. The dataset consists of different images with varying illuminations. Different object detections are been performed using the YOLOv3 algorithm. This approach encompasses a single deep CNN dividing the input into a cell grids and each of them predicts a boundary box as well as categorizes the object. The first frame of the video was taken and Multiple weapon detection is performed in the further frames of the video the object is tracked using its centroid position. This was developed using YOLOv3 algorithm in OpenCV and Python for the object detection.

III. METHODOLOGY

1) Upload weapon dataset: The created dataset of weapon detection should be uploaded which typically involves collecting and labelling of the images and videos that contains instance of weapons.
2) Generate and Load Weapon Detection Model: The dataset described ensures that its property is annotated and split into training, validation and testing sets. This instance is then trained and assessed.
3) Upload Image: Give a scene of a picture where a weapon could possess the ability to be detected.
4) Detect Weapon from Image: Identifying the process and localizing objects within the image that resembles weapons. The weapons are detected by a bounding box around them.
5) Detect Weapon from Video: The procedure for automatically identifying and localizing instances of weapons within a video stream or file.
6) FRCNN Weapon Detection Training Accuracy-Loss Graph: Refers to the visual representation of the execution of FRCNN model that is trained specially for detecting of weapons.

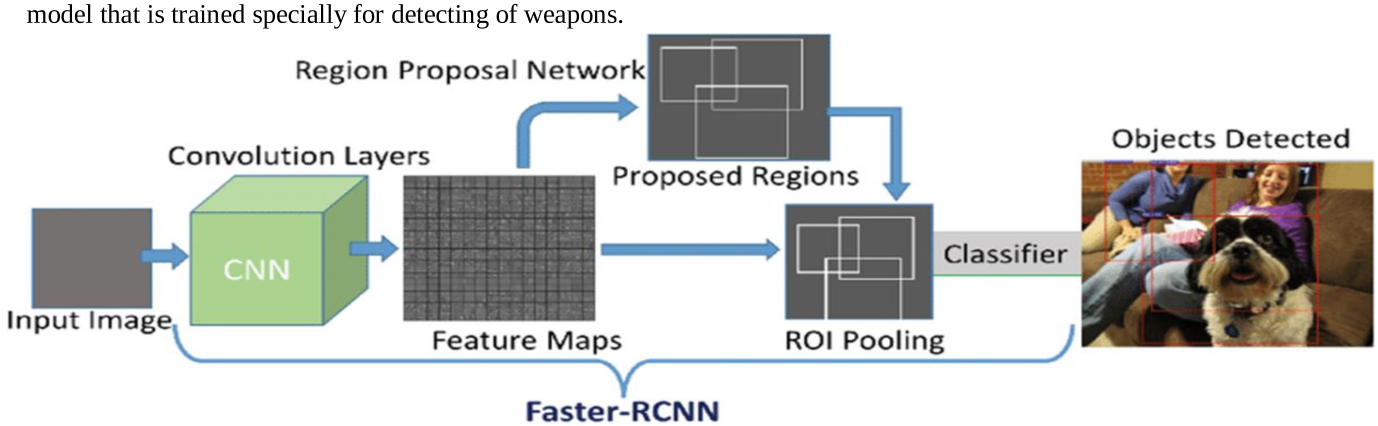


Fig. 1. Architecture

IV. RESULTS

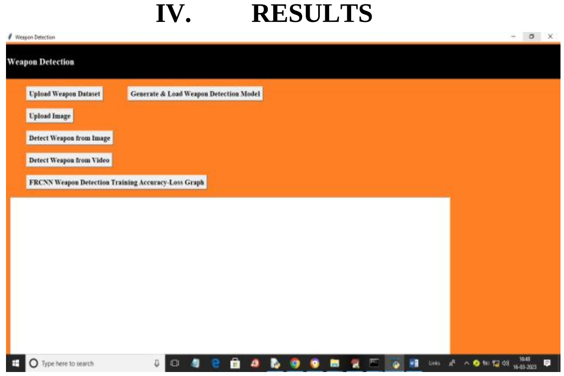


Fig. 2. Upload weapon dataset

In above screen, click on ‘Upload Weapon Dataset’ button to upload dataset that contains weapons.

