CRIMINAL ACTIVITY MONITORING AND PREVENTION USING CCTV SURVEILLANCE

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Abstract— In this paper, we describe a surveillance program which is to be designed that can automatically detect the gestures or signs of aggression and brutality on real time. A single CCTV human operator can handle very limited set of operations, so as the number of CCTV camera increases the need of the human intervention also increases which can also cause human errors so automation for certain detection operations is necessary. Basically, our proposed system consists of 2 main modules which are capable of detecting the actions of objectional objects and humans in the frame for example gun and knife. Here in this project, we propose algorithms which are able to make the people attentive about (1) Presence of a any hazardous act, the danger is detected when the objectional object appears in the frame with the presence of human. (2) An abnormal activity of human when they be handling the weapons or acts of assaults, In this project, we focus to allow the real time application, we completely focus on reducing the number of negative alarms.

Index Terms— Objectional Objects, CCTV Surveillance, Gun, knife, alarm, abnormal activities.

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1.INTRODUCTION

Crime and theft are the social irritation for the society. It has major contribution to the crime rate in the world. To overcome such situations of crimes recently CCTVS are being used. Lately here has been a sustainable growth in the use of CCTV surveillance cameras in order to prevent criminal activities. In between the public expansion, as well the concerns for stabbing and getting robbed, there is an alarming need for a proof -based approach with the CCTV Services. Cases of harassment in public places are also becoming very significant. With the growing insertion of CCTV Cameras surveillances, almost now every area can be monitored, so through this if any crimes are committed the vital evidences can be presented from the crime scene. It is very essential to expect an alert or buzzer system for the ongoing /to be happen accidents and criminal activities, where certain actions should be taken on time as it can be question of life and death situation. Such structure is to be identified and monitored by live footages. But as the number of CCTVS per unit are rising, the personnel viewing experience by a human operator is not possible. So, we require a particular surveillance unit which are capable of flourishing these situations with minimum human intervention.

We shall define a "scenario of need" or "vital scenario" as any sensitive scenario that can lead to any of mishaps in the public places. We consider the idea of smart supervision which is activated only when there is the movement in room.

So this means ,at all other times the surveillance is not active so that it helps in keeping the privacy of the person and also hide certain confidentiality of work. But, the traditional surveillance technically can be more risky as it does not hide any private information and does not follow any privacy concerns.

So, the "video feed" would be recorded only when there is a "need of hour" in case there need to be any evidence for crime committed.

So, in the continuation it responses to the trigger with an alert or buzzer noise which helps in scenarios to escalate further. So, this system can be validated for ensuring the security privacy and confidentiality. There is no human intervention. The CCTV camera is inactive when there is no human presence. Basically, the human presence is checked by the motion detection algorithms. When there is any criminal activity, there is an alarm or buzzer that will ring that is connected to the main system.

2.EXISTING SYSTEM

The existing system of the CCTV surveillance is done by the human operator and also the automated system of CCTV surveillance is not that accurate for making decision and give responses as per the bizarre situation.

Normally monitoring in dynamic situations is mainly to recognize, detect and locate the certain thing or object from the provided image and moreover to understand the object behavior. So, our main objective is to develop an intelligent Monitoring Model system and can take over the existing passive CCTV surveillance system which proves to be inefficient and ineffective as, the number of CCTV increase the number of human operator or human intervention to observe the system also increases. Furthermore, if we are placing the cameras as human eyes in certain organization then the main aim of the surveillance is to accomplish the task to be as automated as possible.

Visual Monitoring the dynamic scenarios has a huge range of potential applications such as a for the Guards, traffic, building in city expressways Detection of objects and human activities in Mall, Airways etc.

In this paper we focus on monitoring of people and objects in the full range in the frame.

We also focus on detecting the knives and pistols these objectional objects which are mainly overseen in the existing passive CCTV

system.

Monitoring applications which involve people include the following: -

a) Access control in special areas: People with certain specific identity or authorized person are allowed to enter in private or security centered locations such as certain government office and military camps. Certain security system has biometric features which helps in deciding the difference between authorized and non-authorized person which basically gets recorded in biometric database.

