ANDROID BASED AUTOMATIC ANAMOLIES DETECTION BY IoT DEPLOYMENT

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Abstract: Video surveillance structures are getting increasingly more essential for crime research and the number of cameras set up in public area is increasing. But, many cameras set up at constant positions are required to take a look at a wide and complex area. Detection of suspicious human behavior is of tremendous sensible significance. Defining a technique to the trouble of robotically monitoring humans and detecting unusual or suspicious moves in Closed Circuit Television (CCTV) videos is the number one aim. A widget is presented that works for surveillance structures mounted in indoor environments like entrances/exits of buildings, corridors, etc. The proposed system offer a framework that strategies video statistics obtained from a CCTV digital camera fixed at a selected place. There had been so many applications that make the most using GSM/GPRS facility of the handset. Many automated systems has been developed which informs the proprietor in remote vicinity approximately any intrusion or attempt to interfere inside the residence. The development of an Android utility which translates the message a cellular tool gets on possible intrusion and in the end a reply Short Message Service (SMS) provider which triggers an alarm/buzzer in the far off residence making others aware about the viable intrusion. The usage of threshold cost the detected pixel is identified. For this reason the motion of the item is diagnosed appropriately. After motion detection it will ship Google Cloud Messaging (GCM) alert to the android mobile application.

Index Terms: **Android, Google Cloud Messaging, Video Surveillance, Cauchy Distribution Model**

I. INTRODUCTION

The efficiency of using this traditional surveying for crime investigation has no accuracy within the captured image in addition to there's no SMS alert approximately the movement detection to the consumer. The transferring item cannot be detected efficaciously. The image can't retrieve at the time of motion detection. In an effort to efficaciously look at the sort of the extensive region of intrusion at lower value, the transferring item is recognized the usage of the photo Cauchy distribution model method. The pervious body is as compared with the present day body. From that the transferring object is diagnosed. Here stumble on the precise picture of the shifting item. Another advantage of this gadget is whilst the edge value is reaching the restriction that time server detected as a movement.

Gadget keeps two modes which day mode and night mode wherein in day mode handiest video reporting takes place and in night mode image shooting and evaluating with the template image takes area after detecting intrusion video recording takes area. If the intrusion is discovered, the server sends a notification to the legal customers via Global System for Mobile communications (GSM) modem/ cellular cell phone. A database is maintained that holds the mobile numbers of the legal users that needs to be contacted in case of intrusion. The database may be made to inventory those cellular numbers on the premise of precedence. The gadget additionally maintains the song of all of the sports. Consequently particularized document of messages dispatched and received is maintained. As quickly as the intrusion is detected, the consumer is knowledgeable about it and the machine starts recording the video. The consumer can login to the software and may view the modern videos. The customers can master the system from a remote area.

The system accepts instructions from directors that are then used to take vital movements. E.g. a command like "change mode" may be used to exchange the mode of the digital camera from day to smart mode or vice versa. The system handiest responds to owner's cellular numbers. Google Cloud Messaging (GCM) alert obtained from every other mobile will be rebuffed. Furthermore the communication through SMS is password included. Subsequently, another consumer too cannot manage the machine from one of the proprietor's mobile number. Therefore the movement of the object is diagnosed appropriately. After motion, discovery, it will send GCM alert to the android utility of the consumer mobile were shown in the Fig.1
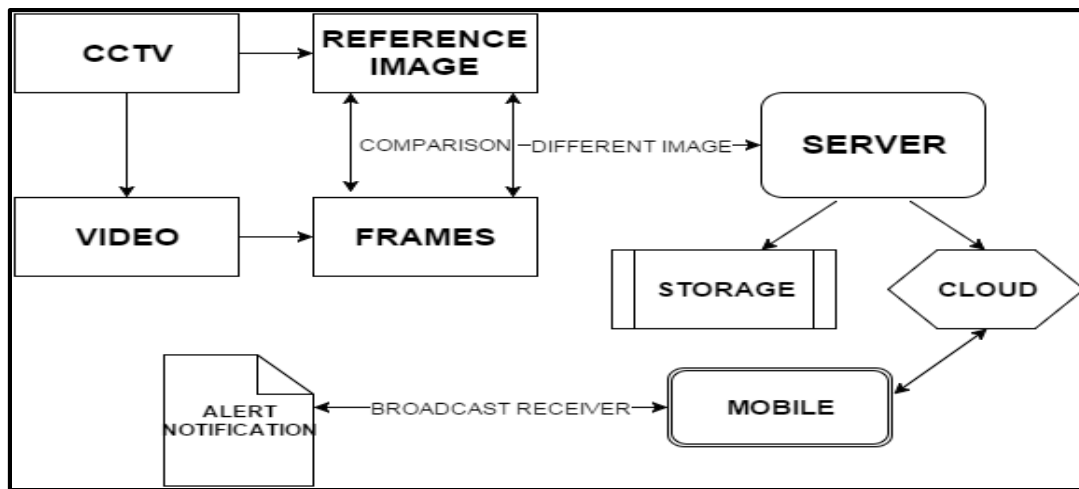
Fig.1 Data Flow diagram