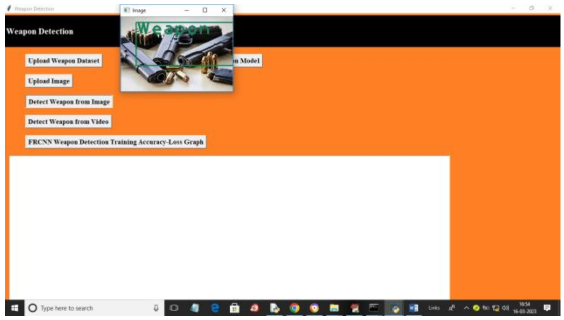


Fig. 3. Weapon is detected from image

In above screen, weapon is detected. Now similarly click on ‘Detect Weapon from Video’ button to upload video file and get below output.

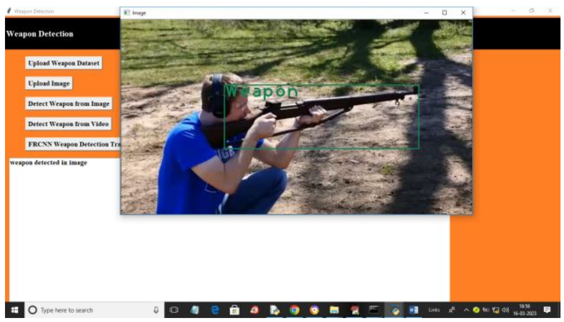


Fig. 4. Weapon is detected from video

In the above screen, we can see the video starts playing and the weapon is detected as an output.

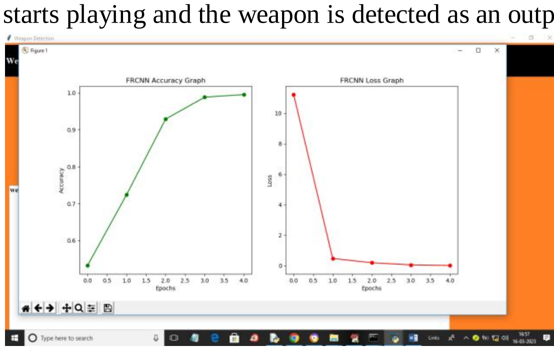


Fig. 5. Represents Accuracy and Loss

In above training graphs x-axis represents training EPOCH and y-axis represents accuracy and loss values and green line represents accuracy and red line represents LOSS and with each increasing epoch accuracy got increase and loss got decrease. You can upload and test other photographs in a similar manner.

V. CONCLUSION

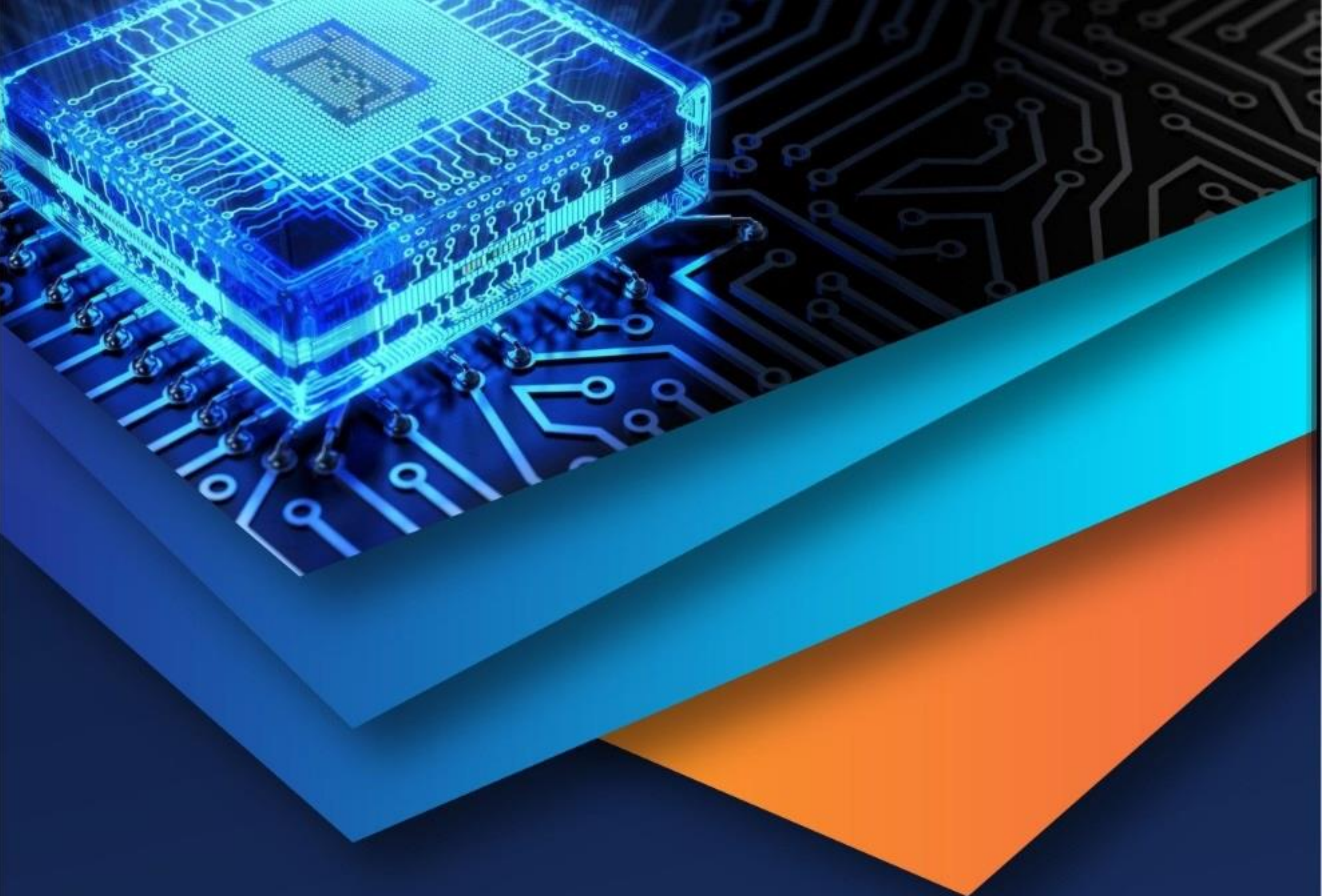
Two modules comprise the FRCNN algorithm: a pre-labelled pictures collection and a self-created one.

