IoT Based Intruder Prevention using Fogger

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Abstract:

Anamoly detection in videos plays an important role in various real-life applications. Most of traditional approaches depend on utilizing handcrafted features which are problem-dependent and optimal for specific tasks. Nowadays, there has been a rise in the amount of disruptive and offensive activities that have been happening. Due to this, security has been given principal significance. Public places like shopping centers, avenues, banks, etc. are increasingly being equipped with CCTVs to guarantee the security of individuals. Subsequently, this inconvenience is making a need to computerize this system with high accuracy. Since constant observation of these surveillance cameras by humans is a near-impossible task. It requires workforces and their constant attention to judge if the captured activities are anomalous or suspicious. Hence, this drawback is creating a need to automate this process with high accuracy. Moreover, there is a need to display which frame and which parts of the recording contain the uncommon activity which helps the quicker judgment of that unordinary action being unusual or suspicious. Therefore, to reduce the wastage of time and labour, we are utilizing deep learning algorithms for Automating Threat Recognition System. Its goal is to automatically identify signs of aggression and violence in real-time, which filters out

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irregularities from normal patterns. We intend to utilize different Deep Learning models (CNN and RNN) to identify and classify levels of high movement in the frame. From there, we can raise a detection alert for the situation of a threat, indicating the suspicious activities at an instance of time and spray the smoke spray.

Key words: Internet of Things, Image Processing, Cloud Access, Security System.

INTRODUCTION:

Presently, there has been an increase in the number of offensive or disruptive activities that have been taking place these days. Due to this, security has been given uttermost importance lately. Installation of CCTVs for constant monitoring of people and their interactions is a very common practice in most of the organizations and fields. For a developed country with a population of millions, every person is captured by a camera many times a day. A lot of videos are generated and stored for a certain time duration. Since constant monitoring of these surveillance videos by the authorities to judge if the events are suspicious or not is nearly an impossible task as it requires a workforce and their constant attention. Hence, we are creating a need to automate this process with high accuracy. Moreover, there is a need to show in which frame and which parts of it contain the unusual activity which aids the faster judgment of that unusual activity being abnormal or suspicious. This will help the concerned authorities to identify the main cause of the anomalies occurred meanwhile saving time and labor required in searching the recordings manually. Anomaly Recognition System is defined as a real-time surveillance program designed to automatically detect the person's activities immediately. This work plan to use different Deep Learning models to detect and classify levels of high movement in the frame. In this work, videos are categorized into segments. From there, a detection alert is raised in the case of a threat, indicating the person movements at an instance of time. These anomalies would provide better security to the individuals. To solve the above-mentioned problem, deep learning techniques are used which would create phenomenal results in the detection of the activities and their categorization. Here, two Different Neural Networks: CNN

[3] and RNN [4] have been used. CNN is the basic neural network that is being used primarily for extracting advanced feature maps from the available recordings. This extraction of high-level feature maps alleviates the complexity of the input. To apply the technique of transfer learning, we use InceptionV3- a pre-trained model[1-11].

However, the approach of transfer learning would enhance this task by considering initially the previously learned model for some set of classified inputs e.g. Image Net; which further can be re-trained based on the new weights assigned to various new classes. The output of CNN is fed to the RNN as input. RNN has one additional capability of predicting the next item in a sequence. Therefore, it essentially acts as a forecasting engine. Providing the sense to the captured sequence of actions/movements in the recordings is the motivation behind using this neural network in this work. This network is having an LSTM cell in the primary layer, trailed by some hidden layers with appropriate activation functions, and the output layer will give the final classification of the video into person movement images [12-22].

EXISTING SYSTEM

Framing and Blob recognition (FBD) for Input video preparing and (HON) Human tracking, Object recognizable proof and warning organize. HOG is in charge of pulling back shape data of question in picture utilizing force angles and edge headings. General purpose computing on graphics processing units (GPGPU) that is appropriate for use in human stance estimation, and accomplishes constant execution. A diminishing calculation iteratively expels limit voxels from a question create a topologically identical skeleton. K-nearest neighbor is a strategy for grouping objects in view of nearest preparing cases in the component space. Scale Invariant Feature Transform (SIFT) has been turned out to be the most powerful nearby invariant element descriptor.

PROPOSED SYSTEM

Proposed Shop / Commercial-guard. With the help of AI, each fog node can detect and identify a possible crime event and crime object by processing the motion-captured images sent by an edge node. DCNN model running at a fog node detects and labels the images with the name of the crime objects having the highest probability, and saves those images. The crime unit receives the crime image, alert [23-33].

