SUSPICIOUS ACTIVITY DETECTION USING DEEP LEARNING

1. RA1611003010840 – Ayan Gupta
2. RA1611003010919 – Shivom Goyal

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING
SRM Institute of Science And Technology.

Project Guide -
Mr. Saminathan S.

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ABSTRACT

• Rise of anti-social incidents taking place in today's environment, leading to increase protection and monitoring.

•CCTV cameras already been used to reduce manual monitoring.

•Rate of unusual activity is 20 times a day for developed countries with a population of more than one billion.

•Continous efforts required to monitor the survelliance hence increasing the work and man power.

•So it provides a requirement to simplify the same.

• There is a necessity to display which frame represents the irregular component, which allows you to assess the abnormal behaviour more easily.

• This method includes the way movement effect maps are created that are used for frames and reflect interactions caught in the picture.

•Therefore, the most characteristic aspects of the movement impact contours are that the characteristics of the scale, path and subsequently estimates artefacts and their intelligent characteristics are identified with the contours arrangement.

•It then removes frames with large motions and contrasts them with test frames to auto-detect the global as well as local abnormalities.

IMPLEMENTATION

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•It involves the actual materialization of the ideas that are developed in the design phase.

• Implementation should be a perfect mapping of the design document in a suitable programming language in order to achieve the necessary final product.

• Use of python 3.8 for coding and scripting the algorithms.

• Implementation of 3 important algorithms that helped in training the machine.

• Training the machine with different datasets that are classified as usual activities.

• testing the machine with test datasets that are classified as unusual activity.

IMPLEMENTATION

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- Here, we should note that we considered two types of unusual activities:
  1)local and
  2) global.
- Local unusual activities occur within a relatively small area. Different motion patterns may appear in a portion of the frame, such as the unique appearance of nonhuman objects or the fast movement of a person when most of the other pedestrians are walking slowly.
- Global unusual activities occur across the frame, for example, when every pedestrian within a scene starts to run suddenly to escape from the scene.

LITERATURE SURVEY

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REF NO.	OBJECTIVE	ALGORITHM /STRATEGIES USED	DATASET OR INPUT PARAMETERS	RELEVANC
[1]	Smart Surveillance as an Edge Network Service: from Harr-Cascade	SVM to a Lightweight CNN	Haar-Cascaded and HOG+SVM	Enhance security in smart cities by surveilling crowd.
[2]	Suspicious Activity Detection in Surveillance Video using Discriminative Deep Belief Network	Discriminative Deep Belief Network (DDBN) convolutional neural network (CNN)	PETS 2007 CAVIAR	Detects suspicious activity in local streets and residential areas

LITERATURE SURVEY

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REF NO.	OBJECTIVE	ALGORITHM /STRATEGIES USED	DATASET OR INPUT PARAMETERS	RELEVANC
[3]	Automated Invigilation System for Detection of Suspicious Activities during Examination	Eigen face Convolutional neural network	Created by themselves	Requires less processing power. Effective and efficient
[4]	Temporal Context Network for Activity Localization in Videos	Temporal Context Network (TCN)	Activity Net dataset and the THUMOS14 dataset.	Explicitly captures context around a proposal for ranking it

OBJECTIVES

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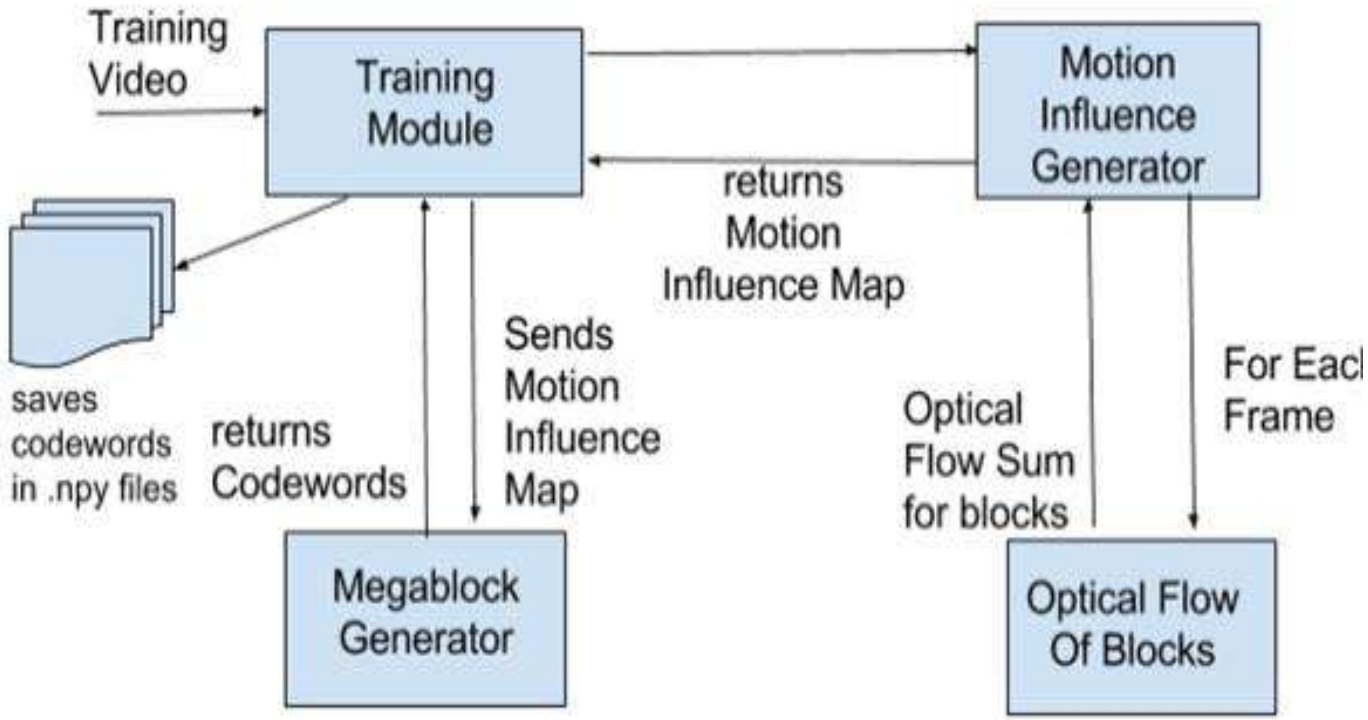
The objectives of our project are as follows –