Although the technique is effective and produces good results, its real-time implementation depends on a trade-off between the speed and accuracy.

Faster RCNN provides a speed of 1.606 seconds per frame. FRCNN provides improved accuracy, coming in at 84.6%. Best accuracy was obtained with a faster RCNN. With training, it might be applied to bigger datasets. However, in comparison to RCNN's speedier performance, SSD's accuracy of 73.8% is not up to pace. SSD provided the real-time detection since that’s the case faster in speed, while faster RCNN provided improved accuracy. It can be applied for larger datasets also, pricey DSP and FPGA kits, and GPU training.

REFERENCES

[1] Wei Liu et al., "SSD: Single Shot Multibook Detector", European Conference on Computer Vision, Volume 169, pp 20-31 Sep. 2017.
[2] D. Erhan and colleagues, "Deep Neural Networks for Scalable Object Detection," IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2014.
[3] Ruben J. Franklin, International Conference on Inventive Systems and Control, 2020, "Anomaly Detection in Videos for Video Surveillance Applications Using Neural Networks."
[4] A review of AI techniques for data science and analytics: applications and research challenges was presented by H R Rohit and colleagues at the 2018 2nd International Conference on I-SMAC (IoT in Social, Mobile, Analytics, and Cloud).
[5] Abhiraj Biswas et. al., "Classification of Objects in Video Records using Neural Network Framework," International conference on Smart Systems and Inventive Technology,2018.
[6] In the 2019 IEEE International Conference on Intelligent Sustainable Systems, Pallavi Raj et al. presented their work, "Simulation and Performance Analysis of Feature Extraction and Matching Algorithms for Image Processing Applications."
[7] Mohana et al. (2018) presented their work at the International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), titled "Simulation of Object Detection Algorithms for Video Surveillance Applications."
[8] Sruthi, P., Premkumar, L." Attribute-based storage supporting secure de-duplication of encrypted data in cloud",International Journal of Recent Technology and Engineering, 2019, 7(6), pp. 418–421
[9] Shirisha, N., Bhaskar, T., Kiran, A., Alankruthi, K." Restaurant Recommender System Based on Sentiment Analysis",2023 International Conference on Computer Communication and Informatics, ICCCI 2023, 2023
[10] Bhanu, J.S., Bigul, S.D., Prakash, A." Agricultural internet of things using machine learning",AIP Conference ProceedingsThis link is disabled., 2021, 2358, 080010
[11] Y.Ambica, Dr N.Subhash Chandra MRI brain segmentation using correlation based on adaptively regularised kernel-based fuzzy C-means clustering Int. J. Advanced Intelligence Paradigms, Vol. 19, No. 2, 2021 '



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