II. LITERATURE SURVEY

The human observer associate degrees following in the video closed-circuit television proposes an approach to detect and track the persons in an exceedingly video. This approach uses mathematician Mixture Model to observe the person and the Kalman filter to trace the detected person. The interval to observe the person is reduced by playacting the detection operation on down-sampled video. Once sleuthing the person, the first size of the video is reconstructed mistreatment Papoulis-Gerchberg technique. The performance analysis is disbursed by comparison with the state-of-the-art-algorithms. The experimental results show that the planned technique is well matched for sleuthing and following the person in lower interval [1]. Automated, multiple camera police investigation and intelligent observance system that detects felony within the store victimization human behavior analysis that finds the activity of the persons united nations agency have mischief intentions. These systems generate warnings if they find a suspicious person or uncommon activity before the particular activity takes place. It additionally generates alerts for such events and sends a message of ascertaining activities through Wi-Fi to a personality's operator for immediate action and response call [2]. Abnormal event detection supported Support Vector Machine (SVM) in video police work proposes a completely unique hybrid optimization of feature choice and SVM coaching model supported genetic algorithmic program. For reducing the dimensions of multi-feature, Adaptive Genetic Simulated Annealing algorithmic program (ASAGA) feature choice technique is projected. The ASAGA takes advantage of the native search ability of the simulated hardening algorithmic program to resolve the slow convergence and high complexes drawbacks of genetic algorithm program. And additionally improve the SVM coaching model performance supported genetic algorithmic program. Experimental results demonstrate that the projected hybrid optimization supported genetic algorithms will quickly get the best feature set and SVM parameters. So the projected theme reduces time and improves the accuracy of police work video anomaly detection [3].

The CCTV has vied important role in several police work and security systems. However, such a system needs continuous watching by human is avoided victimization detector systems. Sensors solely notice events and don't offer info regarding the threat. Therefore the utilization of CCTV camera and detector systems severally might not be ample for timely detection of unwanted events. The humanitarian efforts in watching will greatly scale back by victimization activity analysis of video captured by CCTV. By analyzing the captured video, info regarding the threat and cause is obtained terribly quickly and accurately so as to require mitigating actions. However, within the absence of sunshine, the camera cannot notice such threat. To focus and style a system that may notice the threat in time under completely different lighting conditions victimization camera and detector network. The video police work provides a security by following uncommon activities of the individuals in CCTV videos and an immediate alert message is shipped to the revered owner [4]. The video police work systems turn out large amounts of knowledge of storage and show. Long-run human observation of the non heritable video is impractical and ineffective. The planned methodology is well-suited for contemporary video-surveillance architectures, wherever restricted computing power is on the market close to the camera for compression and communication. The rule uses the macro block motion vectors that area unit generated in any case as a part of the video compression method. Motion options area unit derived from the motion vectors. The system of those options throughout traditional activity is calculable by coaching [5]. A novel algorithm for view-invariant human action recognition is presented. This approach is based on Two Dimensional Principal Component Analysis (2DPCA) applied directly on the motion energy image or the motion history image in both the spatial domain and the transform domain. This method reduces the computational complexity by a factor of at least 66, achieving the highest recognition accuracy per camera, while maintaining minimum storage requirements, compared with the most recent reports in the field. Experimental results performed on the Weizmann action and the Iniria Ixmas data sets confirm the

excellent properties of the proposed algorithm, showing its robustness and ability to work with a small number of training sequences. The dramatic reduction in computational complexity promotes the use in real time applications [6].

