iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VIII **Month of publication:** August 2020

DOI: https://doi.org/10.22214/ijraset.2020.30788

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VIII Aug 2020- Available at www.ijraset.com

Violence Detection in Surveillance Video using Computer Vision Techniques

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Abstract: The aim of the project is to come up with alarm just in case of abnormal activities and to help human operators and for offline review. A challenge is to detect/develop intelligent video systems capable of mechanically analyzing and investigate violence within the scene. Such capability could also be extraordinarily helpful in some videos police investigation eventualities like in prisons, medical specialty centers or perhaps in sensitive areas within the town.

I. INTRODUCTION

In the last years, the matter of act recognition at a distance has become tractable by CV techniques. Though the primary approaches obtained sensible results, they have some limitations too. There are, as an example, aperture issues and discontinuities in optical flow based mostly approaches, and illumination and re formatting issues in feature chase approaches. The goal of this paper is to assess the performance of contemporary action recognition approaches for the popularity of fights in videos, movies or video-surveillance footage.

Most of previous work on action recognition focuses on straightforward human actions like walking, jumping or hand waving. Despite its potential quality, violent action detection has been less studied. Whereas there's variety of well-studied datasets for action recognition, vital datasets with violent actions haven't been created accessible. In the work we have introduced a fight dataset to assess the performance within the fight detection.

A violence detector has immediate pertinence each within the police investigation domain and for rating/tagging online video content. The first perform of large scale police investigation systems deployed in establishments like faculties, prisons and elder care facilities is for alerting authorities to probably dangerous things. However, human operators are flooded with the quantity of camera feeds and manual response time is slow, leading to a robust demand for machine-driven alert systems.

Similarly, there's increasing demand for machine-driven rating and tagging systems that may method the nice quantities of video uploaded to websites. The major contribution of this paper are two-fold. First, we have shown that one will construct a flexible and correct fight detector employing a native descriptors approach. Second, we have used a new dataset of hockey videos containing fights and demonstrate that our projected approach faithfully notices violence in sports footage, even within the presence of camera motion.

II. LITERATURE REVIEW

Compared with the previous strategies, the projected methodology achieves higher performance on the 3 difficult datasets. Experimental results may much demonstrate the effectiveness of the projected approach for each general violence and crowd violence sequences [1].

During the study, we have tried to enhance ViF mistreatment completely different optical completely different algorithms as IRLS, Horn-Schunck and Lucas-Kanade, their performance on various datasets and different subsampling video frames were evaluated. This analysis complete that the ViF's accuracy with the initial optical the initial (IRLS) had higher results, however within the case of Hockey dataset ViF's with Horn-Schunck was higher [2].

In this paper, analysis towards the detection of violent scenes in movies is given, using fusion methodologies, supported learning. Towards this goal, a multi-step approach is followed: at the start, machine-driven sense modality and visual process and analysis is performed so as to estimate probabilistic measures concerning explicit audio and visual connected categories. At a second stage, a meta-classification design is adopted, which mixes the audio and visual info to classify mid-term video segments as "violent" or "non-violent". The projected theme has been evaluated on a true dataset from ten films [3].

With the zoom of police investigation cameras in several fields of life to watch the act, conjointly grow the demand of such system that acknowledge the violent events mechanically. In Computer vision, violent action detection becomes hot topic to draw in new researchers. Indeed, several researchers projected completely different techniques for detection of such activities from the video.

The essential goal of this systematic review is to explore the progressive analysis within the violence detection system. The systematic review delivers details of strategies mistreatment SVM, CNN and ancient machine learning classification-based violence detection. These techniques are explained intimately and their execs as well as cons are deliberated. Study probably contributes in highlight the techniques and strategies of violence activity detection from police investigation videos [4].

In this paper, a three-staged end-to-end framework is projected for violence detection during a cyber investigation video stream. Within the initial stage, persons are detected mistreatment associate economical CNN model to get rid of unwanted frames, which ends in reducing the general interval. Next, frames sequences with persons are fed into a 3D CNN model trained on 3 benchmark datasets, wherever the spatiotemporal options are extracted and forwarded to the SoftMax classifier for final predictions. Finally, associate OPENVINO toolkit is employed to optimize the model to increase the speed and its performance at the top platform [5].

III. METHODOLOGY/EXPERIMENTAL

A. *Block Diagram*

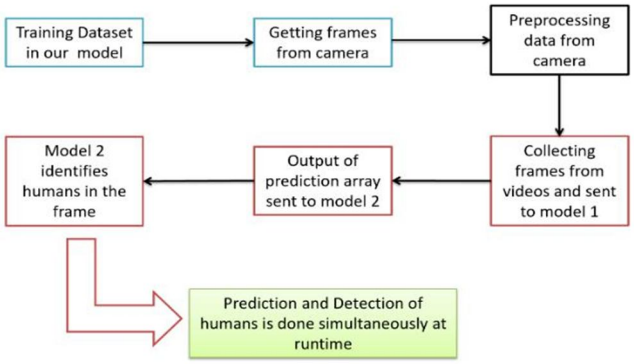

Fig.1 Block Diagram

B. *Algorithm*

1) Firstly training of dataset in the model is done which has been gathered from videos. Dataset used is Hockey Fights Dataset which consists of nearly 1000 short videos which are converted into frames. Half of the videos are violent while rest are non-violent which are labelled accordingly.
2) Frames are then taken from the camera and preprocessing is done.
3) The collected frames are then send to the model for prediction and classified as violent or non-violent.
4) The output from prediction array is send to another model that shows on the camera frame whether it is violent or non-violent.
5) The second model identifies the person or people in the frame.
6) Finally we get to know whether there is violence or not and also detect people in run time.

