

Detection of Suspicious Activities in a Surveillance Video using convolution neural network

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Abstract:

Detection of suspicious human activities in automated video surveillance applications, is of great practical importance in real world. Reliable classification of suspicious human movements can be very difficult due to the random nature of human movements. The primary aim of the project is to define an approach to the problem of automatically tracking people and detecting unusual or suspicious movements in CCTV videos. Firstly, the videos are converted into frames of specified size. Then from the obtained frames, humans and human actions are detected from the video using a background subtraction method. Then the features are extracted using a convolutional neural network (CNN). The features thus extracted are fed to a Trained CNN model. Labelled videos of some suspicious activities are also fed to the CNN and their features are also extracted. Then the features extracted using Convolutional Neural Network (CNN) are compared against these features extracted

from the labelled sample video of classified suspicious actions using a Trained model and various suspicious activities are detected from the given video.

Introduction:

Video Surveillance system is a collection of video, electronic and wireless components to ensure the continuous or periodic video recording for monitoring the various important public locations. Now a days we can find these surveillance cameras in many public places like bus stops and shopping malls. These cameras are only used to record the video but they cannot analyse the video . A technology should be integrated with these surveillance or CCTV cameras so that these cameras can analyse and identify what is happening in the video. Without these kind of applications one has to sit in front of system and should carefully analyse each frame in the video. This kind of approach is very difficult and may result in fault results. Due to the increased crime rate and instable incidents are happening

around the world many organizations are deploying video surveillance systems at their locations with CCTV cameras. With the help of visual surveillance, One can monitor and track human activities in sensitive and public places like bus stations, airports, banks, shopping malls, schools, colleges, parking lots and theatres etc. It helps in identifying various activities that are going on in video and if any suspicious are found it can alert the concerned people. Like, If an accident is detected in a video, It can alert the nearest hospital and if an theft is found in a video it can alert the nearest police station so that the concerned people can take required action as early as possible. therefore an intelligent video surveillance is required that can monitor the human activities in real-time and categorize them as usual and unusual activities and it also helps in reducing the crime rate.

The main motivation to propose this work is to help the surveillance authorities by providing an automated system to reduce their burden. Main task is to locating unusual events in videos by using some surveillance system which can be manual, semi-automatic or fully automatic. Manual surveillance system is fully dependent on human. It required manual labour to analyze behaviour or to make difference between abnormal and normal behaviour. Semi-

automatic system required less human intervention while fully automatic are intelligent and smart video surveillance system which doesn't required human intervention and burden of analyzing the footage to detect unusual activities In a huge set of surveillance footage and make decision.

Proposed System:

Database:

Our database consists of a decent number of images collected from various sources, One of the major source in internet. Our database consists of images that are captured from live CCTV cameras. We have 450 images that are classified in to safe and suspicious activities. These images are divided in to train and test where train consists of 80% of the images where as test consists of 20% of images.

Methodology:

