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Real Time Security System using Object Motion Detection

S.Rajeswari,AP/IT[1] , Y.Lisha[2],C.Sankar[3],S.Sudhahar[4],K.Swetha[5],
[1] Assistant Professor, Department of Information Technology
[2,3,4,5] Final Year Student, Department of Information Technology
Indra Ganesan College Of Engineering,
Trichy , TamilNadu, India.

ABSTRACT

Nowadays CCTVs are installed at many places like jewellery shops, supermarket, hospitals, banks, etc. But the CCTV cameras continuously record the situations. Camera records everything then stored all. So, they need high storage space. Hence it is an unnecessary. Also the CCTV system does not provide alerts of burglary happening at particular night time. So there is a need of a system which will record the situation only if there is some movement happening in front of the camera and send alerts to the manager as well as the police. Object motion Detection System is developed from the security point of view. The objective of Real Time Security System using Object Motion Detection is to develop a system that monitors the area in which it is being deployed. In Object motion detection System, web camera is applicable in the area where no one is permissible to enter, also where we need to detect if any motion has been done. We can use camera for Object Motion Detection .The Camera is used to catch the live motion of the area in which it is being implemented, if any object is moving particularly in night time. The captured video is stored for further work. If motion is found in this video, the computer will start recording, buzz an alarm and send SMS to people listed in its database. In this way the system will provide the security against any misdeed.

Keywords: CCTV Surveillance, Image Processing, Bi-narration, Background Subtraction techniques.

I INTRODUCTION

Motion detection is the process of detecting a change in the position of an object relative to its surroundings. Motion detectors are often integrated components of systems that automatically perform tasks, or alert users of motion in an area. Moving Objects Detection and Image Compression are widely used low-level tasks in much computer vision Applications like surveillance, monitoring, robot technology, object recognition etc. Many approaches have been proposed for moving object detection and Image compression from videos, mainly dedicated to Human monitoring and visual surveillance .we present an automated video surveillance system for real-time security system. Here we use a single camera for detecting the object motion and tracking it over time. The main goal is to detect the object efficiently using background subtraction techniques, which aims to reduce the cost and to increase efficiency. This Security system presents a novel and simple method for moving object detection. The human object is captured; a database about the pixel values is used to train the system. Video Camera is fixed at a required place where security is needed Whenever human movement is captured by the camera it is immediately detected and the object is tracked by Frame difference method, finally the system is processed to make the alarm to produce sound. Detection of moving object from a sequence of frames captured from a static camera is widely performed by frame difference method. The objective of the approach is to detect the moving objects from the difference between the existing frame and the reference frame. After determination of differences, in order to find an image which shows the rate of movement, motion point must be classified in categories .To do this, first define the moving points to be recognized in image. Motion point is the point for which the rate of its whitening in difference image is more than threshold rate.

II LITERATURE SURVEY

When the object motion detection is very useful to law enforcement and police like government especially for jewellery shops, banks and etc. For monitor threats and prevent the criminal activities. The main goal is to detect the object efficiently using background subtraction techniques, aims to reduce the cost and to increase efficiency in the security systems. Motion features are derived from the motion vectors. The statistical distribution of these features during normal activity is estimated by training. The frame difference method is the common method of motion detection. This method adopts pixel-based difference to find the moving object .Approaches that detect the moving objects. For accurate detection, the motion must be accurately detected using suitable methods, but they are affected by a number of practical problems such as shadow and lighting change overnight time. This method is a fast and achieve better detection Performance. In , motion detection approach will reduce the unwanted recording of surveillance videos. This method consumes low power. . In background subtraction technique are used to detect the moving object and then remove the shadow in subsequent phase.This method scan from top to bottom for detecting the presence of an object .This method is able to detect foreground objects against new backgrounds.

