

SUSPICIOUS ACTIVITIES DETECTION USING VIDEO ANALYSIS

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ABSTRACT-Security has been a key feature in the present world due to an increase in the unethical activities or anti-social activities that have been happening very frequently. Many organizations have installed CCTV for constant monitoring of people and their movements, interactions. A lot of video data is generated continuously. Constant monitoring of data by humans to judge if events are abnormal is an impossible task as it requires a workforce and constant attention. This creates a need for automating the same. Also, there is a need to observe in which frame and which parts of it contain the unusual activity which gives the fast judgment of that unusual activity being abnormal. This can be done by converting video into frames and analyzing the people and their activities from the processed frames. Machine learning and Deep learning algorithms and techniques support us in a wide aspect to make this possible.

Keywords: Security, automate, machine learning, deep learning.

1. INTRODUCTION

Detection of suspicious human activities in automated video surveillance applications is of great practical importance. Trusted classification of suspicious human movements can be very difficult due to the random nature of human movements. The Manual surveillance system is very much dependent on human. It requires manual labor to analyze behavior or to make difference between abnormal and normal behavior. The Semi-automatic system required less human intervention while fully automatic are intelligent and smart video surveillance system which doesn't require human intervention and burden of analyzing the footage to detect unusual activities in a huge set of surveillance footage and make a decision. An automated system is needed which can classify each frame of the video as normal or abnormal and provide the results with the best accuracy. Surveillance cameras have been installed everywhere today. Even though we are able to monitor the activities of the people through those cameras, we may not find the unusual activities directly by looking at them. Hence, we propose an automated system that can detect any unusual activities that happen at any point of time in the surveillance footage. The basic approach of this project is to create a machine learning model which gets trained with the pictures of suspicious activities like people carrying guns or wearing masks, etc. After the model has been properly trained, the video which is to be analyzed is given as the input. The video will get divided into a number of images called frames and these frames will now be analyzed to decide which image contains unusual activities.

2. EXPERIMENTAL

Frame Generation

The initial step of the method is to extract frames from given video input. This task is achieved by using OPENCV. In simple language, it's the library that's used for Image Processing. It's mainly used to perform all the operation associated with Images. Written in optimized C/C++ languages, the library can take advantage of multi-core processing. Enabled with OpenCV, it takes the advantage of the hardware acceleration of the underlying non-similar compute platform.

Analysis of frames

The next step deals with analysing the frames and find which frame contains suspicious activities. To create the system, learn the patterns of images and pictures that contain suspicious activities, we use a machine learning algorithm to train the model and the algorithm is a neural network. We are able to closely relate the behavior of neural networks to the thought process of humans.

Convolution Neural Networks could be a category of neural network which are one amongst powerful architectures which are used.

Image AI is one of the built-in libraries of python to empower developers, researcher and developers to build applications and systems with self-contained Deep Learning and Computer Vision capabilities using simple and few lines of code. **Image AI** is a project developed by Moses Olafenwa and John Olafenwa, the Deep Quest AI team. It can be used for Image Object Detection Video Detection Analysis Custom Image Recognition Training and Inference.

ImageAI is used to implement a form of Neural Network called ResNet which is the abbreviation for "Residual Network". We can treat the problem as a classification because, for each frame, we need to assign a single value: suspicious (1) or not (0). The neural network has been trained to detect whether a frame is suspicious or not. So, all the frames generated in the first step will be given to the neural network and analysed.

Interface

To develop GUI (Graphical User Interface) Python offers multiple options. Comparatively over all the GUI methods Tkinter is used by most of the python users. Tk toolkit is a standard interface of python which provide many widgets. It is easy to create GUI applications using Tkinter. Almost every python user use Tkinter for developing front end.

Tkinter mainly gives many widgets such as text boxes ,radio buttons , labels that are used for developing Graphical User Interface applications. These various buttons ,labelsetc are called widgets. In the present version of Tkinter 15 types of widgets.