Message, and crime location information. The alert message consists of the crime data and location, and the labeled-image verifies and confirms the crime weapon. Finally, the location information tells the police where the crime might occur so they can take necessary steps to prevent it.

Advantages:

Owner get the alert message at the time of person detects inside the shop. Fog sprayer reduces the person's vision so that they can't get clear vision. It reduces the thefting.

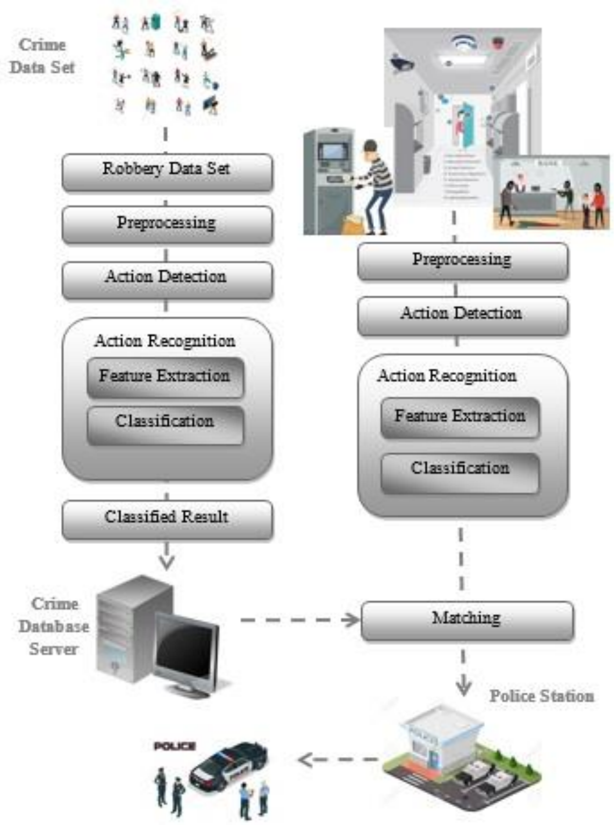

Figure 1. Proposed Architecture diagram

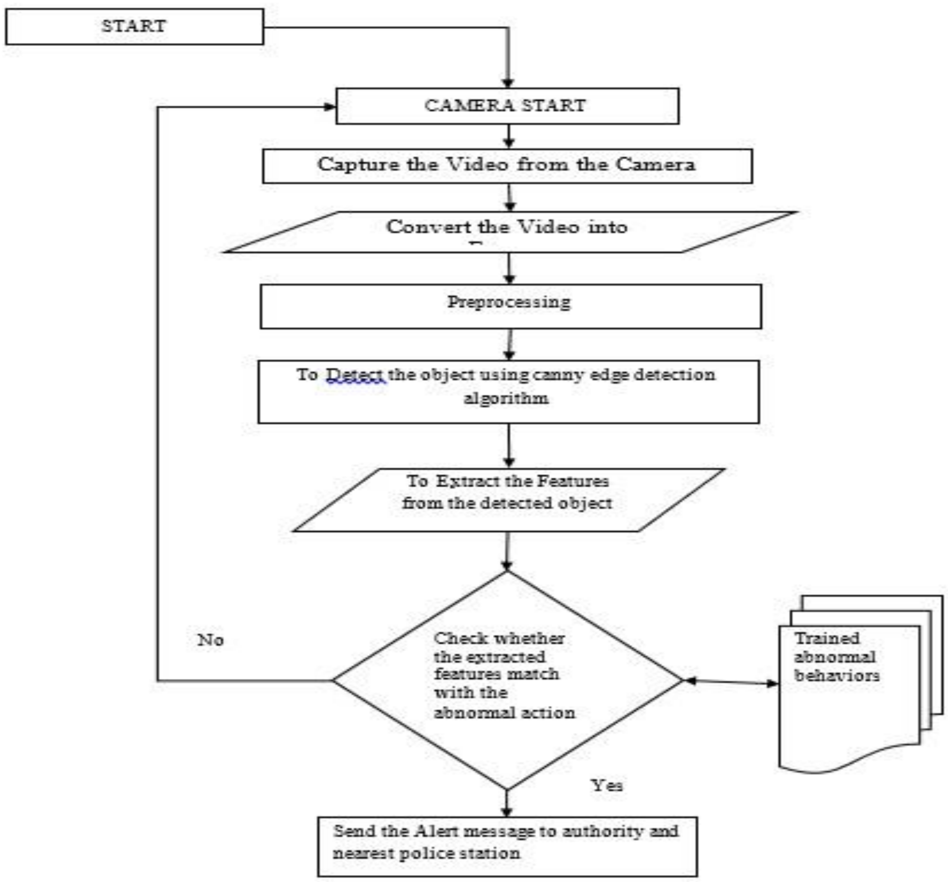

Fig.2 Flowchart of Proposed System

HARDWARE IMPLEMENTATION

Mostly, surveillance is carried with a view to monitoring a large portion of land. This brings forth the need to mull over some factors before computerizing surveillance. Moreover, this section explains the constraints for deep learning in surveillance and how we can overcome these constraints. We have 2 constraints for deep learning in surveillance: Video Feed and Processing Power. Video Feed: Usually, to survey or monitor a large area, multiple CCTVs are installed. These cameras require higher storage for recorded information; either locally, or at a faraway location. A good-quality recording can demand loads of memory than a low-quality recording. Memory being a limitation, we can't store a large quantity of information stream and thus quality is generally brought down to amplify storage capacity. Moreover, using a BW input stream instead of an RGB input stream can reduce the size by 3 times. Therefore, our deep learning surveillance system must be able to process low-quality videos as well. To tackle this issue, we have trained our model with videos captured at different durations of time with varying illuminations. The quality of our dataset is kept low to obtain better performance during real-time.

Processing Power: Where do we process the data collected from CCTV? This is a vital consideration in deciding the hardware cost of our system. This can be done in two ways:

Handling on a centralized server: The extracted frames from the video streams recorded by the CCTV are processed by a GPU on a server operating at a remote location. This is a robust technique and allows us to achieve high accuracy even with a complex model. To overcome the problem of latency, fast Internet connectivity is required. Moreover, we have to use a commercial API to reduce the server setup and maintenance costs to a reasonable level. A lot of memory is consumed by most high-performance models. • Handling on the edge: The transmission latency can be eliminated and abnormalities can be identified comparatively faster by appending a small microcontroller on the CCTV itself. Hence, we can perform Real-time inference. Moreover, this is eliminating the dependency on the range of Wi-Fi/Bluetooth available and is an excellent add on for mobile bots (such as micro