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An Intelligent Video Anomaly Detection System Using Deep Convolutional Methods

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ABSTRACT:

Safety has recently been given the utmost importance due to the rise in the number of anti-social triggers. CCTVs have been installed by several organizations to track people and their communications consistently. An established nation with 64 million people has 30 video recordings of every person every day. A large amount of video clip data is created and stored for a specific amount of time. A shot with a size of 704x576 and a frame rate of 25fps will undoubtedly produce around 20GB every day. It is nearly impossible for humans to continuously track information to determine whether certain events are unusual because it takes a workforce and constant attention. This results in the requirement to automate the same. Additionally, it is necessary to demonstrate which structure and which area of it contain the unexpected duty in order to make a quicker determination that the unusual activity is abnormal. This is accomplished by breaking up the video into frames and analyzing the people and their turns on in the resulting processed frame. Deep learning algorithms and techniques, along with machine learning, help us in a broad range of capabilities.

Keywords: GUI, Deep learning algorithm, unusual activity.

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1. INTRODUCTION

Both the human face andbehavioral patterns are crucial for personal identification. For such recognitions, aesthetic information is an essential source. Security video footage provides such aesthetic details that it can be used as live video footage or replayed for advice in the future. Even in the area of video clip analytics, the recent trend of "automation" is having an effect. Applications for video clip analytics include movement detection, human activity prediction, person identification, unusual activity recognition, car counting, people counting in crowded areas, and many more. In this field, face recognition and gait recognition especially are the two elements that are used for individual identification. Face acknowledgment is far more adaptable than the other two methods for automated person identification in surveillance footage. Face recognition can be used to predict a person's head orientation, which will help to foretell that person's behaviour. A person may be verified, recognized, and their presence or absence at a certain location and at a particular time can all be determined using motion recognition with face recognition. Additionally, human interactions such subtle eye contact between two people, head movement detection, hand motion recognition, and estimation are used to design a system that can effectively identify and also identify suspicious activities among students in an exam hall. This research offers a face recognition method for the detection of questionable human behaviour.

Two important fields, such as protection and research, both make use of video handling. Such cutting-edge technology makes use of clever calculations to track online videos. A real-time system needs to take into account a number of important elements, including time and computational complexity. For time-critical applications like bank robbery discovery, patient surveillance system, finding and also reporting suspicious activities at the railway terminal, and so on, the system that employs a formulawith a reasonably lower time complexity, using less hardware resources and also producing good results will be better. Around the world, manual tracking of testhalls using invigilators and manual

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tracking of test halls using monitoring videos are both used. It takes a lot of manpower to keep a test hall under control. Assessment hall monitoring that is manually operated while under human supervision may be inaccurate. Such a technology, when used as a "automated doubtful activity detection system," will undoubtedly aid in both the detection and the reduction of such actions. Additionally, there will undoubtedly be a lot less risk of error. For educational facilities, this device will be an invaluable surveillance system.

This paper describes a contemporary system that analyses real-time video recordings of people performing tasks in a testing environment to determine whether or not such tasks are problematic. The developed system detects irregular head motions, which limits copying. It also knows when a student switches places with another student or vacates his position. In the end, the technology detects communication between students and prevents the distribution of damaging information

among students. In our research, we've included a system that can analyse real-time video of classrooms filled with students taking exams and also determine whether or not their work is suspicious. This study suggests an intelligent algorithm that can assess students' performance in an exam room and alert the administration of the academic institution to any malpractice orsuspicious activity. The goal of the Suspicious Human Task Discovery system is to locate students who take pleasure in cheating or other suspicious behavior during an exam. The system detects questionable tasks automaticallyand alerts management.