To create a Tkinter:

- Import all the modules -Tkinter
- Create main window (workspace)
- Add required widgets to the main window
- Event trigger should be applied to all the widgets

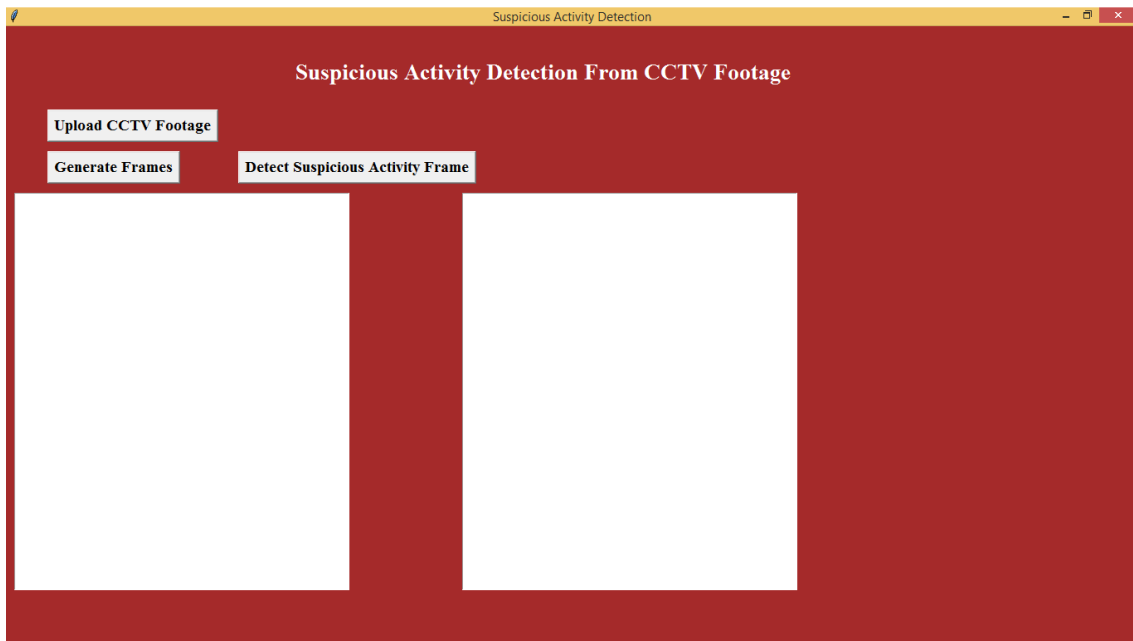
3. RESULTS ANDDISCUSSION

To implement the above concept, we need to install the python 3.7.0 version on a 64-bit laptop. While Python installation we need to select a checkbox saying ‘Add path to system variable’. This option will show on the first screen of Python installation. After Python is successfully installed, we need to execute the be commands below in the command prompt. Make sure that the internet is connected. This is because the “pip” command is used to install some packages.

