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Real Time Violence Detection Using CNN

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ABSTRACT

It is becoming more crucial to have automated surveillance systems that can rapidly and correctly identify violent crimes and firearms in public areas. Based on the Faster R-CNN object identification method, this research suggests a solution for violence and weapon detection. The system uses a pre-trained CNN to extract visual features, which are then fed into the Faster R-CNN framework for object detection. For training, a sizable annotated dataset of photos with various sorts of violent situations and weaponry is employed. According to experimental findings, the system detects weapons and acts violently with a mean average precision of above 90% for each category. The technology also functions in real-time, making deployment in surveillance systems an excellent choice, The proposed system can be integrated into a real-time system because of the efficiency of our project, which enables us to quickly send a warning message to security email as well as a sms alert for a given phone number upon any suspicious fighting or weapon-wielding behavior in public places where surveillance systems are installed. The suggested system highlights the value of precise and effective automated surveillance systems to improve public safety and illustrates the possibilities of employing Faster R-CNN for violence and weapon identification in public settings.

KEYWORDS: DEEP LEARNING, CNN,F-R-CNN,SMTP,SMS

INTRODUCTION

Detection of violence event in real time is playing a significant role in law enforcement and city safety in addition to that detecting harmful objects has become a major issue which is leading to increased crime factor, however effectiveness of violence detection is not satisfactory. In this project we aim to detect violence which involves behavior of fighting, and harmful objects like knives, guns are detected.

Upon detecting violence and harmful objects an alert message can be sent which helps in taking immediate action. This project can be used in existing video frames and live surveillance systems. As this project is based on object detection we use deep learning which aids in improved accuracy and effective detection.

project is to detect Violence or weapon using F-R-CNN algorithm. Our project helps to detect the Violence and Weapons and sends a mail. Our model can be used to detect Violence or Weapon in both existing video frames and live monitoring system. Overall, the scope of weapon and violence detection is to provide an added layer of security and safety to

Public spaces, transportation hubs, and other high-risk areas, reducing the risk of harm and promoting peace of mind for all.

EXISTING SYSTEM

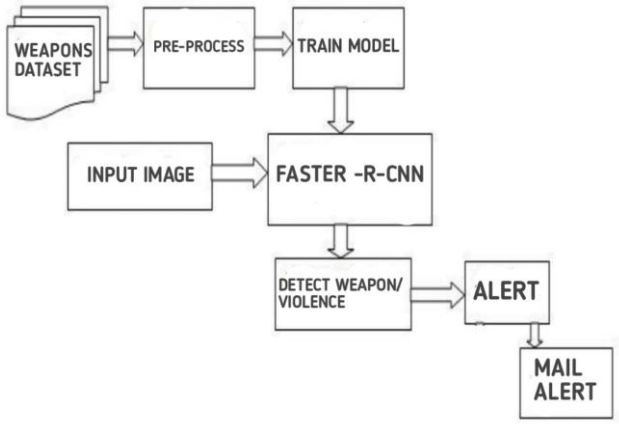
In the existing system violence is inferred using R-CNN algorithm. It is a two stage detection algorithm where in the first stage identifies subset of regions in an image that might contain an object. In the second stage classifies the object in each region. It divides an image into 2000 regions and only one region is fed at a time to the SVM. The SVM is used for regression and classification problems.

It works by mapping data to a high-dimensional feature space so that data points can be categorized. Regions with convolutional neural networks (R-CNN), combines rectangular region proposals with convolutional neural network features. It is a type of deep learning model that is used for computer vision tasks, specifically for object detection. In the existing system an object can only be identified and detected. Alert system which sends alerts after detection of violence is not integrated with the existing system. In the existing system detections are made using pre recorded video frames.

PROPOSED SYSTEM

In proposed system, We are using F-R-CNN algorithm which is way more efficient because this can be much faster than R-CNN algorithm. For the purpose of detecting objects like guns and knife, F-R-CNN algorithm is used for faster recognition of objects by dividing the image into region proposals. The F-R-CNN uses a novel region proposal network (RPN) for generating region proposals, which save time compared to traditional algorithms like Selective Search. It uses the ROI Pooling layer to extract a fixed-length feature vector from each region proposal. It passes the entire image ConvNet which generates region of interest instead of passing the extracted regions from image.The proposed system can be employed in real time cctv surveillance systems as we aim to make this project for both pre-recorded video frames and real time systems.

The alert mail sent upon detection of any violence or weapon is implemented using SMTP protocol. Video capture from live webcam using open cv which is a vast library that helps in providing various functions for image and video operations. For creating the user interface we used Tkinter GUI module used for GUI programming in python.