III. EXISTING SYSTEM

Human pursue an Associate in Nursing automatic detection system of everyday incidence, cause the requirement of inventing Associate in Nursing intelligent closed-circuit television, which can build lives easier still as alter North American country to vie with future technology and on the opposite hand it pushes North American countries to research the challenge of the machine-driven video police work eventualities tougher visibility of the advanced computer science. Nowadays, it's seen that police work cameras are a unit already current in industrial institutions; with camera output being recorded to tapes that area unit either rewritten sporadically or hold on in video archives. To extract the most like this recorded digital knowledge, establish any moving object from the scene is required while not part taking any human eye to observe things all the time. Processes are recently thought of to symbolize the performance of video segmentation algorithms: pixel-primarily based mostly methods, model based mostly all methods and item-based techniques.

First object detection is not a classic binary detection hassle. Second, a couple of techniques are a unit based on the choice of remote pixels or rectangular areas with Associate in Nursing while not person's area chimerical assumption. One by third, it is not continuously possible to stipulate a singular floor truth .The prevailing technique could be a switch connected to the door that detects any intrusion tried with the help of intruders. The image is could also be held on at intervals the server and it's able to be retrieved once a while. The interrupt GSM electronic equipment and therefore the electronic equipment send Associate in Nursing according to-configured warning SMS to the mobile sensible phone within the remote place. What is more, there is not any alert system to tell the admin whereas the unknown item is detected. If the person acknowledges the pop-up, promptly a message is shipped once more to the faraway electronic equipment.

IV. PROPOSED SYSTEM

The proposed system suggests objective metrics to assess the performance of item detection strategies by using evaluating the output of the video detector with the ground fact received by using manual version. Several sorts of mistakes take into consideration: splits of foreground regions; merges of foreground regions; synchronic slice and merge of foreground regions; faux alarms, and detection failures. False alarms occur while the faux objects square measure detected. The detection failures square measure thanks to missing areas that have no longer been detected. Surveillance and tracking systems frequently require on line segmentation of all shifting items in a video series. Segmentation is a key step since it impacts the overall performance of the other modules, e.g., item tracking, type or popularity.

As an instance, if item type is needed, a correct detection is wanted to achieve an accurate type of the object. Background subtraction is an easy approach to locate moving items in video sequences. The primary concept is to subtract the cutting-edge frame from a historic picture and to categorize every pixel as foreground or history by comparing the distinction with a threshold. Morphological operations accompanied with the aid of a connected element analysis are used to compute all lively regions inside the picture. In the proposed device, the shifting item has identified the use of the photo Cauchy distribution model approach. The preceding frame is in comparison with the present day frame. From that the moving item is diagnosed. The exact images of the shifting item were detected. Any other gain of this machine is whilst the brink value is achieving the limit that time server detected as a movement. The device will alert the consumer routinely via sending a GCM alert to person's mobile utility. The user may use Android mobile for the retrieval of motion detection from the far off location to recognize whether the one pixel is crucial and can be left out.