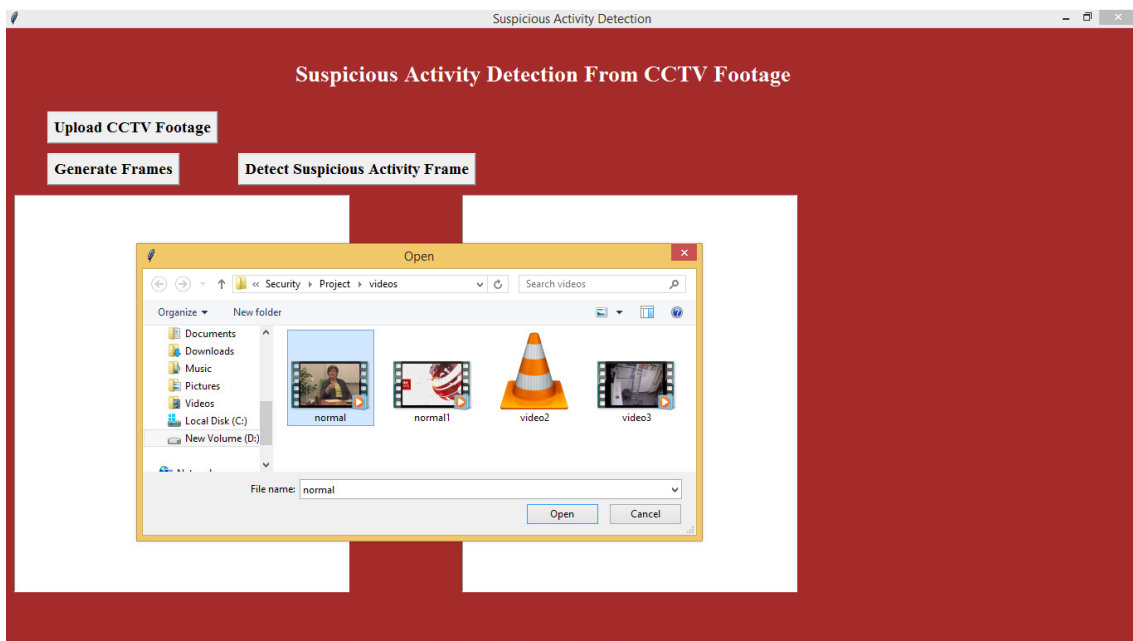
- pip install TensorFlow (Version - 1.14.0)
- pip install imageAI (Version - 2.0.2)
- pip install numpy (Version - 1.18.5)
- pip install SciPy (Version -3.7.0)
- pip install OpenCV-python (Version - 4.5.2.54)
- pip install pillow (Version -7.0.0)
- pip install h5py (Version - 2.10.0)
- pip install keras (Version-2.3.1)
- pip install matplotlib
- pip install

<https://github.com/OlafenwaMoses/ImageAI/releases/download/2.0.2/imageai-2.0.2-py3-none-any.whl>

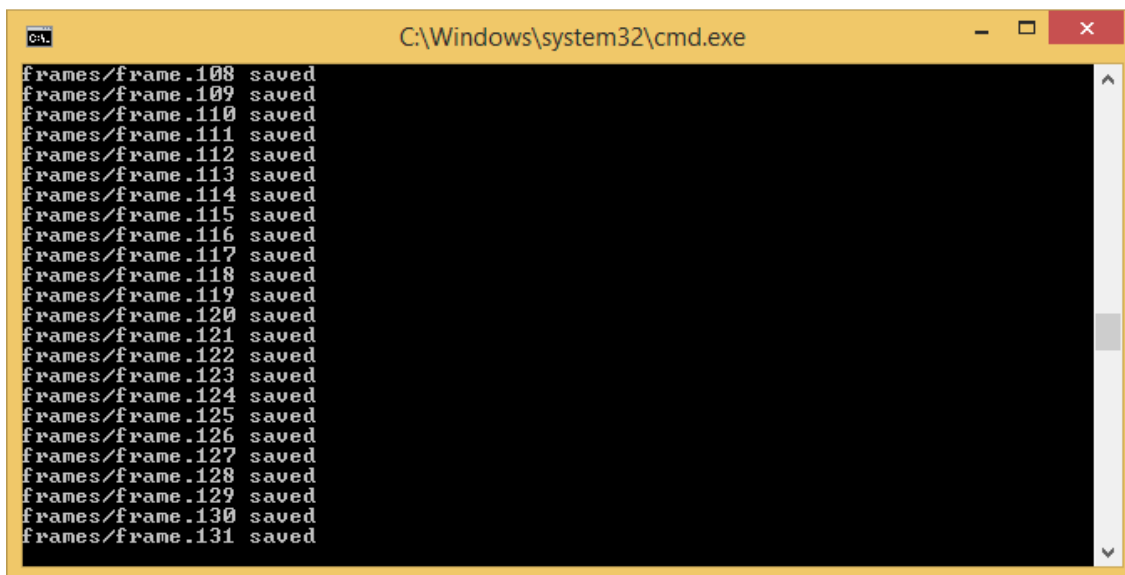
After executing the above commands, all the required packages for the further steps will be installed. Double click on the ‘run.bat’ file. We will get below screen