IV. RESULTS

The final product is able to categories the frames in terms of violent and non-violent and also able to identify the people in the frames, there are certain limitations though but the accuracy and loss is given below.

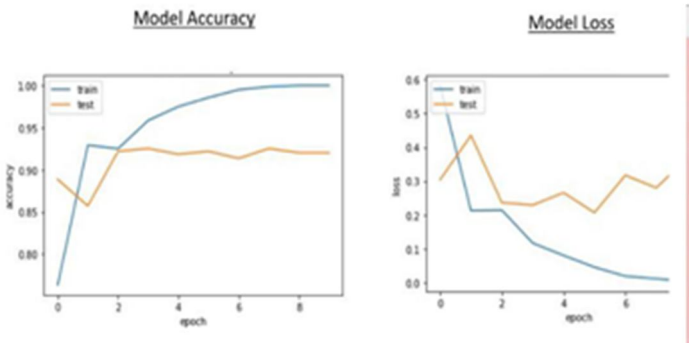

Fig.2 Model Accuracy and Loss

Model: "sequential_1"

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d_1 (MaxPooling2	(None, 111, 111, 32)	0
conv2d_2 (Conv2D)	(None, 109, 109, 64)	18496
max_pooling2d_2 (MaxPooling2	(None, 54, 54, 64)	0
conv2d_3 (Conv2D)	(None, 52, 52, 128)	73856
max_pooling2d_3 (MaxPooling2	(None, 26, 26, 128)	0
flatten_1 (Flatten)	(None, 86528)	0
dense_1 (Dense)	(None, 128)	11075712
dense_2 (Dense)	(None, 2)	258

Fig.3 CNN Model Layers

The frames are also surrounded by green borders or red borders, green for non-violent frames and red for violent frames respectively.

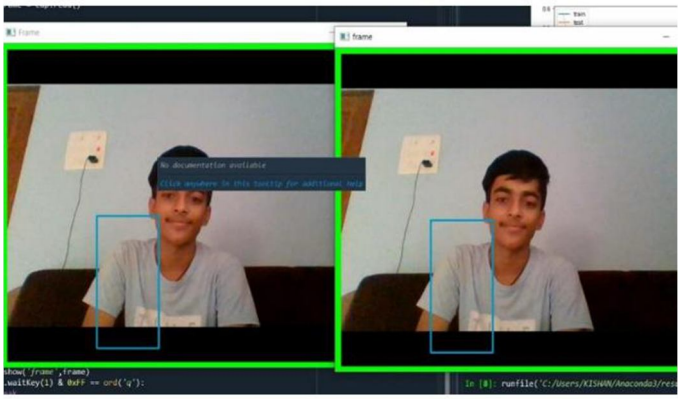

Fig. 4 Result 1

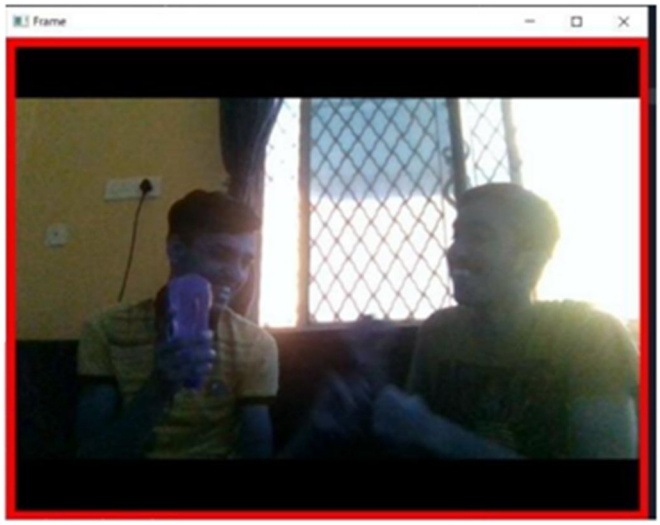

Fig. 5 Result 2

V. LIMITATIONS

It is difficult to detect the actions and identify people when there is presence of too much noise and produces undesirable results, desire results are also not obtained when there are dance moves or extreme hand movements as they are sometimes falsely detected as violent actions and also the availability of limited datasets also produces less accurate results and the probability of misclassifications increases if the quality of video is bad.

VI. FUTURE SCOPE

Computer Vision techniques have a great role in future of technology and our project revolves around the same. The project can further be extended by applying the same on traffic cameras and ATM, street cameras with a built in function to inform the server room on detection and from there the operator can view and inform the authorities about the same.