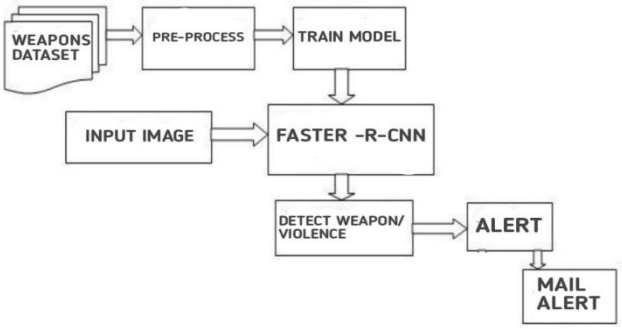


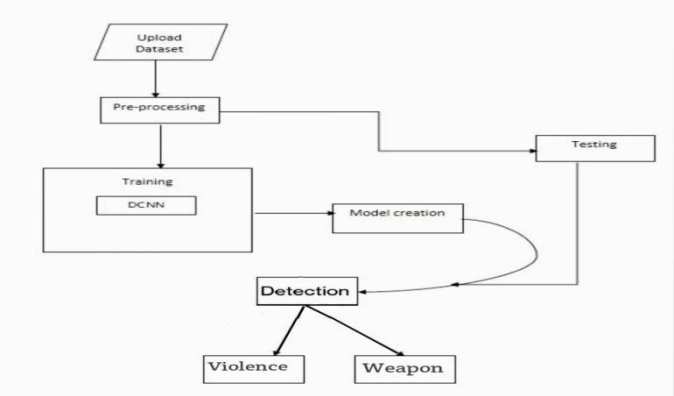
Faster RCNN

Faster R-CNN is a single-stage model that is trained end-to-end. It uses a novel region proposal network (RPN) for generating region proposals, which save time compared to traditional algorithms like Selective Search. It uses the ROI Pooling layer to extract a fixed-length feature vector from each region proposal. Faster R-CNN shares computations (i.e., convolutional layer calculations) across all proposals (i.e., ROIs) rather than doing the calculations for each proposal independently. This is done by using the new ROI Pooling layer, which makes Fast R-CNN faster than R-CNN. Fast R-CNN does not cache the extracted features and thus does not need so much disk storage compared to R-CNN, which needs hundreds of gigabytes.

A. ARCHITECTURE SYSTEM

The System architecture consists of various components interacting with each other and the flow of processes. In the below architecture detection of weapon and violence is possible by comparing with the pre-loaded dataset and processing the given input.



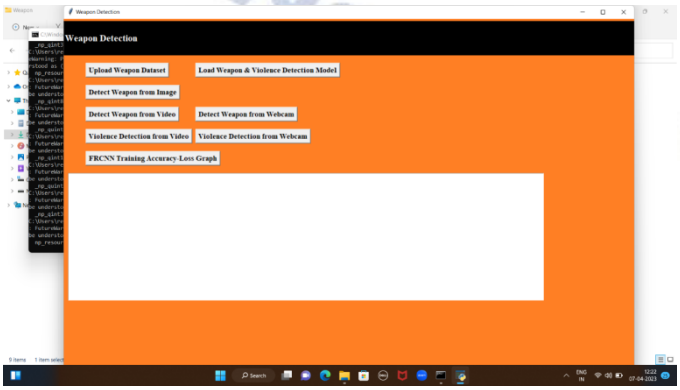


RESULTS AND DISCUSSIONS

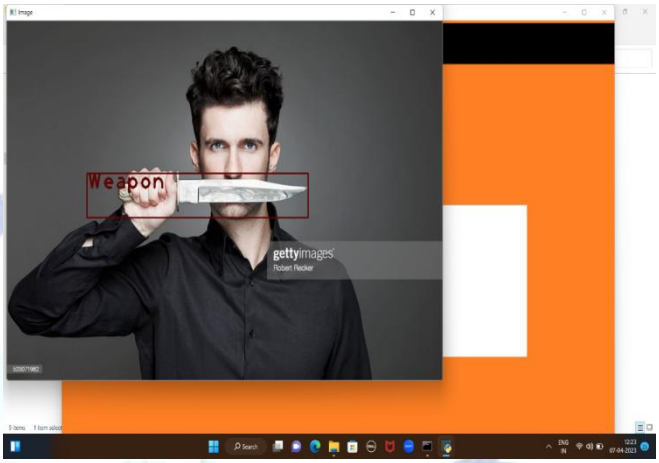
For this project ,we have taken a dataset which consist of images of weapons and poses consisting fighting etc..By considering dataset the image or video will be processed using training model and the input image will be processed using frcnn algorithm and if any abnormal behavior like fighting or weapons are detected it will send an email and also sms to the admin.

We have taken a dataset of 1056 images which includes weapons and poses of fighting which helps in training model and dataset images will help in detecting weapons and violence like fighting.