Click on the 'Upload CCTV Footage' button to upload a video

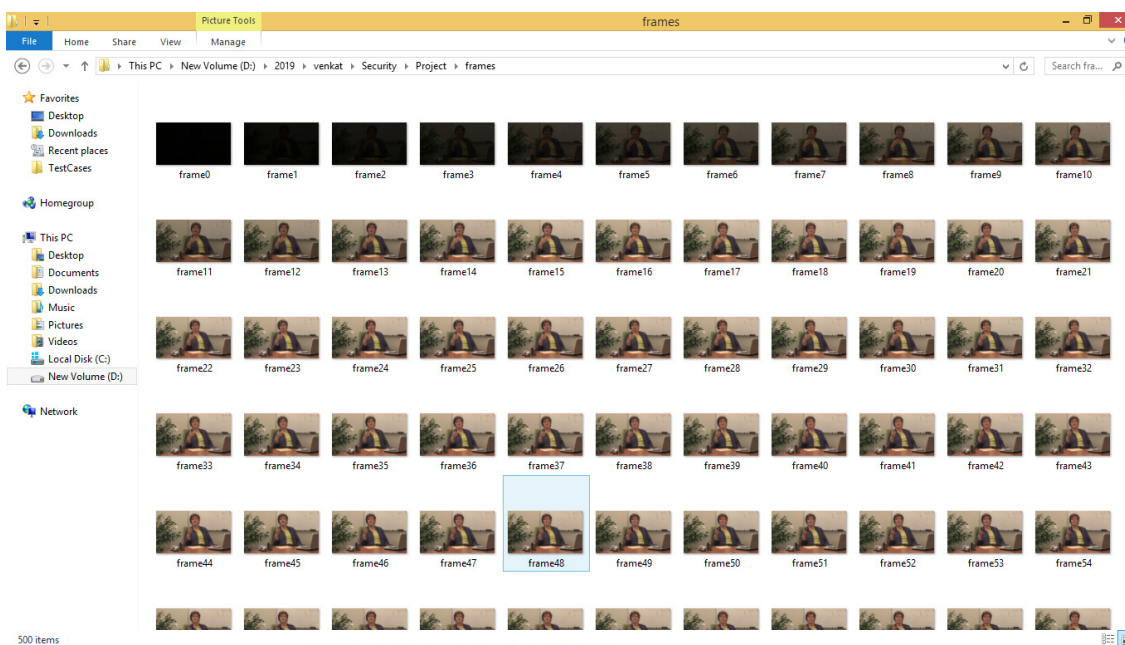


Select the video to be analysed by browsing in the above window. After uploading the video click on the 'Generate Frames' button to generate frames

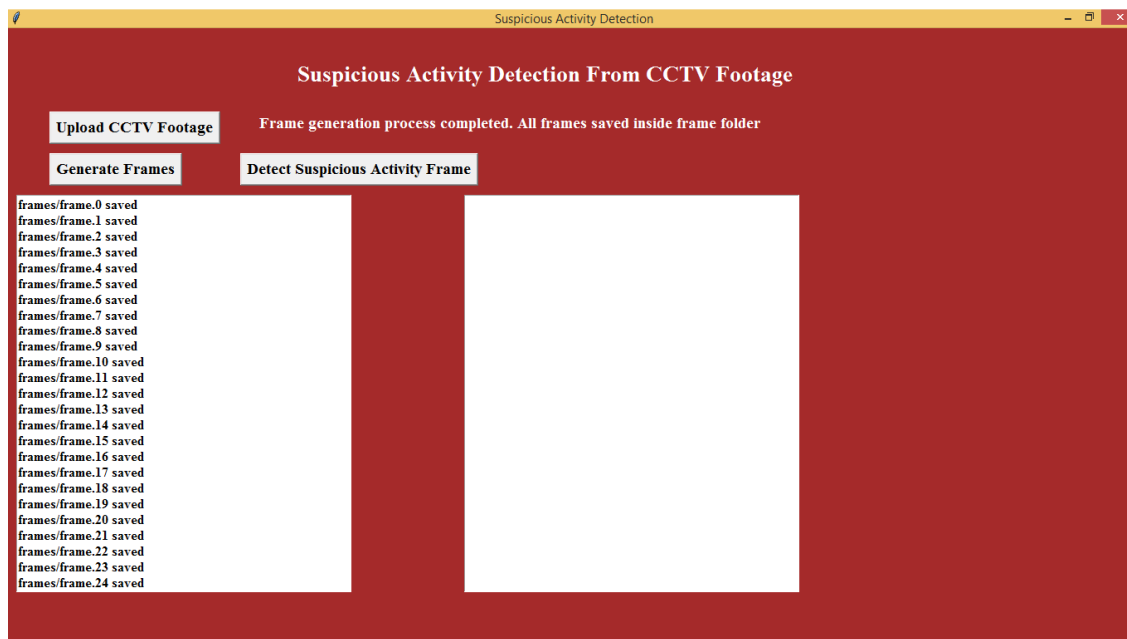


```
C:\Windows\system32\cmd.exe
frames/frame.108 saved
frames/frame.109 saved
frames/frame.110 saved
frames/frame.111 saved
frames/frame.112 saved
frames/frame.113 saved
frames/frame.114 saved
frames/frame.115 saved
frames/frame.116 saved
frames/frame.117 saved
frames/frame.118 saved
frames/frame.119 saved
frames/frame.120 saved
frames/frame.121 saved
frames/frame.122 saved
frames/frame.123 saved
frames/frame.124 saved
frames/frame.125 saved
frames/frame.126 saved
frames/frame.127 saved
frames/frame.128 saved
frames/frame.129 saved
frames/frame.130 saved
frames/frame.131 saved
```