4.1 Architecture of IoT Deployment

The video surveillance gadget refers to continuous tracking activities in a selected location via the CCTV cameras without the gain of intrusion sensor to direct interest to a particular place. Evaluation of scene takes region is followed with the aid of tracking. Assessment refers to analysis of the scene where undesired pastime has been detected. This kind of surveillance machine may be carried out in places where in effect, of loss may be tolerated. In different phrases, such machine does now not prevent the prevalence of undesired occasion. Effective safety device has to include a few computerized surveillance technologies to help in the detection characteristic and reduce the chances of occurrence of unfavorable event. So the attempt might be to stumble on of extraordinary activities using movement detection technique, item tracking techniques and pastime analyses. The security personnel will be furnished with an accurate area of such event so as to investigate and act as quickly as viable. The machine can be enabled to routinely report the complete adversary movement [10].
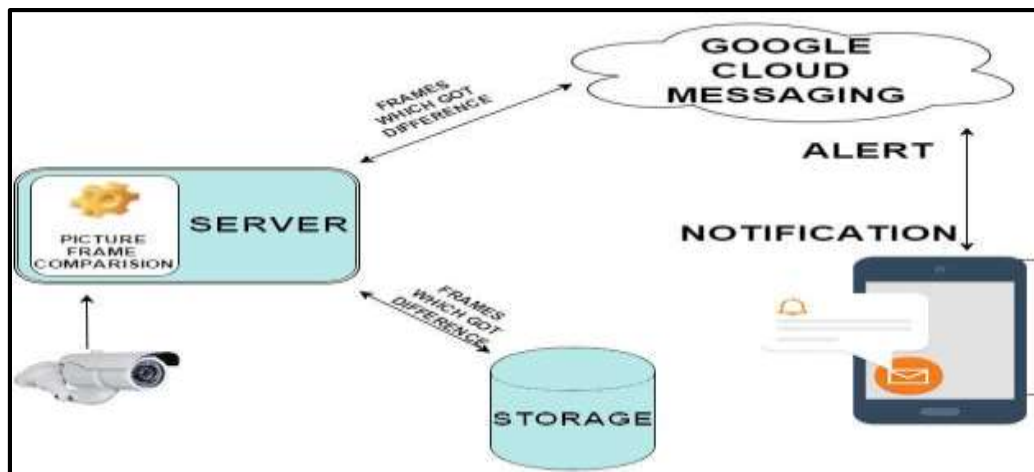
Fig.2 System Architecture

The system architecture which is shown in the Fig.2 above describes that the anomalous motion detection from the surveillance camera are captured. The captured pixels are in comparison with image processing systems of the previous body. These anomalies are stored inside the server for addition processing. The frames, which get difference from the current frame known as a heritage subtraction algorithm, are used. Hence the GCM receives the anomalies from the server due to the fact it's far used as a notification provider for alerting the consumer approximately the frames which get the distinction. Thus the consumer receives the anomalies in the form of alarm/buzzer notification detection from the GCM in the android cellular software. Consequently the person can be alerted from this notification by way of viewing eventually quick message provider SMS frames in keeping with Frames Per Second (FPS) in the remote locality too. By means of using the threshold value the detected anomalies are diagnosed. Therefore the movement of the object is mentioned appropriately and can put away the undesired event through taking immediate response and others be aware about viable intrusions.

4.2 ALGORITHMS AND TECHNIQUES

Abnormal motion detection is that the key to effective and economical video transmission, recording, alarm assessment in security systems. It often wants to determine the placement of a threat and therefore immediate mitigating actions are often taken before the prevalence of unsought event. The video surveillance system refers to continuous monitoring activities in a specific area through the CCTV cameras without benefit of intrusion sensor to direct attention to a specific area. Assessment of scene takes place is followed by monitoring. Assessment refers to analysis of the scene where undesired activity has been detected. This type of surveillance system can be implemented in places where the consequence of loss can be tolerated. In other words, such system does not prevent the occurrence of undesired event.

In Nuclear Industry, consequence of loss of an asset is unacceptably high consequently the better alternative for surveillance and alarm assessment system. The effective protection system must incorporate some automated surveillance technology to assist in the detection function and reduce the chances of occurrence of adverse event. Thus the attempt to detect of abnormal activities using motion detection technique, object tracking methods and activity analyses. The security personnel will be provided with accurate location of such event in order to analyze and act as soon as possible. The system may be enabled to automatically record the complete adversary action. Anomaly detection in data is the identification of patterns that do not match with normal behavior. And these anomalous patterns are also referred to as exceptions, outliers, novelties, noise, deviations, discordant observation in different application domain.