RESEARCH ANALYSIS

A recent study by IMS Research [5] predicted that from 2008 to 2013, the global market for video clip content evaluation (VCA) software will expand at a rate of over 40% annually. Additionally, projections show that the VCA marketwill expand from roughly US$ 50 million in 2008 to US$ 140 million in 2012. Different scientists have proposed various video clip surveillance systems for various sorts of video data surveillance. One of the most popular methods for removing static historical images from video data in order to identify the moving things in the foreground was history

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removal [6, 7]. This method for extracting static background information from moving video clip data was suggested by Moeisund and Hilton. However, this method used the exact same hue to extract the foreground from history. For help in the conflict zone, CMS research participants supplied Video clip Monitoring and Tracking (VSAM) devices [8]. By utilising several sensors, VSAM enables a single human observer to examine numerous video clip frames in the same space. These sensors merely recognize strange actions in video footage and relay that information to a human observer so they can recognize the questionable task. The drawback of this approach is that it lacks the intelligence to identify suspicious activities in the video data. Using offline methods for researching historical information and behavioral trends the distinction between common and rare behaviours was first made by Tao et [9]. This approach organizes the currently available data according to various categories and also recognizes the pattern of data collection behavior to identify dubious activities.

Existing systems:

In surveillance tape, many activities appear strange under the covers, and some of them even put lives in peril. We pay particular attention to two circumstances and suggest solutions to spot them. Finding objects was challenging, and before arriving to a finish line, several indirect tactics and pipes were used. Standard methods used in indirect methods included efficient pipes to identify items together with custom functions and superficial neural network topologies to react to the resource limitations.

A. Research on Weapon Discovery

Some of the very early writing on the subject of weapon detection focused on looking at x-ray images [6] and infrared images [7] to find concealed weapons.These systemshad

manufacturers scanning through people and also objectsthat passed

through them, and the photographs obtained from them were examined using various techniques to find weapons. In one investigation [6],weapons were found in the fractionalphotographs using

the color-baseddivision,

the Harris interest factor detector, and FREAK. To

effectivelydetermine things,video an detection. A couple of these involved the

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identification of violent sequences in motion picture material [8] and the detection of handguns in video clips. [9] Some methods make use of transfer learning

[10] since it requires a lot smaller dataset and prevents the need to retrain an entire complicated network.

B. Study on Found Baggage Abandoned

Most tools that assist in identifying abandoned goods use backdrop reduction as their first step. However, some studies make an effort to minimize false-positive detections by combining the Blob Tracker and the Human Tracker. [11] The blob tracker frequently locates things and positions luggage in the most advantageous location. However, a tracker struggles to swiftly distinguish between groups of people that first appear to be mixed up, and it frequently misidentifies the sort of tracked goods by

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relying just on wheelchairs. [11] In some scenarios, a finite state robot is used to locate abandoned travel bags. However, their suggested method for finding abandoned bags lost out on two incidents, one brought on by darkness and the other by a failure in object surveillance. [12] Guler and Farrow apply a new stationary method along with moving item tracking to locate abandoned objects. Theirmethod consists of two key components: a tracker for locating and tracking movements, as well as a stationary item detector that enables the discovery and quick identification of abandoned objects. And to identify stationary items, their system uses a backdrop subtraction-basedtracker. [13] Systems for finding abandoned items have been developed, and they typically consist of four main components: foreground segmentation, moving object monitoring, stationary object surveillance, and also occasion discovery. [14] Using a backdrop subtraction technique, in which movingobjects are seen as the foreground andstationary ones as the background, is a common way to identify moving objects in a scene. These methods produce excellent accuracy and more cost effectively. To further improve precision by utilising deep understanding techniques, FgSegNet [15], a triplet CNN design proposed by Lim and Keles, is given.

Disadvantages:

1. However, as these tasks are too complex and resource-intensive for artificial intelligence to handle, human guidance is required to find such activities. One way to make a work easier to automate is by breaking it down into smaller tasks and identifying subtasks that could lead to criminal activity. We focus mostly on potential criminalpathways that we try to discover using our models.
2. Less accuracy.

PROPOSED SYSTEM

The proposed method makes use of a convolutional semantic network to extract different characteristics from the movies and to categories the recognized activities into legitimate and questionable activities.

Type of Input

The interface between a person and an information system is the input layout. It entails creating standards and procedures for data preparation, as well as the steps required to convert transaction data into a

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form that can be processed. This can be done either by having users key the data directly into the system or by having the computer read the data from a written or printed document. The input process is designed with an eye toward minimizing the quantity of input necessary, minimizing errors, minimizing delays, minimizing extra stages, and maintaining a straightforward workflow.