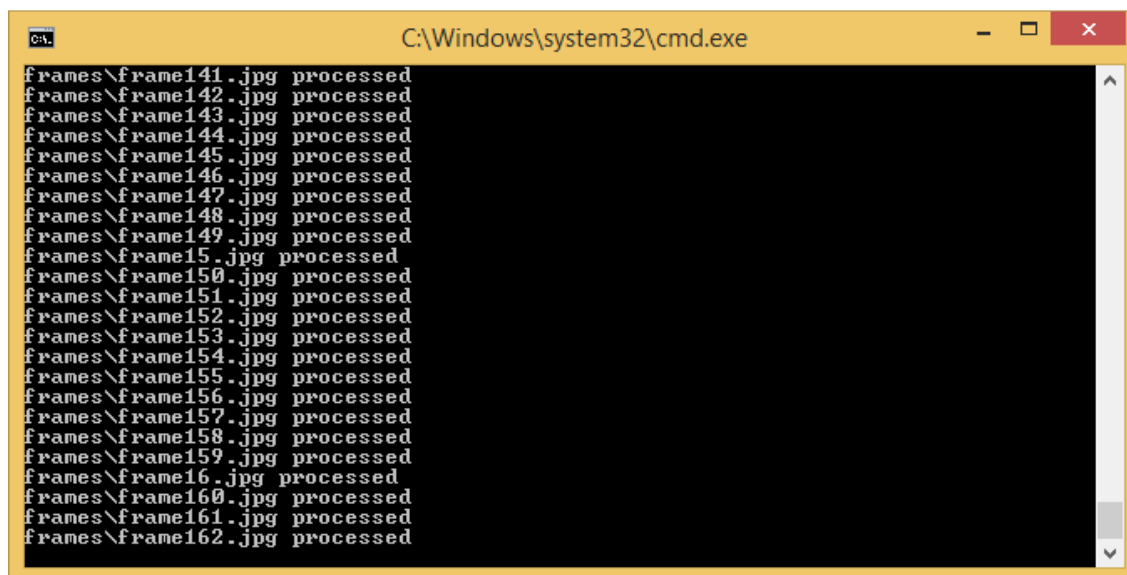
In the above black screen (command prompt) we can see extracted frames are saving inside the 'frames' folder. Now we see the frames folder below which has images from video