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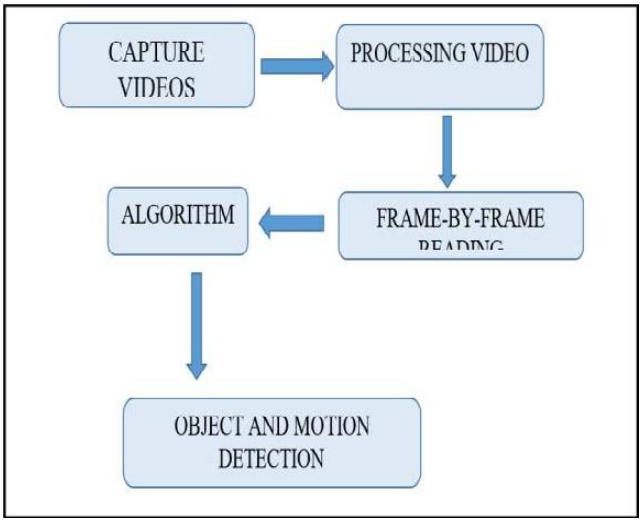
Temporal differencing to detect the moving object and give the alarming in time and produces high accuracy.



This method is a fast and achieves better detection performance. Temporal differencing to detect the moving object and give the alarming in time and produces high accuracy. This method is a fast and achieves better detection performance. Moving regions were obtained automatically by frame difference with an effective threshold selection algorithm.

Title: AVID: Adversarial visual irregularity detection

Authors: Sabokrou, Mohammad, Masoud Pourreza, Mohsen Fayyaz, Rahim Entezari, Mahmood Fathy, JürgenGall and Ehsan Adeli

Propose an end-to-end deep network for detection and fine localization of irregularities in videos (and images). Our proposed architecture is composed of two networks, which are trained in competing with each other while collaborating to find the irregularity. One network works as a pixel-level irregularity In painter, and the other works as a patch-level Detector.

After an adversarial self-supervised training, in which I tries to fool D into accepting its in painted output as regular (normal), the two networks collaborate to detect and fine-segment the irregularity in any given testing video. Two proposed deep networks, I and D area adversarially trained in a self-supervised setting. I learns to efficiently reconstruct normal (regular) regions and implicitly in paints irregular ones .D learns to score different regions of its input on how likely they are irregularities. Integrating the outputs of the pixel-level results from I, and the patch-level results from D provides a promising irregularity detection metric, as well as fine-segmentation of the irregularity in the visual scene. The results on several synthetic and real datasets confirm that the proposed adversarially learned network is capable of detecting irregularity, even when there are no irregular samples to use during training. Our method benefits from the advantages of both pixel-level and patch-level methods, while not having their shortcomings.

Title: Adversarially Learned One-Class Classifier for Novelty Detection

Authors: Mohammad Sabokrou, Mohammad Khalooei, Mahmood Fathy, Ehsan Adeli

The proposed framework applies to different related applications of anomaly and outlier detection in images and videos. Our architecture is composed of two deep networks, each of which trained by competing with other while collaborating to understand the underlying concept in the target class, and then classify the testing samples. One network works as the novelty detector, while the other supports it by enhancing the in lier samples and distorting the outliers. The intuition is that the separability of the enhanced inliers and distorted outliers is much better than deciding on the original samples. The proposed one-class classification framework is composed of two main modules: (1) Network R, and (2) Network D. The former acts as a prepossessing and Refinement (or Reconstruction) step, while the latter performs the Discrimination (or Detection). These two networks are learned in an adversarial and unsupervised manner, within an end-to-end setting. In this section, we present a detailed overview of both. It can be seen that reconstructs its input, X, generates X′ , and tries to fool D so that it speculates that the reconstructed sample is the original data, not a reconstructed sample. On the other hand, D has access to the original set of data and is familiar with their concept. Hence it will reject the reconstructed samples. These two networks play a game, and after the training stage, in which samples from the target class are presented to the model, R will become an expert to reconstruct the samples from the target class with a minimum error to successfully fool D. The training procedure leads to a pair of networks, R and D, which both learn the distribution of the target class. These two modules are trained in a GAN-style adversarial learning framework, forming an end-to-end framework for one-class classification for rnovelty detection.

Title: An efficient motion detection and tracking scheme for encrypted surveillance videos.

Authors: Guo, Jianting, Peijia Zheng,and Jiwu Huang.

