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CONVOLUTION NEURAL NETWORK BASED TRACKING OF SUSPICIOUS ACTIVITY IN REAL TIME VIDEO

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Abstract
Suspicious activity refers to any observable conduct that implies a person is involved in a crime or is about to commit one.
To evaluate the efficiency of our approach, We carry out in-depth experiments. on benchmark video surveillance datasets. Our results demonstrate significant improvements in detecting performance in comparison to cutting-edge techniques, achieving high accuracy while minimizing false positives.
Keywords: Security, Artificial intelligence, Internet of Things, Video Surveillance.

Introduction

Video surveillance systems have become essential tools for monitoring public spaces, ensuring safety and preventing criminal activity. However, the effectiveness of these systems is highly dependent on their ability to accurately detect suspicious behavior in real time. Traditional methods often struggle with the complexity and variability of human behavior, resulting in high false alarm rates and limited scalability.
This demonstrates how crucial it is to automate video dataset monitoring and suspicious behavior detection in surveillance systems. A basic understanding of identifying human activity from frames and comparing it to specified training models is necessary for the construction of systems such as this one.
The proposed method harnesses the power of deep learning to automatically learn discriminative features from raw video data. By training CNNs on large-scale annotated datasets, our model learns to extract spatial and temporal features relevant to suspicious activities, enabling robust detection even in challenging scenarios. We employ a combination of frame- level and temporal convolutional layers to capture both spatial and temporal information effectively.

Literature

[1] The author presents a novel solution employing the SSA-Algorithm to enhance a deep CNN classifier's capabilities, enabling more accurate identification of suspicious activities. The study focuses on person detection and tracking, facilitating individual monitoring within video footage. Image skeletonization techniques outline core structures, while statistical, grid, and Histogram of Oriented Optical Flow (HOOF) features are computed. These features serve as inputs for the deep CNN classifier, proficient in identifying abnormal activities.
[2] In this work, we offer a person-focused dataset that documents a variety of behaviors that have been seen in an educational context, including fighting, stealing, cheating, and intimidating circumstances. This dataset offers standardized and consistent identification annotations that make it possible to track, identify, and analyze individual activity in an efficient manner. Using an upgraded architecture, YOLOv5, we improve detection accuracy and present a way to effectively detect abnormal behaviors, both local and global. This technique extracts motion characteristics that accurately describe direction, speed, and velocity.

Proposed Methodology:

The architecture of a CNN is crucial in determining its ability to extract features and recognize patterns in visual data. When designing a Convolutional Neural Network (CNN) for a video dataset focused on

suspicious activity detection, somemodifications to the architecture may be necessarycompared to traditional image-based CNNs. Videodatasets introduce temporal dynamics that need to be captured for effective activity recognition. Below are key considerations and potential modifications for CNN layers in a video-basedsuspicious activity detection.
Traditional 2D convolutional layers process spatial features in images. For video datasets, 3D convolutional layers can be used to capture both spatial and temporal features. These layers extend the convolution operation into the time dimension,enabling the network to learn spatiotemporal patterns. The output layer should be adapted to thespecific task, such as binary classification for suspicious activity detection or multi-classclassification for different types of activities.

Fig. proposed system showing CNN based feature extraction and tracking of suspicious activity.

Convolutional Layers:
Extract spatial features from input data.
Parameters include filter size, stride, and the number of filters.
Pooling Layers:
Downsample feature maps, reducing computational load.
Max pooling or average pooling can be used.
Fully Connected Layers:
Used for high-level feature learning.
The number of neurons in these layers is a design choice.

Proposed Algorithm:
Step 1 : Video is capture from survillence system.
Step 2 : Using ImageTk module video is converted to the frames.
Step 3 : Pixel are extracted from frames by using imagetk library.
Step 4 : Pixel are converted to gray scale then further it converted to binary format which is understandable by machine.
Step 5 : Extracted pixel are compare to predefine train dataset.
Step 6 : If pixel are matched with train dataset it will predict the result as suspicious activity is detected.
Step 7 : After detecting suspacious event it will generate the alert mail and send to the registered user.

Results and Analysis:
The paper highlights the increasing importance of intelligent visual surveillance systems, especially in public places, where ensuring safety is crucial. It acknowledges that traditional surveillance methods have limitations and outlines the need for more advanced systems to detect and respond to suspicious activities.

The core of the paper is the introduction of the "L4BranchedActionNet," a deep CNN model designed for feature extraction and classification insuspicious activity recognition. This model is based on an altered version of the AlexNet architecture, with added branches for feature enhancement. The paper mentions the creation of a dataset consisting of five suspicious activities from existing datasets, such as HMDB51 and AIDER To evaluate and teach the suggested model.