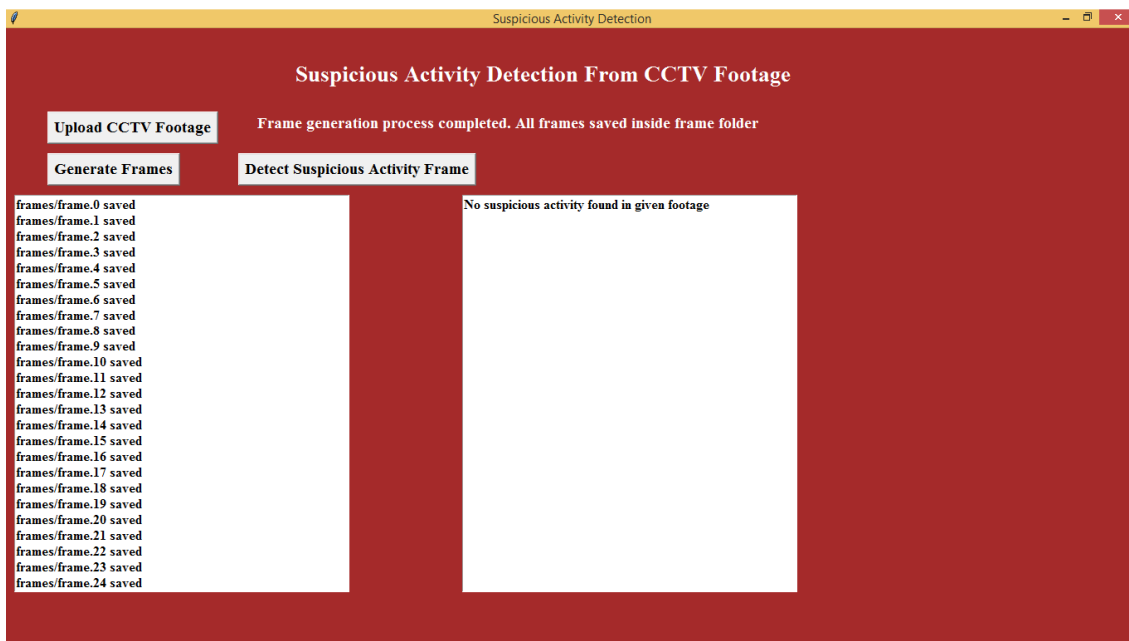
In the above folder screen, we can see all images which have been extracted from the video. After frame extraction will get below screen.



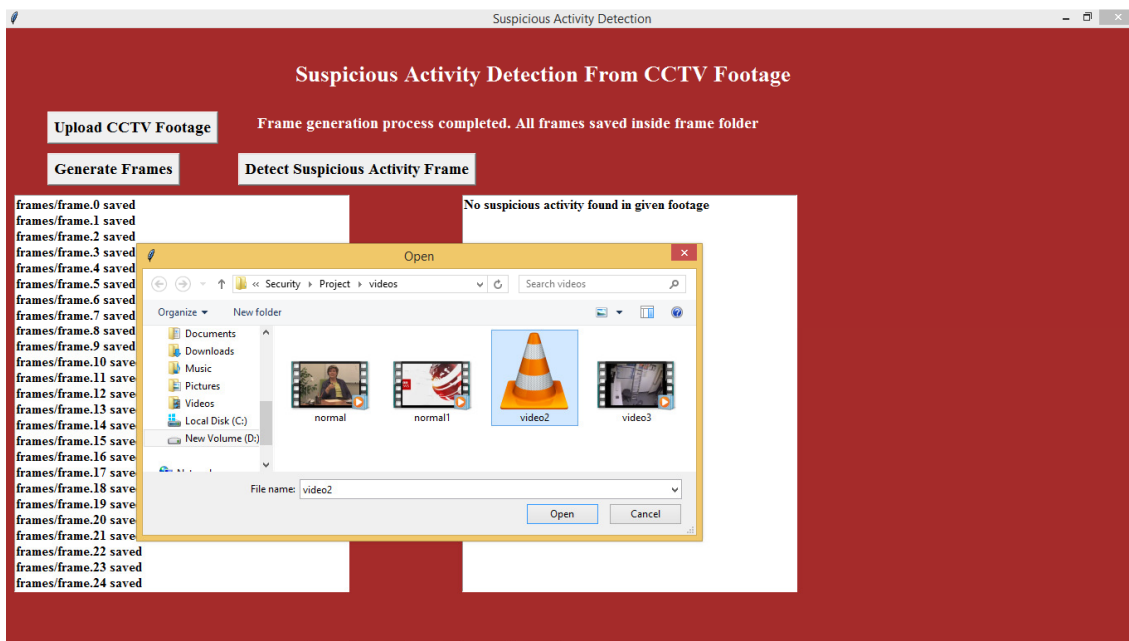
Now click on the 'Detect Suspicious Activity Frame' button to start monitoring frames for suspicious activity.