- By the title of the project itself, we can get the idea of the objective of the project. Anomalous activity detection or unusual activity detection using artificial intelligence and machine learning. This means that in this project, we are going to detect the unusual activity frames that will be collected from the live camera which are installed in the crowded place.

- In a nutshell, our objective is to train the machine with the dataset made of unusual activities, building frames from those datasets and making the machine learn the difference between the frames of usual and unusual activities. Further the objective is to get the video frames from the live camera and compare it to the trained datasets. The frames will be compared using algorithms and will be categorized accordingly.

ARCHITECTURE DIAGRAM



INNOVATIONS

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The innovations of our project are as follows –

- The innovation in the idea is that the system can work for different variety of datasets with few requirements.
- The programmer can check different varieties of dataset depending on the conditions required.
- It is a user friendly algorithm i.e , the person monitoring the video doesn’t have to monitor all the time as the alarm will be activated if(if feature included by the cctv) or the video will be highlighted with the heading of the activity.
- The project can be updated easily as we just need to train the project with required type of dataset in future.

MODULES

The project is divided into 5 modules:

1. Optical flow of blocks
2. Motion influence generator
3. Create mega blocks
4. Training
5. Testing

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1. OPTICAL FLOW OF BLOCKS

- The module optical flow of blocks is provided with a frame and the optical flow of a frame. It divides the frame into blocks of size m x n and sums all the optical flows in each block and returns it along with details like m, n, size and center of blocks.

- checks the movement of every frame in video and trains the machines . Will be considered as usual activity.

2. MOTION INFLUENCE GENERATOR

- This module is provided with training or testing video and it calculates the motion influence map for each frame in that video and also returns the size of the blocks in the motion influence map.
- defines the motion of each person and calculates motion of speed and direction.
- further use these values in order to solve the algorithm equation.

3. MEGABLOCK GENERATOR

This module has 2 functionalities.

a) Generating megablocks and returning them (testing) : Megablocks are generated by grouping motion influence blocks into a bigger sized blocks as motions of closely situated blocks are similar. A set of megablocks of size (number of frames * number of megablocks in each row * number of megablocks each column) is returned.

b) Generating megablocks and returning codewords (training): After repeating the above process but before returning the set of megablocks, each set of megablocks present in the same frame position is applied kmeans clustering on and the means called codewords are only returned to the calling module.

4. TRAINING

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• Training module calls motion influence generator and megablock generator to obtain codewords on a training video input. It then stores codewords in a .npy(NumPY file).

• In this training module, we have used 3 different types of data sets .

•2 are made in day light with a good clearity and resolution. The other is recorded in a closed building.

• To make it a little tough and accurate, we used a dataset video which is colorless i.e black and white video .

5. TESTING

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- When the testing was done with those videos are not usual, the output occurred was same as the expected output.
- The frames mismatched and the video with unusual activity gets popped up that highlights the part of that video with red blocks that were created using one of the algorithms.

