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# Suspicious Movement Detection and Tracking based on Color Histogram

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**Abstract** - Video Monitoring systems are becoming highly important for crime investigation and the number of cameras installed in public space is increasing. However, many cameras installed at static positions are required to observe a wide and complex area. Detection of suspicious human behavior is of great practical importance. Due to changing of nature of human movements, consistent classification of suspicious human movements can be very difficult. Defining an approach to the problem of automatically finding people and detecting unusual or suspicious movements in Closed Circuit TV (CCTV) videos is our primary aim. We are introducing a system that works for monitoring systems installed in indoor environments like entrances/exits of buildings, corridors, etc. Our work presents a framework that processes video data obtained from a CCTV camera fixed at a particular location.

**Keywords**: Suspicious, Closed Circuit, Monitoring

## I. Introduction

Investigation and so the number of surveillance cameras installed in public space is increasing. Many cameras installed at fixed positions are required to observe a wide and complex area, so observation of the video pictures by human becomes difficult. So there is a need for automation and dynamism in such surveillance systems. In order to allow the different users (operators and administrators) to monitor the system selecting different Quality of Service (QoS) are required depending on the system status and to access live and recorded video from different localizations i.e. from their mobile devices. Automatic object detection is usually the first task in a multi-camera surveillance system and background modeling (BM) is commonly used to extract predefined information such as object's shape, geometry and etc., for further processing. Pixel-based adaptive Gaussian mixture modeling is one of the most popular algorithms for BM where object detection is

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formulated as an independent pixel detection problem. It is invariant to gradually light change, slightly moving background and fluttering objects. However, it usually yields unsatisfactory foreground information (object mask) for object tracking due to sensor noise and inappropriate GM update rate, which will lead to holes, unclosed shape and inaccurate boundary of the extracted object. While sensor noise can be suppressed through appropriate filtering, it is difficult to find an optimum update rate of the model because different objects behave differently in the scene. Furthermore, important information of the object such as edge and shape are not utilized in such method. Therefore, the performance of subsequent operations such as object tracking and recognition will be degraded. In this paper, a mean shift (MS)-based segmentation is proposed for improving the object mask obtained by AGMM. By using the segmentation information, holes within the mask can be significantly reduced through in painting and better alignment between the object boundary and those of the mask can be obtained. Occlusion of moving objects is a major problem in multi-camera surveillance systems. In existing multi-camera surveillance systems, occlusion problem is addressed by fusing the BM information obtained from the overlapped image information in adjacent cameras. These approaches, however, are not directly applicable to our non-overlapping setup. Therefore we propose to use stereo cameras, which offer additional depth information to resolve the occlusion problem. The next step in our proposed framework is object tracking over multi-camera network and it consists of two parts: 1) intra-camera tracking (tracking objects within a camera view); and 2) inter-camera tracking (associating the tracks of objects observed in different camera views). A comprehensive survey on intra-camera tracking algorithms can be found in and it can be classified into two categories in terms of tracking strategy: deterministic and probabilistic tracking. For the former, is the most popular because of its simplicity and efficacy? It only keeps a single hypothesis/candidate and utilizes the gradient of the data distribution for seeking the maximum possible candidate. Consequently, it is very computationally efficient. However, conventional MS tracker is prone to losing tracks due to rapid movement of the object. Moreover, its performance degrades considerably if

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significant occlusion occurs or there are similar objects in the scene. Monitoring: Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting. Surveillance is therefore an ambiguous practice, sometimes creating positive effects, at other times negative. It is sometimes done in a surreptitious manner. It most usually refers to observation of individuals or groups by government organizations, but disease surveillance, for example, is monitoring the progress of a disease in a community. The word surveillance is the French word for "watching over"; "sur" means "from above" and "veiller" means "to watch". The inverse (reciprocal) of surveillance ("to watch from below"). The word surveillance may be applied to observation from a distance by means of electronic equipment (such as CCTV cameras), or interception of electronically transmitted information (such as Internet traffic or phone calls). It may also refer to simple, relatively no- or low-technology methods such as human intelligence agents and postal interception.

## II. Related Work

- The Existing methodology is a switch is attached to the door which detects any intrusion attempted by intruders.
- Image is can be stored in the server and it can be retrieve after some time
- The interrupts GSM modem and the modem sends a per-configured warning SMS to the mobile phone in the remote location.
- Moreover there is no alert system to inform the admin when unknown object is detected.
- If the user acknowledges the pop-up, immediately a message is send back to the remote modem.

### 2.1 Drawback

There is no accuracy in the captured image.

- The moving object cannot be detected correctly.
- SMS alert about the motion detection to the user.
- Image cannot be retrieve at the time of motion detection.

## III. Proposed Work

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In the Proposed system, the moving object is identified using the image Cauchy distribution model method. The previous frame is compared with the current frame. From that the moving object is identified. Here we can detect the exact image of the moving object. Controlling home appliances remotely with mobile applications have started becoming quite popular due to the exponential rise in use of mobile devices. Another advantage of this system is when the threshold value is reaching the limit that time server detected as a motion. Then the system will alert the user automatically by sending a GCM alert to user's mobile application. User will be using Android Mobile for the Retrieval of Images from the remote place to know whether those images are important and can be ignored.