Performing detection on surveillance videos contributes significantly to the goals of safety and security. However, performing detection on unprotected surveillance video may reveal the privacy of innocent people in the video. One promising solution to this problem is to encrypt the surveillance videos and performdetectionontheencryptedvideos.Mostexistingencryptedsignalprocessingmethods focus on still images or small data volumes; however, because videos are typically much larger, investigating how to process encrypted videos is a significant challenge. we propose

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an efficient motion detection and tracking scheme for encrypted H.264/AVC video bit streams,which does not require the previous decryption on the encrypted video. The main idea is to first estimate motion information from the bit stream structure and codeword length and, then, propose a region update (RU) algorithm to deal with the loss and error drifting of motion caused by the video encryption. The RU algorithm is designed based on the prior knowledge that the object motion in the video is continuous in space and time. Compared to the existing scheme, which is based on video encryption that occurs at the pixel level, the proposed scheme has the advantages of requiring only a small storage of the encrypted video and has a low computational cost for both encryption and detection. Experimental results show that our scheme performs better regarding detection accuracy and execution speed.

Title: Deep-anomaly: Fully convolutional neural network for fast anomaly detectionin crowded scenes

Authors: Sabokrou, Mohammad, Mohsen Fayyaz, Mahmood Fathy, Zahra Moayed, and Reinhard Klette

Abnormal events in video data are defined in terms of irregular shapes or motion, or possibly a combination of both. As a result of this definition, identifying the shapes and motion is an essential task for anomaly detection and localization. In order to identify the motion properties of events, we need a series of frames. In other words, a single frame does not include motion properties; it only provides shapeinformationofthatspecificframe.Althoughdeeperfeatures areusuallymorediscriminative, using these deeper features is time-consuming. In addition, since the CNN is trained for image classification, going deeper may create over fitted features for image classification. Going deeper leads to larger receptive fields in the input data; as a result, the likelihood of inaccurate localization increases which then has inverse effects on performance .a video is represented using a set of regional features.

These features are extracted densely, and their description is given by feature vectors in the output of the kth convolutional layer. A Gaussian classifier G1 (.) is fitted to all normal regional features generated by the FCN. Those regional features, for which their distance to G1 (.) is bigger than threshold α, are considered to be abnormal. Those ones that are compatible to G1 (i.e., their distance is less than threshold β) are labeled as being normal. A region is suspicious if it has a distance toG1beingbetweenαandβ.Allsuspiciousregionsaregivento thenextconvolutional layer which is trained on all normal regions generated by the pre-trained FCN.

III EXISTING SYSTEM

The normal cameras continuously record the situations. Camera records everything then stored all. so, they need high storage space.

- Fail to simultaneously utilize the rich information and relationship between still images
- Only implement image to image matching
- Performance is less at the time of face recognition.
- Need hardware system to detect abnormal event.

IV PROPOSED WORK

Proposed system focuses on implementing a Smart Camera which monitors the activity in the banks, it can detect any sort of suspicious behavior, and the thieves would be tracked on the basis of motion and the time based face detection. If any such suspicious face is detected in unwanted time, the Smart Camera will automatically send an alert message to the security department.

The message mentions what type of alert is generated; it also contains the image sharing when the face was detected with a web link where the live image is stored, so that the security can come with appropriate preparation.

The typical Gaussian mixture model takes a strategy as follows: For each pixel in new image, if the pixel is well described by any of the K Gaussian distributions, we update the background model by the learning rate, otherwise we replace the least probable distribution with a new distribution with the current value as its mean value, an initially high variance and low priority weight. The Gaussian mixture model is an on-line learning method; it can adjust the background model according to the environment around, such as lighting changes. A Gaussian Mixture Model is a parametric probability density function which is a weighted sum of Gaussian component densities. A Gaussian Mixture Model is used for modeling of the background is because it is one of the greatest model for background modeling. It models all different type of pixels. Anomaly detection which estimates the large cluster pixels value difference from the captured video. When anomaly analyzer estimates the large cluster pixel image then a mask is headed on that pixels and consequently the moving object is detected.

Advantages

- Build the relationship between the unbalanced distributions of still images and video clips of different quality
- Complexity is low and performance is high.
- Low time consuming for detection and provide alerts.