When someone is about to enter the biometric centered place then the system automatically records the persons features, it compares the captured biometric with the saved ones and decide whether or not the person is allowed to enter the place.

b) Person-specific identification in certain scenes: The security guards /police can catch criminals or suspects with the assistance of personal identification at a distance by a smart surveillance system. The police database may contain or store new suspect biometric and this can be obtained using visual CCTV system from the places where the suspect is usually seen as casinos and subway stations etc. So, after this the system is automatically enable to recognize whether or not the person in view are suspects. If yes, then the alarms will be given immediately. Even though such systems with face recognition have already been used at public sites, their reliability is too low for police requirements.

c) Crowd flux statistics and congestion analysis: The flux of people at important public areas such as stores, can be automatically computed by the surveillance systems, using techniques for human detection. It can then provide congestion analysis to assist in the management of the people. Similarly, expressways and junctions of the roads can be monitored through visual surveillance systems, and further analyze the status of road congestion and traffic.

d) Ambiguity detection and alarming: At sometimes, it is very vital to analyze the behavior or characteristics of people and to check whether they are normal or abnormal. For example, abnormal behaviors indicative of theft, can be analyzed using the visual surveillance systems, which can be placed in supermarkets and parking lots. Basically, there are so many ways of giving alert such as by ringing the buzzer. One way is to make recorded declaration automatically whether certain abnormal behavior is detected.

e) Face detection and Object Detection: Convolutional neural networks are widely used in addressing image-based problems, such as object/character detection and face recognition. In this paper we will be Using Faster-RCNN Because its Faster Than the traditional CNN and also saves time as it detects the things region-wise and searches only the region that is needed rather than searching for all the regions marked in the image as the CNN does.
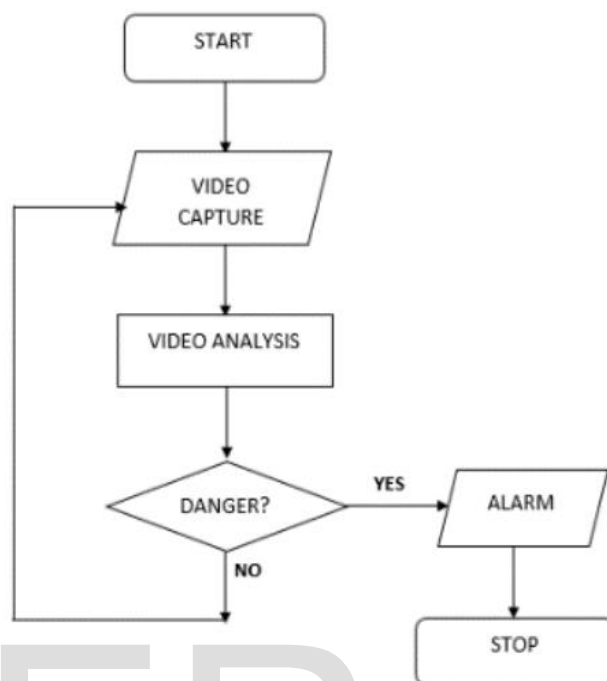

Fig-1 : Proposed System

Drawbacks

- The passive system is used only in the military bases but not metro stations, airports and mall etc.
- It is a complex architecture. In passive system there is not individual safety level considered.
- Basically, the video in passive system is captured continuously which can lead to privacy issue.
- Also, the system does not have efficient alarm system that responses in return of any act of abuse or bullying.
- There is nor blurring out of the sensitive information in present system.

3.PROPOSED SYSTEM

The main aim of our project is to detect the criminal activities with the utmost accuracy that take place in the public areas through the CCTV that take place in the public areas. Our current model consists of 2 detection functions, one for detecting crimes which are done when there are little movements detected (e.g., Robbery or people armed with weapons) and another one for detecting crimes that committed with the heavy or large movements (e.g., stabbing). To avoid the negative/false alarms detection, we have executed a system where the already stored detections are all cleared and only the recently detected.

Other crime prediction system software perform certain citizen trustworthiness analyzes which is basically based on data that is provided or obtained from organization such as police, hospital, school, banks and from social media. But this solution we believe that such a system can potentially be prone to certain discriminations against certain discrimination against certain situation that may involve in any crime.

In our particular solution, there is no such social credit system that keeps permanent log of all the activity, So in this there is no need of continuous monitoring and assessment. Instead of this Machine Learning is used to detect the crime or criminal activity and react to the scenario by responding or alerting user or relevant authority.

The flowchart here explains the flow of our system
Whenever there is any action in the room the CCTV surveillance gets active.

1)If there is any "situation of concern" then the CCTV cam is directed towards it and the frame is captured.

2)Now the algorithms detect if the frame has a knife or a pistol. If the frame detects the knife then optical flow algorithm calculates the velocity at which the knife is being moved from one frame to the other. It then calculates the probability of stabbing by which intensity the process is taking place.

3)If the probability taken is greater than the threshold value that is being set by us. The threshold needs to be set reasonably low to ensure that the tip of knife is detected as a corner, even at the expense of more corners being detected. Basically, the range is from 0 to 255. Here the threshold set is 204 as low as possible, when we set 204 as threshold it detects the knife in the frame with the utmost accuracy.