In the console window, we can see the processing of each frame to detect suspicious activity.



On the above screen, we can see frames scanned and no suspicious activity found. Now we will upload another video and check the status.



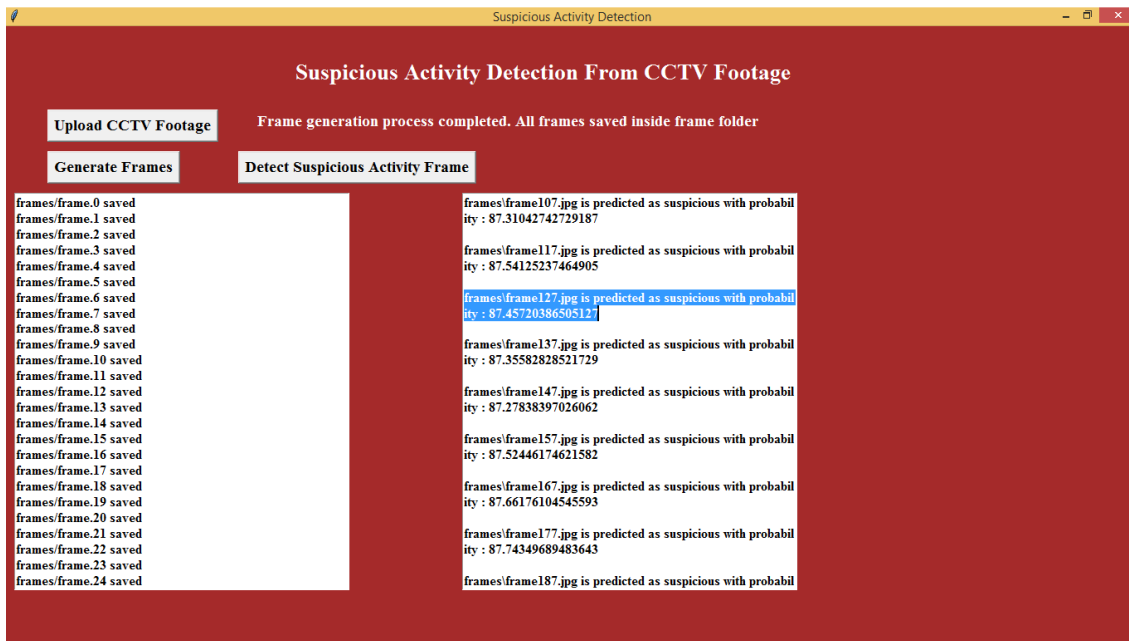
```
C:\Windows\system32\cmd.exe

frames\frame107.jpg is predicted as suspicious with probability : 87.31042742729
187
frames\frame107.jpg processed
frames\frame108.jpg processed
frames\frame109.jpg processed
frames\frame11.jpg processed
frames\frame110.jpg processed
frames\frame111.jpg processed
frames\frame112.jpg processed
frames\frame113.jpg processed
frames\frame114.jpg processed
frames\frame115.jpg processed
frames\frame116.jpg processed
frames\frame117.jpg is predicted as suspicious with probability : 87.54125237464
905
frames\frame117.jpg processed
frames\frame118.jpg processed
frames\frame119.jpg processed
frames\frame12.jpg processed
frames\frame120.jpg processed
frames\frame121.jpg processed
frames\frame122.jpg processed
frames\frame123.jpg processed
frames\frame124.jpg processed
```

In the above screen for uploaded video, we can see suspicious activity found at frame117.jpg. Go to the 'Frames' folder and open frame117.