MODULES

- Video Capturing Framework
- Set Time based Storage
- Movement Detection
- Face Identification
- Send Alert Intimation

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- **Video Capturing Framework**

In this module propose a Surveillance Camera based theft detection along with tracking of thieves. Here use image processing to detect theft and motion of thieves in Surveillance Camera footage, without the use of sensors. This system concentrates on object detection. The security personnel can be notified about the suspicious individual committing burglary using Real-time analysis of the movement of any human from Surveillance Camera footage and thus gives a chance to avert the same.

- **Set Time based Storage**

Before capturing the activities by camera, Admin should set the time for predicting abnormal activities based on unwanted time period. This module takes input from the Human Detection by surveillance camera. When the human enters into the system it checks the timer to measure the time. When the predefined time limit for human detection is reached, the system sends the alert mail to the admin.

- **Movement Detection**

Motion Behavior of the human is analyzed in front of the system. If the system found any movement in the picture, the system without human intervention takes the snap of the detected image and executes the alarm according to the user settings. The first step is by acquiring video images from CCTV. Those images will be used for motion detection process. If a motion is detected, the information of time stamp and images with detected motion will be stored. The captured time value should check with database to predict normal or abnormal activity. The motion value will be compared to time threshold.

- **Face Identification**

Input is in the form of real time video capturing. Video images are splitted into still images. Face detection is done in the process. Facial features matching with database using grassman learning algorithm. The temporal information in video sequences enables the analysis of facial dynamic changes and its application as a biometric identifier for person recognition. There are different ways to form the feature vector for training the classifier. Some of them even use whole image as a feature vector and perform classification which needs high computation. So here feature vector is made from important values of the image from each filter Energy, mean and standard deviation forming a 40 value feature vector for every image.. We have utilize the human nature that human will have atleast small amount of movements such as eyes blinking and/or mouth and face boundary movements. We can get this information easily because dealing with video sequence by which thewholesequenceoftheobject'smovementscanbeobtained .Takingthatpointinto account we can reduce the error that occurs due to false detection of a human face and minimize the time of simulation.

- **Send Alert Intimation**

In a surveillance environment, the automatic detection of abnormal activities can be used to alert the related authority of potential criminal or dangerous behaviors, such as automatic reporting of a person. In proposed system unknown event alert send to the predefined contact numbers regarding particular officers. Here also implement image sharing identification of criminals.

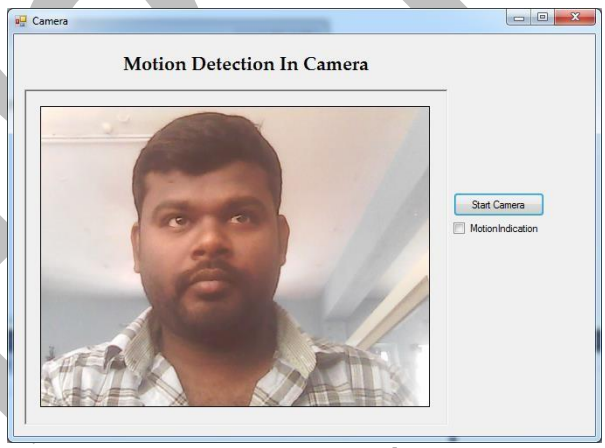

Fig 4.1 StartDetectioninUnwantedTime

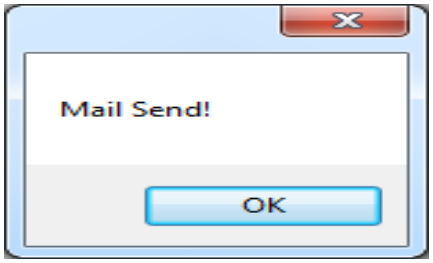

Fig 4.2 SendAlertEmail

V CONCLUSION

Various existing motion detection algorithms available to video surveillance systems are studied. But in most of the algorithm that does not completely detect the moving object because it causes some shadow and it requires large memory to store the video. The studies proved that the initial object mask problem are responsible for shadow present in the detecting moving object it will lead to degrade the accuracy of the system whereas the noisy region is dominant part of accuracy degradation. In our proposed scheme therefore, a best motion detection algorithm must be made for detecting the moving object without present of shadow, particularly for banking applications to improve the security. Furthermore, include an option to take snaps periodically, manually or automatically to store the image with less number of bytes

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.In future, it will implement in real time system.

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