drones). However, the processing power of microcontrollers is comparatively less than GPUs. Hence, we have trained our model on such low-quality images as well. Also, we can process the data obtained from our camera sources by processing on a centralized server or processing on the edge. Handling on the edge is an excellent method - eliminating the transmission latency and reporting the variations from the norm faster than the previous strategies.

FUTURE ENHANCEMENT: As future work, we plan to enrich the set of features by employing other deep learning techniques. Furthermore, heuristic optimization-based algorithms can also be used to enrich the feature set for the purpose of improving the classification performance of HAR.

CONCLUSION

Human activity recognition is a challenging problem with many applications in fields such as visual surveillance, human-computer interaction, autonomous driving and entertainment. To overcome this issue, there are many possible motion estimation approaches. In this study, it is proposed to construct a hybrid deep model for the purpose of HAR. The proposed architecture is built combining a dense optical flow approach and auxiliary movement information in videos using deep learning methodologies. First, deep learning models, namely 3D convolutional neural network (3D-CNN), 3D-CNN with optical flow, long short-term memory network (LSTM) are combined to determine the motion vectors. Classification task for videos are then processed by support vector machine algorithm. A wide range of comparative experiments are conducted on two newly generated chess datasets, namely magnetic wall chess board video dataset (the MCDS), and standard chess board video dataset (CDS) to demonstrate the contributions of the proposed study. Finally, the experimental results represent that the proposed hybrid deep model exhibits considerable classification success compared to the state-of-the-art studies. Furthermore, to the best of our knowledge, this is the first study based on a novel combination of 3D-CNN, 3D-CNN with optical flow, and LSTM over video frames to recognize human activity. In conclusion, the experimental results demonstrate that the proposed architecture represents significant advantages for recognizing and classifying human activities in videos. First, the proposed hybrid deep model is flexible, extendable and customizable as it is able to determine many complex activities in various video datasets including playing chess, playing checkers, playing peg solitaire, and playing cards. Second, any number of features can be easily consolidated as auxiliary information for the proposed architecture. In addition to these advantages, the proposed hybrid deep model architecture allows the connection of other deep learning models to our proposed model as auxiliary features for purposes such as object recognition, hand tracking, and so on.

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