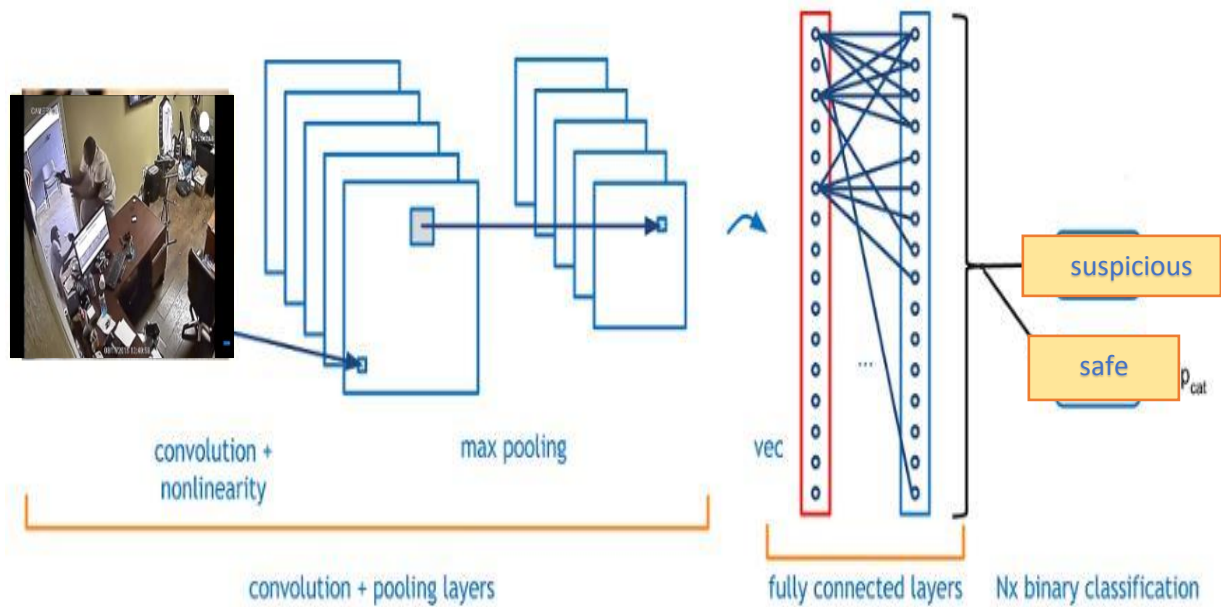
In this project we have used convolution neural networks to classify an activity as safe or suspicious. A Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a CNN is much lower as compared to other classification algorithms. While in primitive methods

filters are hand-engineered, with enough training, CNN have the ability to learn these filters/characteristics.

A CNN model is generated with the database of 450 images and saved. User Interface is developed using Open CV. OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. As soon as the UI code is executed a window will be opened with web cam turned on. This will capture the

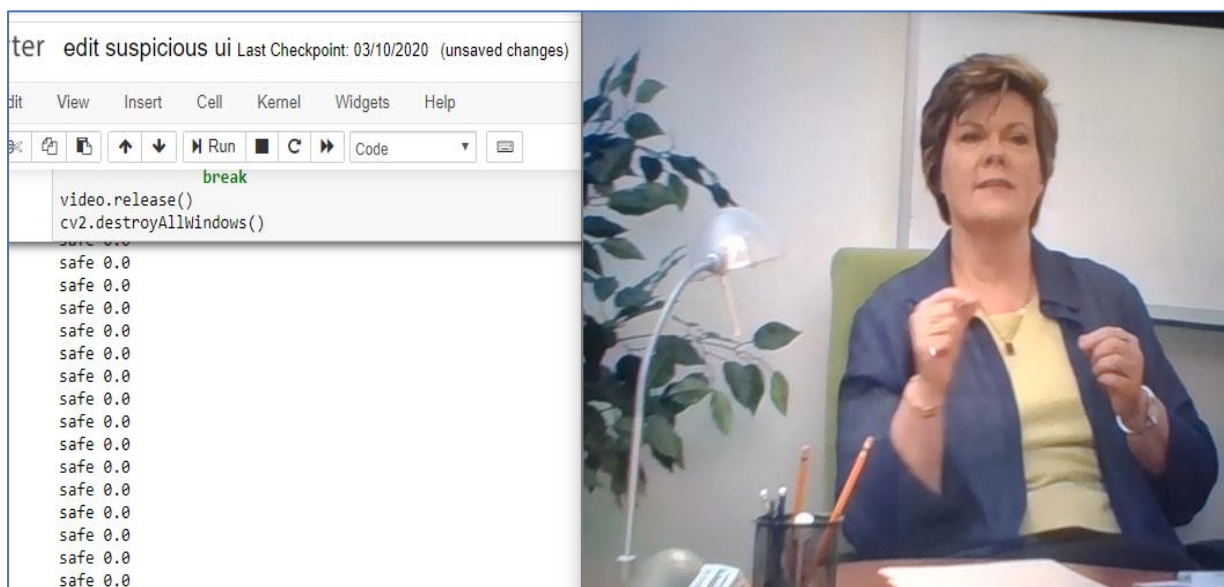
live video and divide the live video in to frames. The length of each frame is 50ms(milli seconds) that means for every 50ms a image(Called as frame) will be generated and will be given to trained CNN model. The features in the input frame are extracted and given to trained CNN model. These extracted features are compared with the features that are extracted from images in the database. Likewise, For every frame that is generated from live video Features will be extracted and compared with trained model and an output for each frame will be displayed on the screen. As it is a binary classification the output will be either a safe activity or suspicious activity.