Output Planning

A quality output is one that shows the information clearly and complies with the end user's needs. Any system's outputs are how processing results are transmitted to users and other systems. It is decided during output design how information will be displaced for immediate demand as well as the hard copy output. It is the user's most crucial and direct source of information. The interaction between the system and aiding user decision-making is improved by efficient and intelligent output design.

1. It is important to design computer output in an ordered, well-thought-out manner. The correct output must be created, and each output component must be created so that users may utilize the system successfully and quickly. When analyzing computer-generated output, oneshould pinpoint the precise output that is required to satisfy the specifications.
2. Decide on how to convey the information.
3. Produce reports, documents, or other forms containing data generated by thesystem.

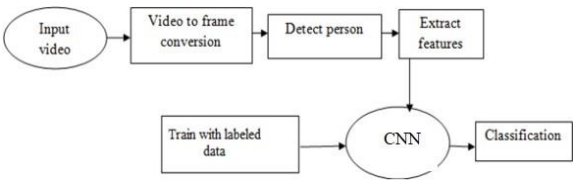

Fig.1. Proposed block diagram.

2. CONVOLUTION NEURAL NETWORK

A Convolutional Neural Network (ConvNet/CNN) is a Deep Understanding algorithm that can take in an input photo, give various characteristics and objects in the image importance (learnable weights and predispositions), and be able to distinguish between them. ConvNets require much less pre-processing than

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other classification algorithms do. ConvNets have the capacity to learn these filters and properties, whereas in basic approaches filters are hand-engineered.

A ConvNet's architecture was informed by the organisation of the Visual Cortex and resembles the connecting arrangement of nerve cells in

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the human brain. Only in a small area of the visual field known as the Receptive Area do private nerve cells react to inputs. Such fields are combined to cover the complete aesthetic spectrum.

DESCRIPTIONS OF OUTCOMES

The purpose of the position is to monitor suspicious activity on a campus using CCTV footage and alert security whenever something suspect happens. This was accomplished by using CNN to remove functions from the structures. Following extraction, the frameworks are classified as suspicious or normal course using style.

Fig.2.Input Video frame.

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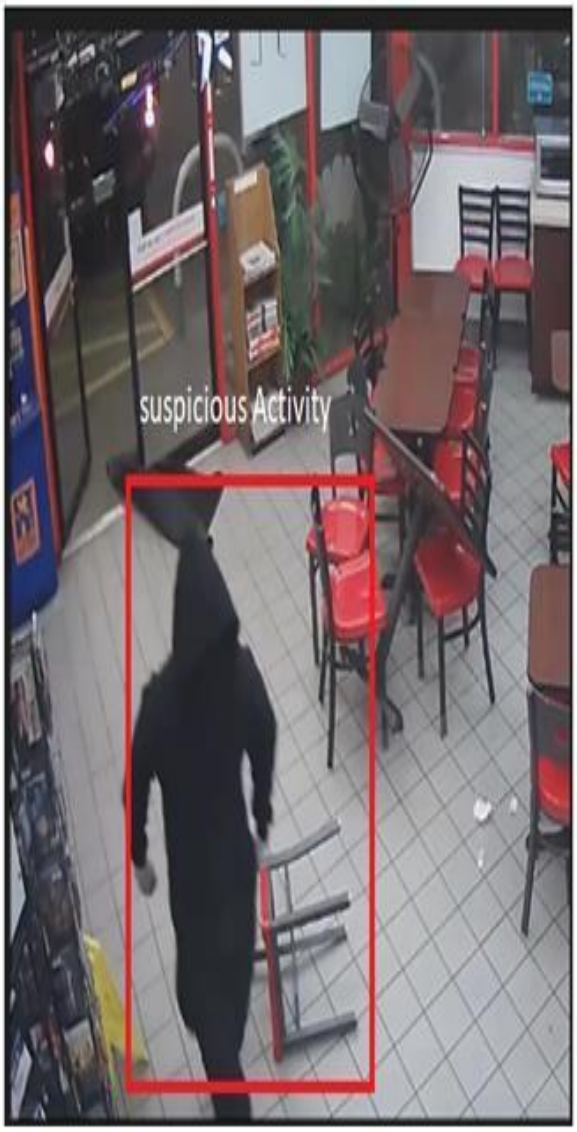

Fig.3. Output video frame.