4.2.1 BACKGROUND SUBTRACTION ALGORITHM

Detection of motion in many current tracking systems relies on the technique of background subtraction. Background subtraction is a widely used approach for detecting moving objects in videos recorded from static cameras. The background image should be specified; it mustn't contain any moving objects and should be unbroken often updated to adapt the varied lighting conditions and pure mathematics settings. By subtracting background image from the incoming video frames, the presence of Associate in Nursing object and its motion is half-track. The methods also exist for background estimation, which will establish the model of background for the subtraction. There is no need to update background images. Graphical representation of background subtraction technique is shown in the Fig.3
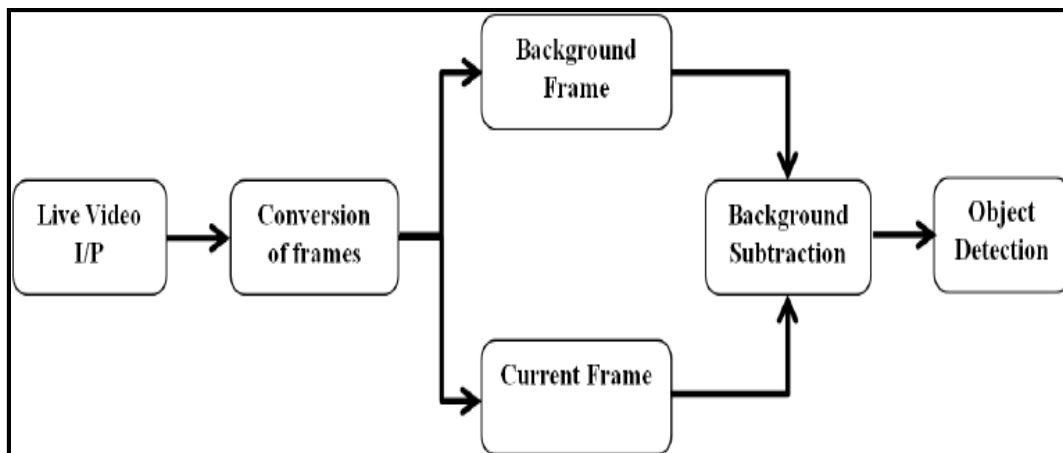
Fig.3 Background Subtraction Architecture

4.2.1.1 Estimating Median over Time

This algorithm will update the median value of the time series data based upon the new data sample. This will increment or decrement the median by an amount that is related to the running standard deviation and the size of the time series data. This approach will also apply a correction to the median value if it detects a local ramp in the time series data. Overall, the estimated median is constrained within Chebyshev's bounds, which are square root 3/5 of the standard deviation on either side of the mean of the data.

4.2.1.2 Computing Median over Time

This method will compute the median of the values at each pixel location over a time window of 30 frames.

4.2.1.3 Eliminating Moving Objects

This algorithm will identify the moving objects in the first few image frames and labels the corresponding pixels as foreground pixels. Next, the algorithm identifies the incomplete background as the pixels that do not belong to the foreground pixels. As the foreground objects move, the algorithm estimates more and more of the background pixels. Once the background image is estimated, it is subtracted from each video frame to produce foreground images. By thresholding and performing morphological closing on each foreground image, the model produces binary feature images. For human motion analysis also similar techniques are used. For real time performance, automatic surveillance needs to compute very complex algorithm very fast and accurately. For such a system, this algorithm needs to analyze not only the motion of people, but also the posture of the human. The postures of human can provide important clues for the understanding of their activities. A background-based estimation and body-based detection are performed to capture the human motion and analyze the human outline using various edge detection algorithms.

Activity analysis can be carried out by analyzing human posture in subsequent frames and can be classified as normal or suspicious behavior of human being present at the scene. As a result various such algorithms are analyzed and will come up with the new algorithm that will classify the behavior of the human in various categories and appropriate actions can be taken if the behavior is found to be suspicious. Hence the moving objects are eliminated by detecting the posture of human activities [9].

4.2.2 NEAREST-NEIGHBOR BASED ALGORITHM

Algorithms that square measure supported nearest-neighbor primarily based ways assume that the outliers exist distributed neighborhoods which they're distant from their nearest neighbors. Throughout the rest of the thesis, let k denote a positive number, or a true range, D the info sheet and partitions ⊆ D.