NOVELTY IN METHODOLOGY

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BEFORE

ABNORMAL ACTIVITY

ALARM

AFTER

SCREENSHOT OF THE OUTPUT

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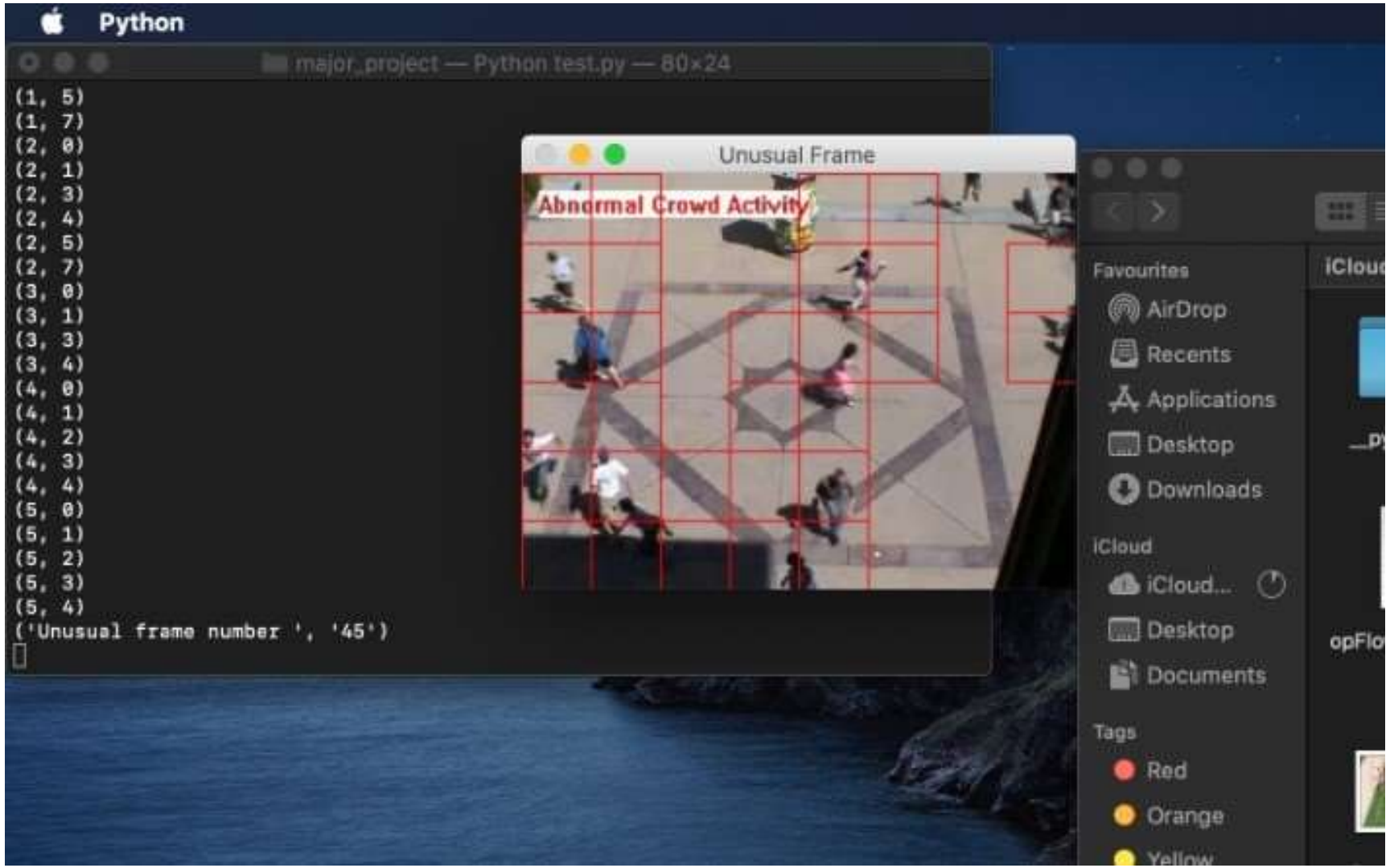

CONCLUSION

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- The machine was trained with the dataset provided.
- The dataset was successfully divided into frames and blocks using artificial and deep learning algorithms like farne back, motion influence generator, optical flow of blocks and generating mega blocks.
- The test dataset was successfully compared with the training data set and was classified as normal or unusual activity.
- As the output, the number of frames compared were shown in the console which tells whether it is an unusual activity or not.

RESTRICTIONS AND CONDITIONS

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- can only input videos with a frame rate of 30 per second
- frame height and width should be 240/320
- no length restriction
- may take running surrounding as an unusual activity. So, the test data should only consist of activity of a person with a steady camera.
- Total bit rate should be 4608 kbps in order to run with the machine.
- Should consist of more than 5 people otherwise optical flow of blocks wont be compared.
- It can only be tested in a crowded area as it is based on such algorithms. (i.e not in ATM centers, nor at a private cctv for main gates.)

FUTURE ENHANCEMENTS

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•Future research could enhance the accuracy of this existing model.

• As this model is trained only with such dataset where people start running abnormally and can only be tested in a public place only.

•This can be enhanced by developing a common model that can detect unusual activities at different types of places like country boarders, Atm machine rooms, malls etc.

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