Further the project can implemented on drones and other mobile robotic devices with a specified path covering all the necessary places and can be traversed on periodic basis with the project implemented on it and it can detect any violence going on and can capture and send the data to the server room from where the operator can inform the authorities and take proper action.

The dataset can further be increased and improved for better results and time to time updates can be implemented with new features and remote administration can also be installed in the project.

VII. CONCLUSION

Our Paper focuses on Violence Detection using Violence Detection in Surveillance Video. Python libraries such as keras, tensor flow, cv2, pandas, NumPy, matplotlib, etc. are used for implementation of the same on the model created using deep learning. Certain layers are added in the model i.e. Conv2D, MaxPooling2D, Flatten and Dense to enhance the performance of the model to obtain required results. The final Project can differentiate between violent and non-violent frames along with identification of person with an accuracy about 94%. This project further can be implemented on street CCTV cameras and traffic cameras and can also be attached to movable objects like drone with specified path and which can detect violence and further inform the appropriate authorities.

VIII. ACKNOWLEDGMENT

Special thanks to Dr. Patil Shrishailappa Tatyasaheb sir for guiding us in our project and concepts.

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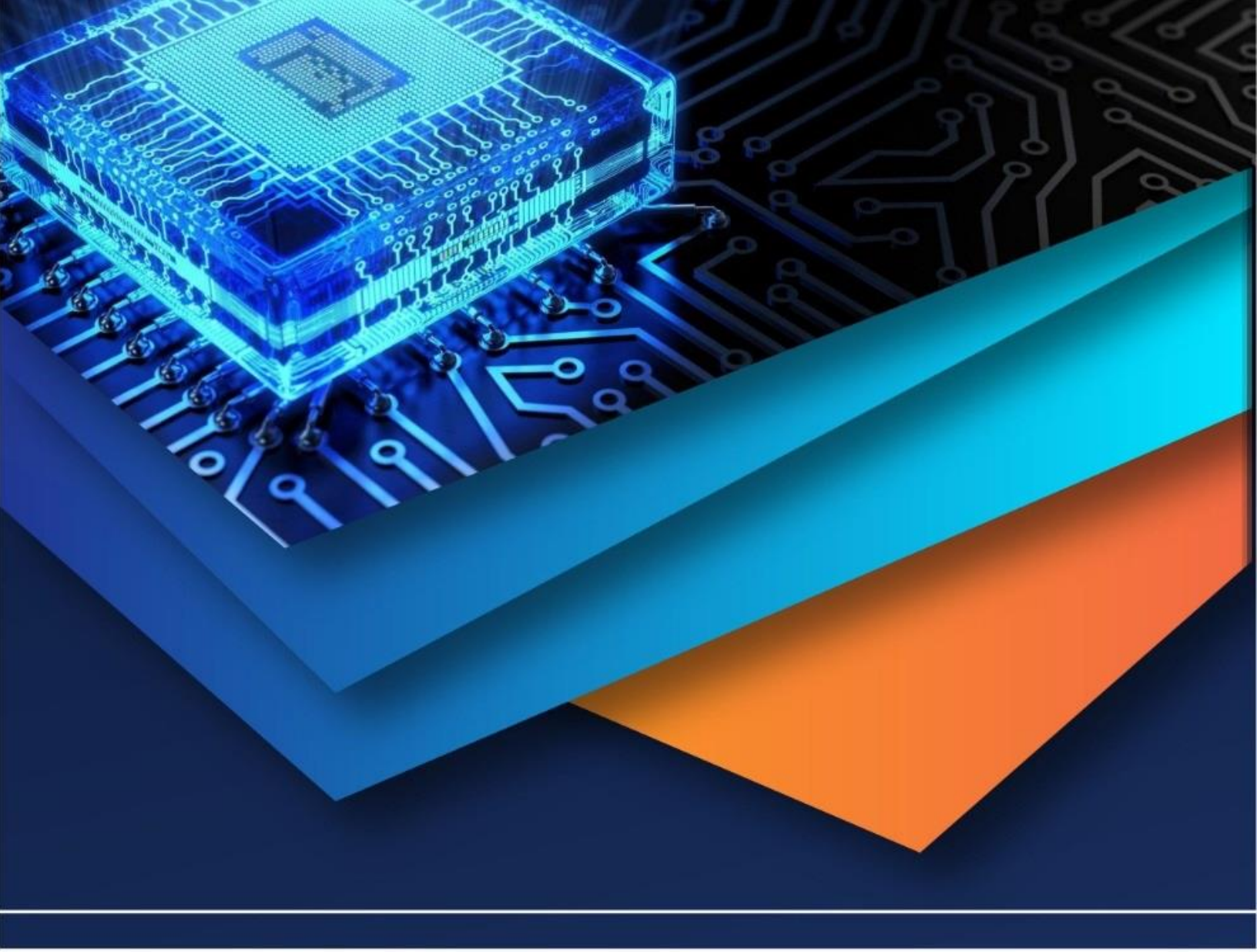

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