4)Then when the knife is detected with much accuracy then the there is an alert that is the buzzer goes on. After which the respective authorities are informed about the criminal activity taking place and they can take instant action.

5)If the knife is not detected then the surveillance is continued. Now, secondly if the pistol is detected in the given frame with a human handling the object then the buzzer goes on and alert the

respective authorities about the criminal activity taking place and they take instant action.
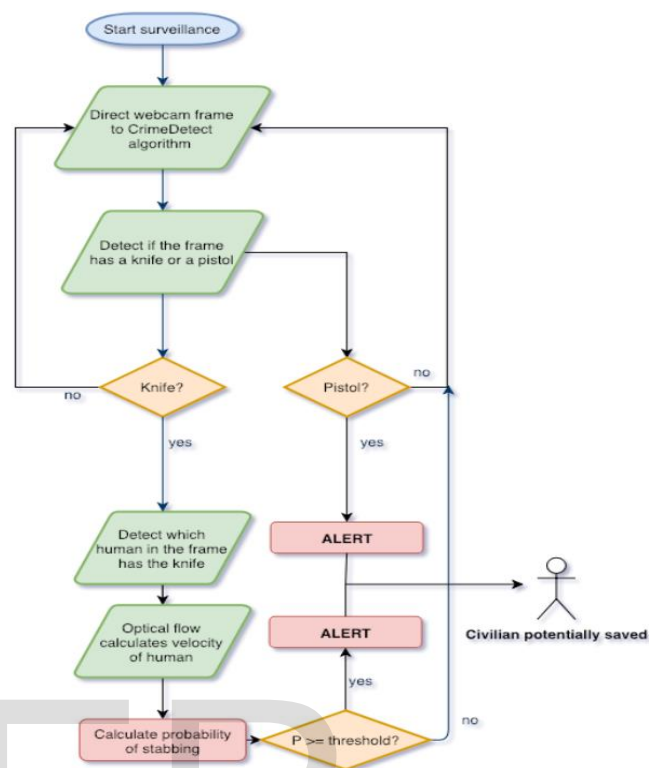
4. METHODOLOGY

In this paper we will be using certain algorithms to determine the human and object detection in the surveillance.
For Detection system we are using faster R-CNN deep learning algorithm. As in traditional CNN we take the image then we divide into regions. we will then consider each as separate image then pass all these regions to CNN as classify them into various classes. Once every region is divided into its certain classes, then we combine all the regions to get original image with the detected objects. We pass an object to the network and it then goes through various loops and pooling layers and then we get the output from the object class. We basically use R-CNN as it implements selective search to extract a bunch of regions in the image rather than the massive number of regions to check if any of these boxes contain any object that we require for our process. Process for R-CNN is as follows: -
1)It takes the images
2)It generates initial sub segmentation so that multiple images from the original image
3)The technique then combines certain same and relatable regions to form a layer region which is based on color, similarity, texture similarity, size similarity and shape compatibility.
But this algorithm has certain drawback that are overcome by Faster-RCNN. The slowest part in R-CNN in selective search or Edge boxes. Faster RCNN replaces selective search with a very small convolution network called Region Proposal network to

generate regions of Interest. Faster R-CNN introduces idea of anchor.

Secondly, for Motion Estimation we earlier used Open Pose library it created problems when the knife detector is integrated it hardly distinguished between human in the frame and who is holding the knife. Looking for alternative we found Motion estimation using Optical Flow to determine average speed of human Optical flow is basically a motion of object between consecutive frame of sequences, caused by the relative movement between object and camera. It is basically 2D vector field where each vector is a displacement vector showing movement of points from first frame to second. So Basically, for our project it is necessary as we have a knife and a person if person makes certain movement with the knife it should be captured instantly. It works on several assumptions

1)The intensities of pixel for the item do not change between the frame that are one after the other

2)The pixels that are present nearby have similar motion.

Lastly, for very low levels of lightning can render the knife undetectable by our algorithm, hence we are using gamma correction to try and increase the brightness of frame gamma correction also blurs the picture so we need to find a good level of gamma correction such that our object is not blurred.

5.RESULTS AND DISCUSSION

In this paper, the result is the final design of the project on topic "Criminal Activity Monitoring and Prevention Using CCTV Surveillance".

Since there it has intuitive GUI which displays the feeds and a event manager tab to store the images of the detected events.