After pre-training, profound highlights are extricated for the suspicious action acknowledgment dataset. Include subset optimization is connected, utilizing entropy and an subterranean insect colony framework (ACS) calculation to choose the foremost instructive highlights.

The paper utilizes different classification models, counting to classify the extracted highlights. The cubic SVM is detailed to realize the most noteworthy exactness execution of 0.9924. The proposed demonstrate is assessed on a isolated dataset, the Weizmann activity dataset, accomplishing an precision of 0.9796, which is considered promising.

The paper's commitments incorporate the improvement of the L4-BranchedActionNet demonstrate, the creation of a dataset for suspicious movement acknowledgment, the application of include extraction and optimization procedures, and the assessment of the model's execution on a real- world dataset.

The paper recognizes different challenges in human action acknowledgment and observation, such as impediment, light, varieties in question measure and appearance, and computational time. The proposed demonstrate points to address these challenges and progress the exactness of suspicious movement location.

The paper gives a comprehensive audit of existing investigate in human action acknowledgment and observation frameworks, counting different methods and approaches.

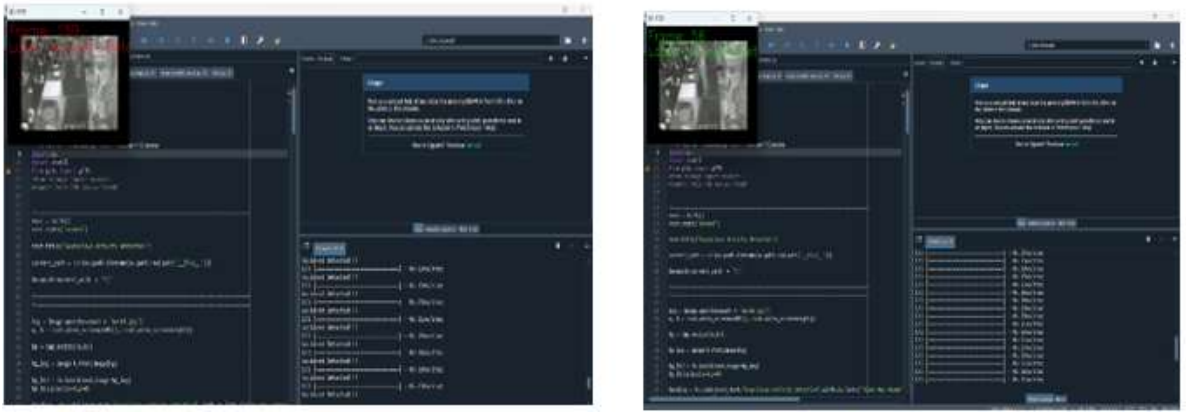

Fig 1.4 Detection of Suspicious activity from video

Fig: Real time video input to CNN based tracking system, here Event Not Occur

Fig: Event Detected

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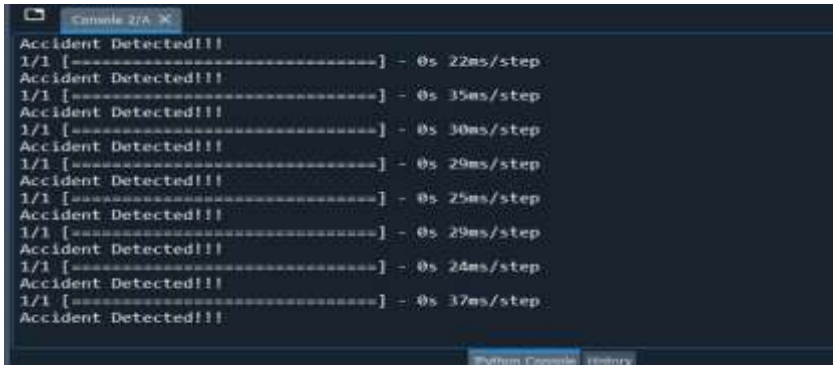

Fig: System Generating Alert

Fig 1.5 System Sending Alert message to user after suspicious event occur.

Fig: Real time video input to CNN based tracking system, here Event Not Occur

VI. Conclusion & Future Scope:

A CNN algorithm to detect suspicious activity in videos has been successful. It's like teaching a computer to recognize unusual behavior in security footage. While the results are promising, there's still room for improvement to make the system more accurate and reliable in different situations. This project opens the door for better surveillance technology in the future.

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