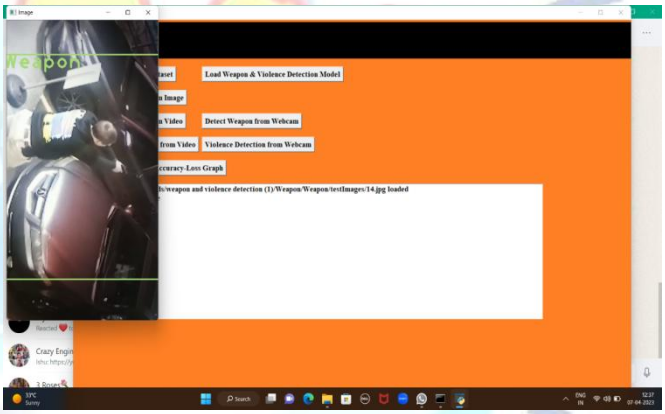
The user interface of our project consists of buttons like Upload weapon dataset ,load weapons & violence detection model ,detect weapon from image ,detect weapon from video ,detect weapon from webcam ,violence detection from video ,violence detection from webcam and FRCNN Training Accuracy :loss graph. And also, a container is present which is used to display the status of input data given.



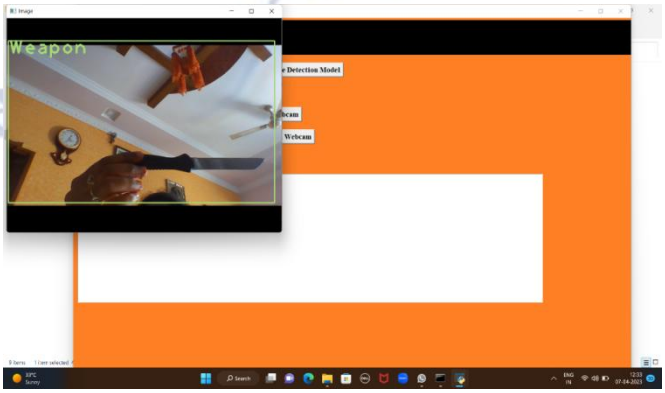
The input image is uploaded. As the image consists of a person who is using weapon, a bounding box is drawn around it and a confidence value is present as detected. The weapon is detected from image



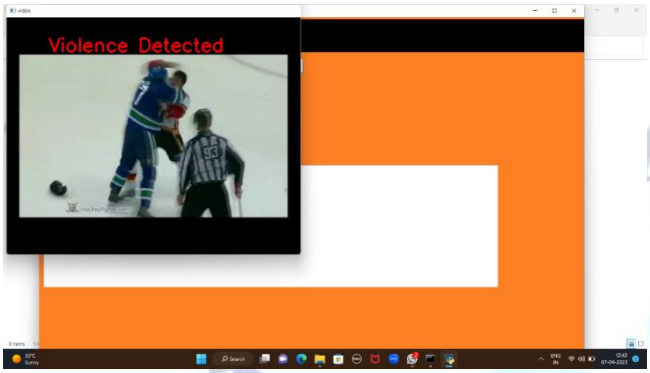
The input video is uploaded. As the image consists of a person who is using weapon, a bounding box is drawn around it and a confidence value is present as detected. the weapon



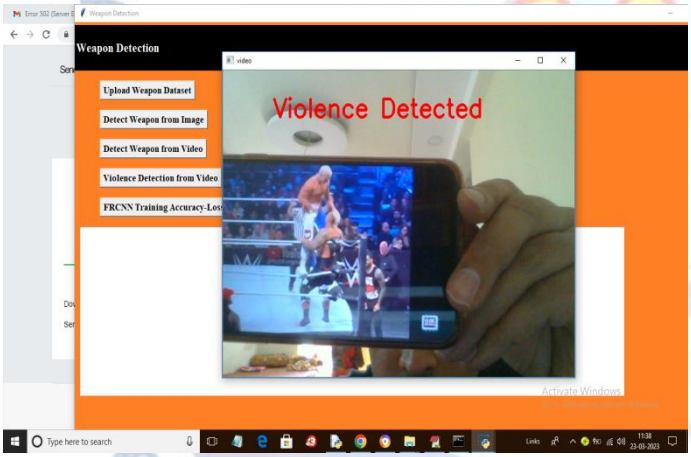
Load the dataset and click on detection of weapon from webcam and bring the weapon near to the webcam. If the weapon is present ,it will detected and a boundary box will be drawn around it and confidence value will be formed .The weapon is detected from webcam.



the input video is uploaded. As the video consists of persons who are fighting, it is detected and shows as violence detected. The result is violence detected from video.



Load the dataset and click on detection of violence from webcam and if the violence is detected near the webcam then it will show as violence detected. The result is violence detected from webcam.



We have used the following algorithms:

- F-R-CNN- Faster Regional-convolutional neural networks are mainly used for fast object detection in images and videos.
- RPN- regional proposal network is used to process the image that takes input from last Convolutional layer.
- The alert mail sent upon detection is implemented using SMTP protocol.

CONCLUSION

Although a Real-time violence and weapon detection using Faster R-CNN is an effective and promising approach to addressing public safety concerns. The use of deep learning algorithms and convolutional neural networks allows for highly accurate detection of violent actions and weapons, even in complex environments. Finally ,the SMTP protocol is utilized to send an email to admin, as weapon detected and violence detected.

Overall, while real-time violence and weapon detection using Faster R-CNN holds great potential, it is important to approach its implementation with caution and consideration for its limitations and broader social implications.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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