Gathering video series from CCTV footage, extracting frameworks from videos, pre-processing images, preparing training and validation datasets from the datasets, training, and testing are the stepsfor building the entire system. The systemnotifies the appropriate authority through SMS when it detects suspicious behavior. The system was developed in Python on an open source platform. By creating a Twilio account and setting up the Twilio library in Python, SMS messages can be sent. Twilio enables sending and receiving text messages as well as phone calls programmatically.

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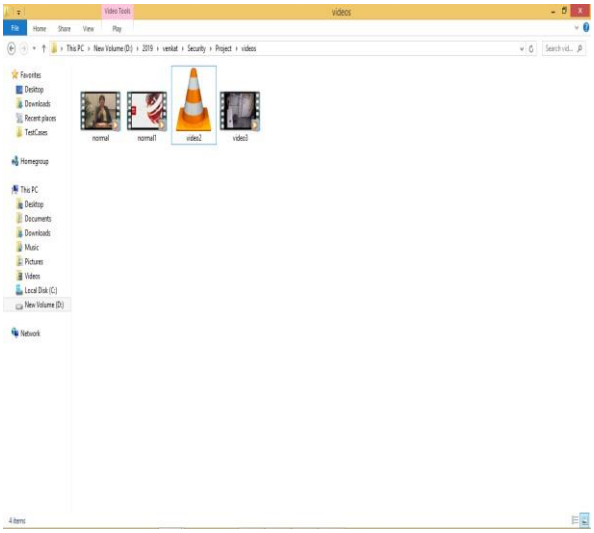
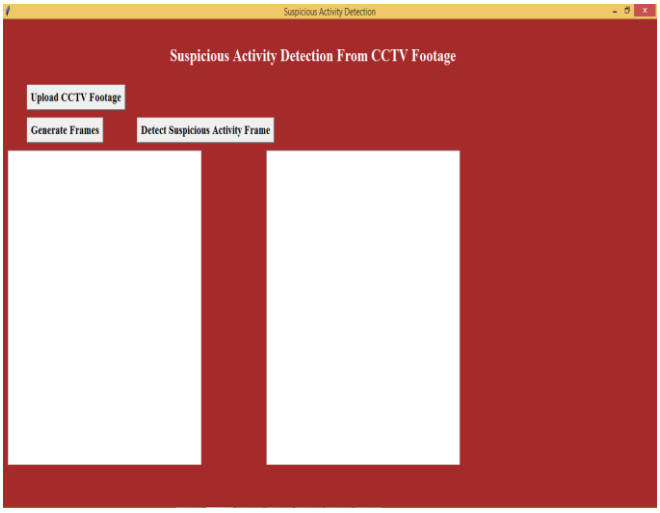
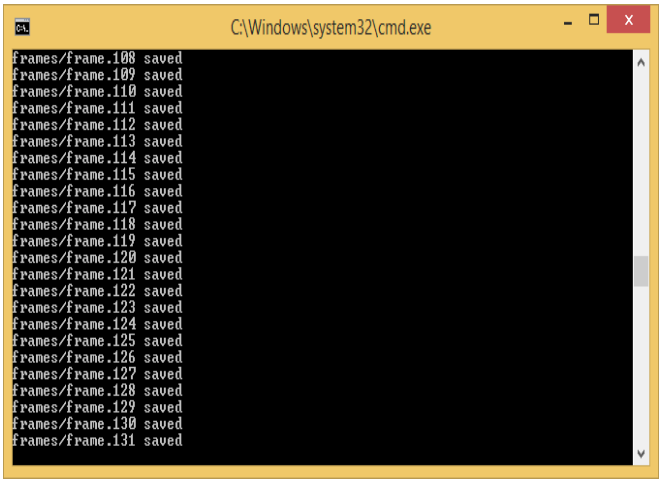
Selecting the video from the system to uploadto the GUI