4.2.2.1 Neighborhoods

Report a bug the neighborhood is outlined because the set of points lying close to the thing and therefore poignant its anomaly scores. They're square measure 2 sorts of neighborhoods they're k-neighborhood and therefore the r-neighborhood. These neighborhoods square measures explained below.

K-distance (p) is up to do (p, q) where q ∈ D and q satisfies the following conditions.

K-neighborhood (p) is the set of objects that lie within k-distance (p)

R-neighborhood (p) is the set of objects lying within r distance from p.

The k-neighborhood (p) would be denoted by Nk (p) and therefore the r-neighborhood by N (p, r) for the remainder of the thesis. Density primarily based approaches that use k-neighborhood will face some issues just in case there are duplicates within the knowledge set. This arises because the density is reciprocally proportional to the space and just in case we've got a minimum of k+1 duplicates of some purpose, then the k-distance would be capable zero and therefore the calculated density would be infinite. The solution that was proposed be utilized for these cases. The solution states that the conditions of the k-distance defined above would

only apply to objects with distinct spatial coordinates. Meaning that if D = {p1, p2, p3, p4} where the coordinates of p2 is the same as p3 and d (p1, p2) = d (p1, p3) ≤ d (p1, p4), then 2-distance (p1) would correspond to do (p1, p4) and not do (p1, p3). It should be noted that the k-distance (p) is always unique, while the cardinality of the k-neighborhood set could be greater than k [7].

4.2.2.2 K-Nearest Neighbors

K-Nearest Neighbors (KNN) is a global distance based algorithm. The neighborhood used in this algorithm is the k-neighborhood. The anomaly score is either set to the average distance of the nearest k neighbor algorithm [8].

4.2.3 Local Outlier Factor

This is the first local density based algorithm. Local Outlier Factor (LOF) uses the k-neighborhood. Local density based mostly ways, compares the native density of the article to it of its neighbors. For the LOF to accomplish that the subsequent definitions were used. Reach-Dist (p, o) - The reach ability distance is that the most of d (p, o) and k-distance (o). It's principally introduced for smoothing native density. Local reaches ability density (lrd) -The native reach ability density of object p relative to Nk (p) is that the inverse of the mean reach ability distance over the neighborhood set. Local Outlier factor is that the quantitative relation between the typical native reach ability densities of the neighborhood to it of the item.

4.3 MODULES DESCRIPTION

4.3.1 Implementation

The proposed system presents GCM for Android is an unfastened carrier that facilitates builders sends statistics from servers to their Android applications on Android gadgets, and upstream messages from the user's tool lower back to the cloud. The application gives a framework that intentional video information received from a CCTV camera fixed at selected vicinity. Eventually, it includes four modules to complete the project successfully. It lets third party application servers to send messages to their Android applications. Many computerized systems has been evolved which inform the owner in a far flung vicinity about any intrusion or attempt to hinder within the location. As an example, the software would possibly post a notification, display a custom user interface, or silently synchronization information. After movement detection it will send GCM alert in the android mobile application and the user can view the detected motion.

4.3.2 LIST OF MODULES

4.3.2.1 User Registration for Application

A small module along with your login web page can play a completely significant position when it comes to normal internet site usability and imparting right user-revel in website visitors. Registered users generally offer some sort of credentials which include a username or email address, and a password to the machine a good way to prove their identity.

4.3.2.2 Motion Detection

The primary goal of this module is to locate the movement in the precise region. Movement detection is the system of detecting an exchange inside the role of an object relative to its surroundings or an alternate in the environment relative to an item. The movement detection is achieved the usage of the cauchy distribution model and absolute differential estimation. Absolute differential estimation is used to evaluate the background body and incoming video frame, if any changes occur in the incoming video frame. Cauchy distribution version is used to discover the pixel of shifting object within the detected incoming video body. Maximum, if now not all, surveillance cameras will give the option of selecting selected vicinity in the viewing display screen to be monitored. In other words, you can say which you most effective need to locate motion in a single region say the door or window.