Whenever there is a "situation of need" then the CCTV is active and captures the situation and responses accordingly. Here, algorithms are designed such that it can alert the respective authorities when there is a presence of any dangerous act, or an abnormal behavior of a person is detected. This can assure security to the public in the public places as well as in other locations such as offices, cinema halls etc. The major advantage of the project includes efficiency, fast to access and uniqueness. The behavioral analysis algorithm also makes it easier to monitor and prevent the crimes.
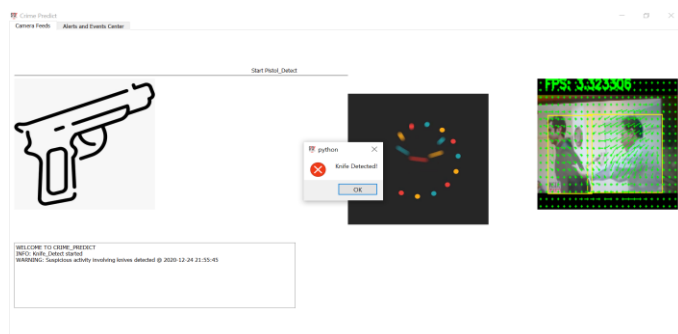

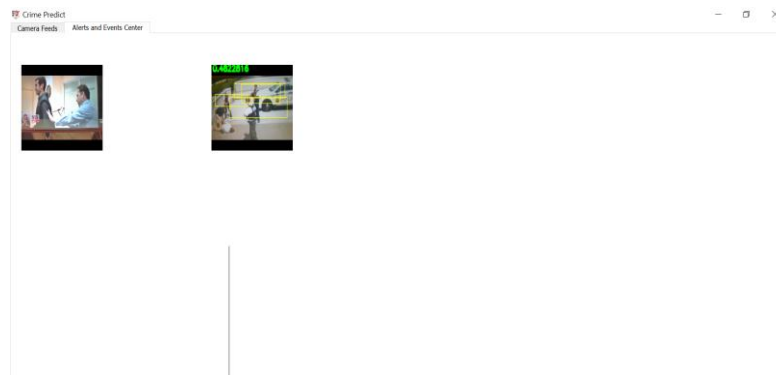**Fig 3: Camera feed for knife detection**
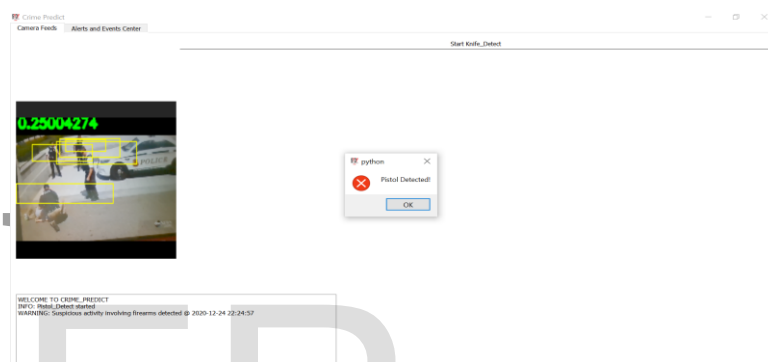

Fig 4: Events Center

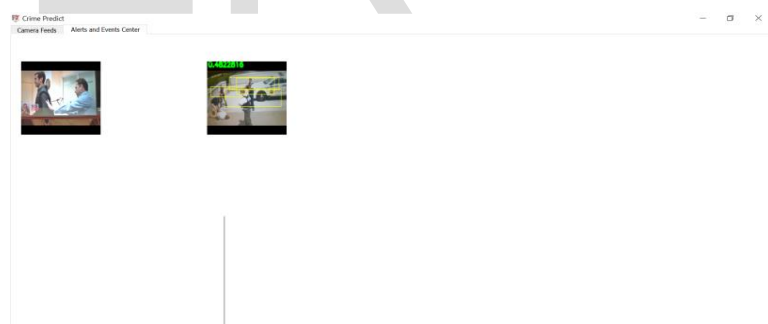**Fig 5: Camera Feed for Gun Detection**

Fig 5: Event Center

6.CONCLUSION

Surveillance by using the CCTV system has reached its great heights. Also, whenever we will be sending the information or data through the networks to any server the transmission process is a very crucial work.

CCTV surveillance systems are mostly managed by governments professional. As CCTV Information are very sensitive and confidential and also very difficult to handle. In this project, we have proposed certain algorithms that are able to alert the respective authorities if any abnormal behavior of a person is detected. We have limited the number of negative alarms in order to allow for a real-time working of the system to process well. This

proposed system we will implement first implement it at low scale then further we can escalate things to higher implementation. In the future, we will enhance the proposed system by implementing the night vision surveillance using the Infrared image enhancement. So that our project progress well and also gives us more coverage to handle the situation at night.

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