### 3.1 Benefits

- High accuracy in image capturing
- Send an SMS alert to user's mobile whenever a Moving object is detected
- Image can be stored in the server and can be view at the time of motion detection.
- User can view the image, via his Android mobile itself.

## IV. Absolute Effort Estimation Algorithm

It is a computational vision process of extracting foreground objects in a particular scene. A foreground object can be described as an object of attention which helps in reducing the amount of data to be processed as well as provide important information to the task under consideration. Often, the foreground object can be thought of as a coherently moving object in a scene. Absolute effort estimation algorithms a class of techniques for segmenting out objects of interest in a scene for applications such as surveillance. There are many challenges in developing a good Absolute effort estimation algorithm. First, it must be robust against changes in illumination. Second, it should avoid detecting non-stationary background objects and shadows cast by moving objects. A good background model should also react quickly to changes in background and adapt itself to accommodate

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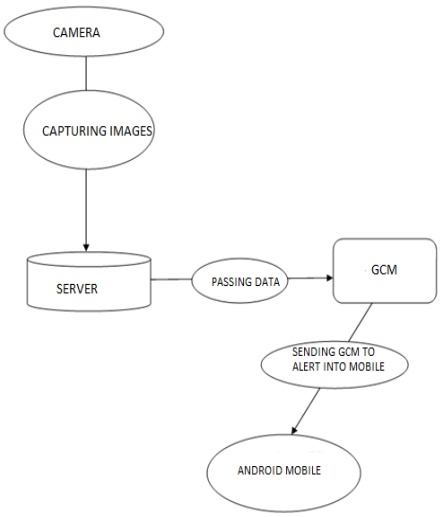
changes occurring in the background such as moving of a stationary chair from one place to another. It should also have a good foreground detection rate and the processing time for Absolute effort estimation algorithm should be real-time.

## V. Cauchy Distribution Model Algorithm

The Cauchy distribution, named after Augustine Cauchy, is a continuous probability distribution. It is also known, especially among physicists, Cauchy–Lorentz distribution, Lorentz function, or Breit Wigner distribution. The simplest Cauchy distribution is called the standard Cauchy distribution. It has the distribution of a random variable that is the ratio of two independent standard normal random variables. This has the probability density function its cumulative distribution function has the shape of an arctangent function .The Cauchy distribution is often used in statistics as the canonical example of a "pathological" distribution. Both its mean and its variance are undefined. The accurate detection of the pixels at each frame is calculated by the Cauchy distribution model which uses the absolute frame differential estimation. It is expressed as follows where is the location parameter and b is the scale parameter.

## VI. System Design




**GCM** - Google Cloud Messages

## VII. Methodology

### 7.1 User Authentication for Application

User authentication is a means of identifying the user and verifying that the user is allowed to access some restricted service. The main aim of these modules is to authenticate the user to application to view the motion detected image this module include username and password for authentication to application the validation is based on web service in server. All subsequent server requests from a user have the session key attached to it, allowing a lookup to be made against the supplied username to make sure the keys on the

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server and device match. If the keys do not match, the server responds with an unauthorized response code. The error handling on the device causes are authorization request' to be made to the server.

**7.2 GCM ID Generations for Unique ID Creation**

Google-provided GCM Connection Servers take messages from a 3rd-party application server and send these messages to a GCM-enabled Android application (the "client app") running on a device. Currently Google provides connection servers for HTTP. The 3rd-Party Application Server is a component that you implement to work with your chosen GCM connection server(s). App servers send messages to a GCM connection server; the connection server en queues and stores the message, and then sends it to the device when the device is online. The Client App is a GCM-enabled Android application running on a device. To receive GCM messages, this app must register with GCM and get a registration ID. If you are using the connection server, the client app can send "upstream" messages back to the connection server. For more information on how to implement the client app, see Implementing GCM Client.

**7.3 Object Motion Detection Model**

Video cameras assist in motion detection by capturing the objects of interest in the form of sets of image pixels where qualitative measurements such as recall and precision are used for assessment. The video tracker estimates the location of the object over a time by modeling the relationship between the appearance of the target and its corresponding pixel values. Determination of the relationship between an object and its image projection is very complex that makes the video tracking task difficult. Motion detection refers to the capability of the system to detect the motion and capturing the events. Motion detection is also called as activity detection, which is a software-based monitoring algorithm. It implies that when the system detects any motions the event is captured. The major application areas of motion detection methods includes visualization of traffic flow, to classify the highway lanes, driving assistance, face detection, interaction of human-machine and remote image processing.

## VIII. Conclusion

In this, Suspicious Movement Detection and Tracking based on Color Histogram has

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been implemented. A new object detection algorithm using color based MS separation and depth information is first implemented for improving background modeling and separation of occluded objects. The separated objects are then detected by BKF-SGM-IMS. Finally, a non-training-based object acceptance algorithm based on SP-EMD alteration measure is presented for detection of same object quoted in nearby cameras to achieve network-based detection. The usefulness of the proposed algorithms is decorated by experimental results and comparison with predictive methods.

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