There are two forms of motion changes which could occur that are able to have a usual exchange inside the pixels as if the lighting fixtures in the room went on or off. If the room has home windows via which incoming light will input, probably do not want to generate motion detection pixels simply because the seller is putting. So, by choosing a "sensitivity" placing that provides a comparison placing and determines how a good deal of a trade needs to be reported. In surveillance video, the frames that consist of a natural historical past scene are only a few. For a sample selection inside the historical past-updating level, a brand new planning is recommended. This approach fuses the video frames into one pure historical past scene to avoid any motion object being delivered into the background version.

4.3.2.3 Sending GCM Alert

Every time when a movement is detected then that picture is stored on the server and the server will notify the Google server. The Google server will send a GCM alert to the android software person mobile who are all registered in that software. GCM for Android is a carrier that permits to ship information out of the server on user's Android-powered device. This could be an inconsequential message telling the application that there are new facts to be fetched from the server or it could be messages enclose as much as 4Kb of payload statistics so the application like immediate messaging can devour the message at once. The application server builds a downstream message request from these fundamental additives: the goal, the message options, and the payload.
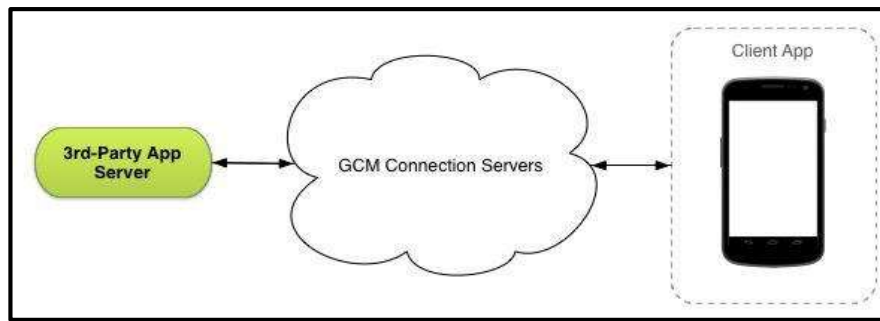
Fig.4 GCM Alert Notification

These components are commonplace among the GCM Hyper Text Transfer Protocol (HTTP) and Extensible Messaging and Presence Protocol (XMPP)   important predefined set of key alternatives for the user-seen part of the notification message. As an example, here's a Java Script Object Notation (JSON) formatted notification message. Notifications offer a smooth manner for builders to send a person-visible display message of the anomaly detection within the android software. The consumer can view the detected image by GCM alert were shown in the Figure 4 and might prevent the abuse.

4.3.2.4 Viewing the Detected Image

Android applications will receive the notification GCM based on project identity which is registered in Google account. Application id will be unique for each application. After receiving the GCM alert from the server to the application and the user needs to authenticate for the application. The image can be viewed using the Uniform Resource Locator (URL) which is received from the GCM alert. A moving security camera is positioned to monitor the area to detect a movement within that particular area. A moving object is detected within the monitored area is the first phase. The detection of a movement uses a simple but efficient method of comparing pixel image values in subsequent frames captured every two seconds from the surveillance camera. Two image frames are needed to detect any movement.

The first frame is called a reference frame, represents the reference frame values for comparison purpose, and the second frame, which is called the input frame, contains the moving object. The two frames, square measure compared and also the variations in component values square measure determined. Component values square measure threshold and saved in a very third frame that is named Associate in nursing output frame, with a black or white background. If the "difference" average pixel value is smaller than a certain threshold value, then the output frame image will be white otherwise, the background will be black. After tracking the moving object motion, the previous input frame will now be used as a reference frame, and a third frame is captured and is called now the input frame. This process is repeated with the frames being captured every second, where the same method is applied. If there is a difference between the reference and input image frames, then an output image is created. The obtained output image contains an object that will be extracted.

V. RESULTS AND DISCUSSION

Urban communities around the nation have been introducing camera frameworks as of late, regularly financed by government Homeland Security stipends, and numerous have detailed great outcomes, yet free research on their adequacy has been rare, as indicated by the Urban Institute. The report offers suggestions for enhancing the odds of accomplishing with reconnaissance frameworks, including:

5.1 Balance Utility with Privacy

Occupants must be shielded from attacks of protection, however, decides that are excessively strict can restrain the frameworks' adequacy. In the regions in the examination where wrongdoing rates didn't drop, police won't not had enough cameras and won't not have been currently observing them.

