First Progress Report on
Real Time Anomaly Detection in CCTV Surveillance

Submitted in the partial fulfilment of the Degree of Bachelor of Technology

(Computer Science and Engineering)

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Project Overview

Anomaly Detection System can be seen as a real time surveillance program designed to automatically detect and account for the signs of threatening activities immediately. We plan to use two Deep Learning models to detect and classify levels of high movement in a video frame. We plan to treat videos as segments and will define Anomalous(threatening) and Normal(safe) segments. From there, a detection alert can be raised in the case of a threat, indicating the suspicious activities at an instance of time. Further, we will recognize the following 12 anomalous activities - Abuse, Burglar, Explosion, Shooting, Fighting, Shoplifting, Road Accidents, Arson, Robbery, Stealing, Assault, and Vandalism. Detecting these anomalies would provide better security to the individuals.

To solve the above-mentioned problem, we will apply deep learning techniques used which would create phenomenal results in the detection of the activities and their categorization. Here, two Different Neural Networks: CNN and RNN are proposed.

Objective

The main objective of our project is to develop real time Anomaly detection in CCTV surveillance.

Objectives Pointwise:

1. To reduce probability of error in anomaly detection in CCTV surveillance.
2. To reduce time of finding the video segment in which anomalous activities happen by making the process real time.
3. To increase accuracy of automatic threat detection in CCTV surveillance.
4. To increase the reliability of the system by making it more generalized and training it on 12 anomalous activities videos data.
5. To increase operational efficiency.

Objectives Completed

The below Mentioned Objective has been completed:-

1. To increase the reliability of the system by making it more generalized and training it on 14 anomalous activities videos data.

The Following tasks are to make this objective completed:-

1. <u>Dataset Preparation:</u>

The dataset that we used were the video footages which was used to train our model to differentiate between various anomalous activities and normal activity. We had gone through available datasets and found that "UCF Crime Dataset" is the best suited for the purpose, it consists of 13 Categories of Anomalous activities and Normal activities footages. This lead to major generalization of our model. The UCF Crime Dataset contains 1800 videos and was made using web scrapping these videos from websites like LiveLeak and YouTube with minor alterations for each anomaly, individually.

2. <u>Video Preprocessing:</u>

In this video preprocessing step, we had converted the Video into frames, so that we could perform object detection in frames so that we could recognize motion in a segment of frames.

3. <u>Frame Resizing and Object Detection:</u>

For object detection in the frames, we did not train our model from the beginning but we intend to apply transfer learning from a pretrained model, InceptionV3 by Google, so that we could save on time for object detection. InceptionV3 was learned on the ImageNet dataset. It is a large dataset released in Visual Recognition competition. The model attempts to classify entire dataset into 1,000 categories. InceptionV3 have a standard input dimension of 299 x 299 pixels thus, we resized frames to 299 x 299 pixels for input of InceptionV3.

Next Steps

The Following steps we are aiming to get Completed till second project Presentation :-

1. To increase accuracy of automatic threat detection in CCTV surveillance.
2. To increase operational efficiency.

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