The above screen frame117 has an image of a person with a face covering. Similarly, we can see all frames details in the below screen which has such activities.



In the above screen in the right text area, we can see details of all frames that have such activities.

4. CONCLUSION

Security could be a very serious concern nowadays and detecting unusual activities in public places in video surveillance requires the constant attention of some or the opposite person which is an impossible task. In the mentioned project, we have put forward a framework for a video analysis tool for suspicious event detection. This tool is designed to reduce the demanding task of manually sorting through hours of surveillance video sequentially to work out if suspicious activity has occurred. We discussed the ideas behind the assorted components of this framework in detail as well as a number of the implementation specifics. This project could help the authorities of surveillances in various fields to detect suspicious activities like robbery, people wearing masks and other people carrying guns; without using man force. Automation of such a task could be a huge saviour of your time and may speed up the work of the authority's manifold.

5. REFERENCE

- 1) L. Zelnik-Manor and M. Irani. Event-based analysis of video. In Proc. of the IEEE Conf. on Computer Vision and Pattern Recognition, December 2001.
- 2) Y. Rui and P. Anandan. Segmenting visual actions based on spatiotemporal motion patterns. In IEEE Conference on Computer Vision and Pattern Recognition, June 2000.
- 3) J. Shi and J. Malik. Normalized cuts and image segmentation. In IEEE Conference on Computer Vision and Pattern Recognition, San Juan, Puerto Rico, June 1997.
- 4) Li X, Zhang C, Zhang D (2010) Abandoned objects detection using double illumination invariant foreground masks. In: 20th international conference on pattern recognition (ICPR), 2010, IEEE, pp 436–439.

- 5) A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha," Face Recognition based on Cross Diagonal Complete Motif Matrix", International Journal of Image, Graphics and Signal Processing(IJIGSP), Vol.10, No.3, pp. 59-66, 2018.DOI: 10.5815/ijigsp.2018.03.07.
- 6) Ayaluri MR, K. SR, Konda SR, Chidirala SR. 2021. Efficient steganalysis using convolutional auto encoder network to ensure original image quality. PeerJ Computer Science 7:e356 <https://doi.org/10.7717/peerj-cs.356>
- 7) A Mallikarjuna Reddy, Vakulabharanam Venkata Krishna, Lingamgunta Sumalatha and Avuku Obulesh, "Age Classification Using Motif and Statistical Features Derived On Gradient Facial Images", Recent Advances in Computer Science and Communications (2020) 13: 965. <https://doi.org/10.2174/2213275912666190417151247>.
- 8) A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha," Face recognition based on stable uniform patterns" International Journal of Engineering & Technology, Vol.7 ,No.(2),pp.626-634, 2018,doi: 10.14419/ijet.v7i2.9922
- 9) A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha, "Efficient Face Recognition by Compact Symmetric Elliptical Texture Matrix (CSETM)", Jour of Adv Research in Dynamical & Control Systems, Vol. 10, 4-Regular Issue, 2018.
- 10) A. M. Reddy, V. V. Krishna, L. Sumalatha and S. K. Niranjana, "Facial recognition based on straight angle fuzzy texture unit matrix," 2017 International Conference on Big Data Analytics and Computational Intelligence (ICBDAC), Chirala, 2017, pp. 366-372, doi: 10.1109/ICBDACI.2017.8070865. (
- 11) A. M. Reddy, K. Subba Reddy and V. V. Krishna, "Classification of child and adulthood using GLCM based on diagonal LBP," 2015 International Conference on Applied and Theoretical Computing and Communication Technology (iCATccT), Davangere, 2015, pp. 857-861, doi: 10.1109/ICATCCT.2015.7457003.
- 12) Nam Y (2016) Real-time abandoned and stolen object detection based on spatio-temporal features in crowded scenes. Multimed Tools Appl 75(12):7003–7028.
- 13) Gouaillier V, Fleurant A (2009) Intelligent video surveillance: promises and challenges. Technological and commercial intelligence report. CRIM Technopole Def Secur 456:468.