5.2 Invest in Active Monitoring

In spite of the fact that 24-hour, dynamic checking raises security concerns, Baltimore police said it gave them the best outcomes, once in a while enabling officers to get to a wrongdoing in advance.

5.3 Train Detectives and Prosecutors

Video is proving not just enables police to explore wrongdoings; it can be utilized as confirmed in court. In any case, it has its points of confinement, especially if a wrongdoing was recorded in terrible climate or during the evening, or if the camera did not get the greater part of a wrongdoing since it was not being observed. When checking, police can coordinate the camera; else, it does over a region. Baltimore prosecutors detailed running into the "CSI impact," in which juries expect top notch criminology and

specialized proof, and may be affected if video prove indicates just a piece of a wrongdoing in light of the fact that the camera panned away. The report suggests prosecutors be prepared in the most ideal approaches to display reconnaissance film as proof.

VI. CONCLUSION

An effective video surveillance in the present day system overcomes the traditional surveying in which human intervention is needed and has to watch keenly for keeping tune of the complete machine. However, this android application has introduced a unique approach that is a first-rate gain to the traditional widget. Right here utilization of Android mobile is critical, so one can efficiently seize the snapshot. The proposed system also has a unique function in which it sends a GCM alert at once there's any sort of variation in the captured pixel. Also in rationale to devote this undertaking to many vital surveillance areas in order that many unwanted things may be prevented. Real time tracking of human movements offers a powerful approach of inferring someone's level of pastime. The advantage of GCM technique is that allows human operators to apply context-based indicators and the reaction to these signals is a whole lot faster.

REFERENCES

[1] Sriram, K.V, and Avaldar R.H. 2017. Human detection and tracking in video surveillance system. IEEE Transactions on Computational Intelligence and Computer Research, ISSN: 2473-943X, Volume 176, pp.749-756.

[2] Kamala. P, Ranjini RS, and Manjula. P. 2015. Automated intelligent surveillance using human behavior analysis in shopping malls. International Journal of Computer Science and Information Technologies, Volume 6, ISSN: 0975-9646, pp.4392-4396.

[3] Yingying Miao, and Jianxin Song. 2014. Abnormal event detection based on SVM in video surveillance. IEEE Conference on Advanced Research and Technology in Industry Applications, Volume 10, Issue 6, pp.134-145.

[4] VipinShukla, Gaurav Kumar Singh, and Dr. Pratik Shah. 2013. Automatic alert of security threat through video surveillance system. International Journal of Computer Architecture , Mobility, ISSN:2319-9229, Volume 1, Issue 6, 201-250.

[5] Nahum Kiryati, Tammy RiklinRaviv, Yan Ivanchenko, and Shay Rochel. 2013. Real time abnormal motion detection in surveillance video. FLARIS Conference, Volume 1, pp.369-372.

[6] Mohamed A.Naiel, MoatazM.Abdelwahab, and Motaz El Saban. 2012. Multi-view human action recognition system employing 2DPCA. IEEE Transactions on System, Man, Cybernetics, Volume 40, no.1, pp.13-24.

[7] Pingkun Yaan, Saad M.Khan, and Mubarak Shah. 2012. Learning 4D action feature models for arbitrary view action recognition. International Conference on Automatic Face and Gesture Recognition, pp.157-163.

[8] Juan Carlos Neibles, Hongcheng Wang, and Li Fei-Fei. 2011. Unsupervised learning of human categories using spatial temporal words. IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Volume 3, pp.1249–1258.

[9] Jacinto Nascimento, and Jorge Marques. 2011. Performance evaluation of object detection algorithms for video surveillance. IEEE Transactions on Pattern Analysis and Machine Intellectual, Volume 3, pp.965–969.

[10] Ivan Laptev, MarcinMarszałek, CordeliaSchmid, and Benjamin Rozenfeld,. 2010. Learning realistic human actions from movies. International Journal of Computer Vision, Volume 64, pp.107-123.