Architecture

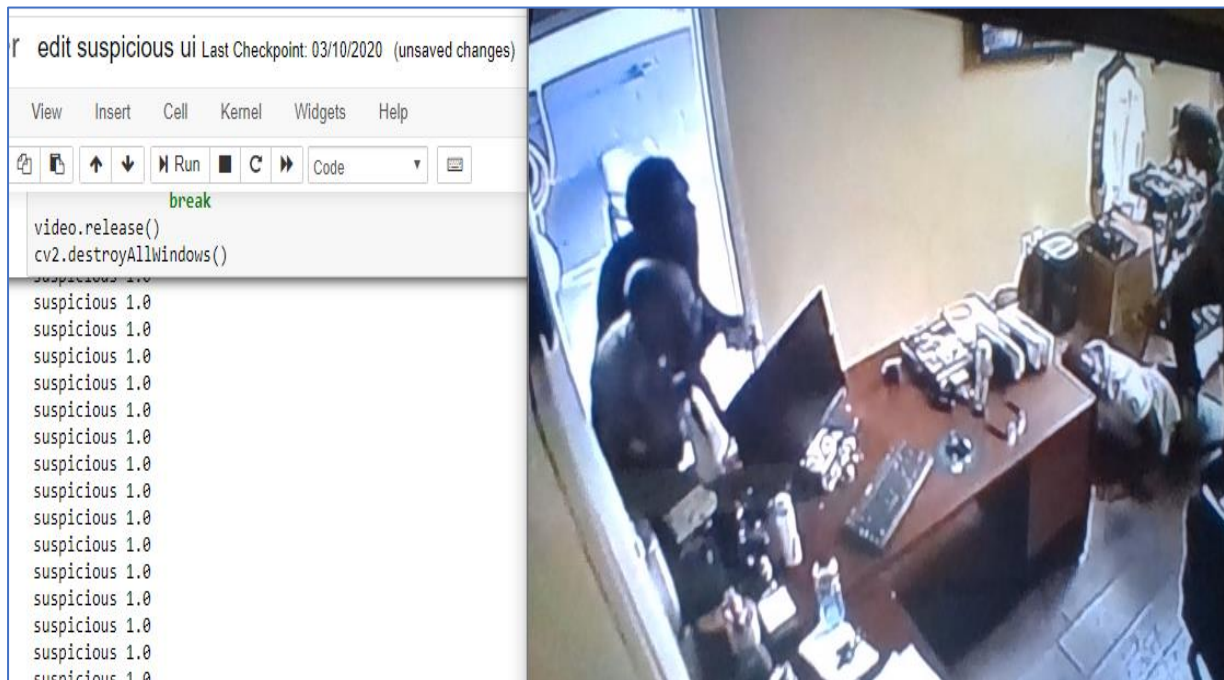


Architecture of Convolution Neural Networks

Screenshots:



Classification of safe activity



Classification of suspicious activity

Conclusion:

Security is a very serious concern nowadays and detecting unusual activities in public places in a video surveillance requires constant attention of some or the other person which is an impossible task. In our proposed system we have built a framework for suspicious activity detection. This system could help the authorities of surveillances in various fields to detect suspicious activities like robbery, people wearing masks and people carrying guns; without using man force. Also this can be integrated with surveillance cameras so that If any suspicious activity found in the video, then

it can alert the concerned people like if an accident is found, it can alert nearest police station and if an robbery is found in the video it can alert nearest hospital. Automation of such a task is a huge saviour of time and can speed up the job of the authorities manifold.

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