Uploading the video to the GUI

GUI:





Conversion of video into frames

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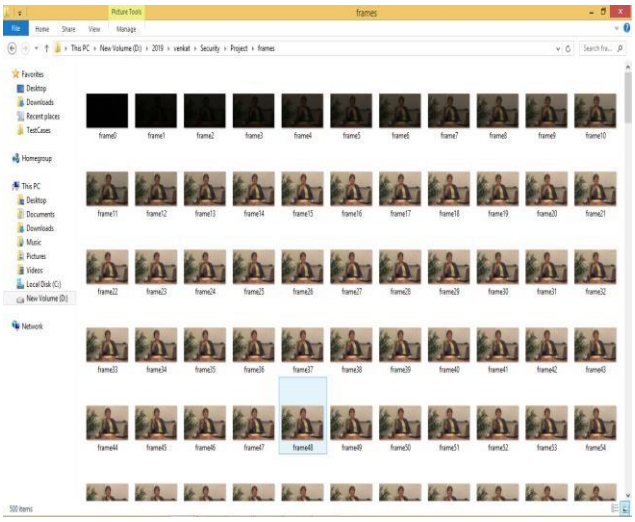
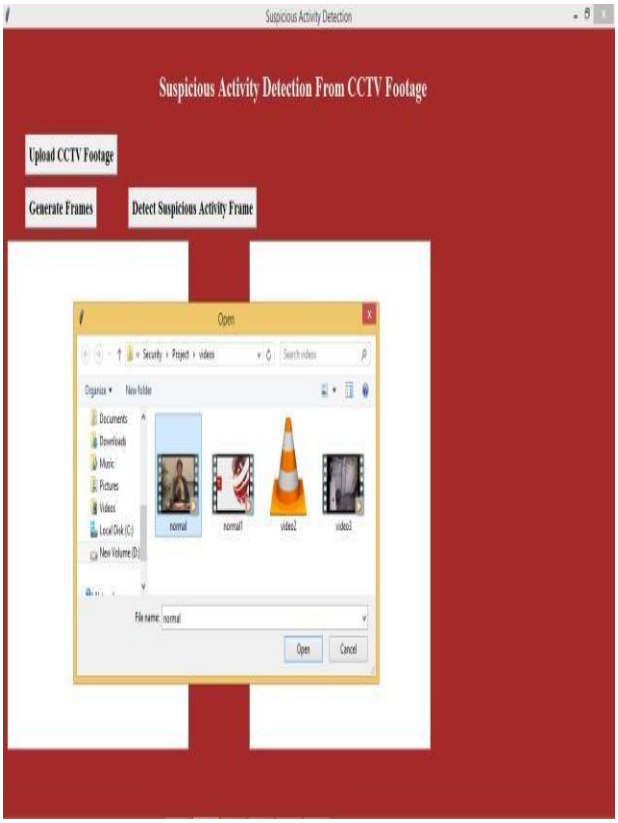
Generated Frames



Detection of Suspicious Activity



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Detecting Suspicious Activity and DisplayingIts Probability and Frame Number

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3. CONCLUSION

In light of current circumstances, developing an automated method for identifying dubious activity from video data for video clip security systems is crucial. Unfortunately, the majority of current techniques heavily rely on human observers, and there is no one structure that can satisfy this criterion. Here, we proposed an Intelligent Questionable Task Discovery Structure (ISADF) for video surveillance systems that is self-learning and observable of human activities and behaviors. This building had a video extraction unit that will extract the video clip information photos as framesets and send them to a video data processing unit for the detection of suspicious activity. The formula for actions analysis will compare present activity to prior experience to determine whether activity is dominant, atypical, or an unidentified task. Studies demonstrate that ISADF can analyze and recognize questionable tasks from KTH video clip data.

UPCOMING AMENDMENTS

Our research proposes experimenting with various architectures and comparing them to improve prediction speed in the future. Due to time and resource constraints, we were only able to complete the research to the point where it is in this report, allowing for future research on ways to speed up discovery in real time. It may also be advisable to conduct research on adding other features to real-time findings in addition to surveillance films.

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