

# **DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING**

**Submitted in partial fulfilment of the requirements for the award of  
Bachelor of Engineering degree in  
Electronics and Communication Engineering**

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**INSTITUTE OF SCIENCE AND TECHNOLOGY  
(DEEMED TO BE UNIVERSITY)**

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**BONAFIDE CERTIFICATE**

This is to certify that this Project Report is the bonafide work of **CHENNA BHERUNADH (37130081) AND DANTHAM DHARMA TEJA (37130097)** who carried out the Project entitled "**DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING**". Under the guidance of **DR. P. CHITRA, Ph.D.**, during the period NOV 2020 to APRIL 2021

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# DECLARATION

We **CHENNA BHERUNADH (37130081) AND DANTHAM DHARMA TEJA (37130097)** Here by declare that the Project report entitled **DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING** is done under the guidance of **Dr.P. CHITRA Ph.D.**, is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in **ELECTRONICS AND COMMUNICATION ENGINEERING**.

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## **ABSTRACT**

The fast development in cash machine Machines (ATM) has made life simple for the lifestyle, except it is not so for administrators who oversee it. ATMs aren't claimed by banks rather they're outsourced to Managed service providers (MSPs) from acquiring to maintaining the machines. A few variables just like the support, cash filling and security. Since the entire motivation behind an ATM benefit is to reduce manual connection and provides administration to the client through mechanization, it's imperative that the safety gave is likewise programmed and proficient. The exchanges through ATM's are expanding quickly alongside some different exercises due to less security. Thus, through the human stance typicality and anomaly identification and Analysis utilizing SIFT (Scale-invariant feature transform) and Gabor include extraction process and Machine Learning (ML) classification technique in ATM machine focuses; the above issue proclamation is often overcome.

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# **CHAPTER1**

## **INTRODUCTION**

### **1.1 OVERVIEW**

Image processing is a strategy where the information is a picture, for example, a photo or video outline; the yield of picture preparing might be either a picture or, a bunch of qualities or boundaries identified with the picture. Picture preparing ordinarily alludes to computerized picture handling, yet optical and simple picture preparing additionally are conceivable. Image processing is used in various applications such as:

- Computer Vision
- Face Detection
- Machine Vision
- Medical Imaging
- Remote Sensing

Computer vision is the field concerned with the automated processing of images from the real world to extract and interpret information on a real time basis. It is the science and technology of machines. PC vision covers the center innovation of computerized picture investigation which is utilized in numerous fields.

The applications of computer vision include systems for:

- Controlling processes.
- Navigation
- Detecting events.
- Organizing information
- Modeling objects or environments

Video reconnaissance is expanding importance approach as associations try to safe gatekeeper physical and capital resources. Simultaneously, the need to notice more individuals, spots, and things combined with a craving to pull out more helpful data from video information is inspiring new requests for versatility, abilities and limit. These demands are exceeding the facilities of traditional analog video surveillance approaches. Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people. It is sometimes done in a surreptitious manner. Surveillance video recording is getting universal in day by day life for public territories like general stores, banks, and air terminals. Investigating human action is one of the critical assignments to comprehend and look through observation recordings. It most as a rule alludes to perception of people or gatherings by government associations, Surveillance is helpful to governments and law authorization to keep up friendly control, perceive and screen dangers, and forestall/examine crime. Observation video recording is getting pervasive in every day life for public territories like stores, banks, and air terminals.

## **1.2 PROBLEM STATEMENT**

Detection and Tracking is a common phenomenon in video motion analysis. Detection and tracking is for reveal the moving object and to track the action of the moving object in the video using image frame sequence. Moving object detection in a video is the process of recognize different object regions which are moving with respect to the background and in action tracking method the movements of objects are constrained by environments. In action tracking, the human motion analysis monitors the behavior, activities or other changing information. So it creates a need to develop the action tracking in video surveillance for security purpose.

## **1.3 OBJECTIVES**

The objectives of the proposed system are

- To notice the moving object in video

Detection is used to detect the moving object in sequence of frames.

- To track the motion of the moving object.

Motion tracking is used to compare the object with the current and previous frame to track the particular movement of the object.

- To track the action of the moving object.

Action tracking is used to identify the behavior of the moving object.

## **1.4 APPLICATIONS**

The study of detection and tracking of moving object attracted more attention recently for its application in many areas including:

- People tracking
- Video surveillance

- Safety monitoring
- Security and Biometrics
- Traffic and road management
- Web Applications
- Medical and biomedical
- Sports analysis, etc.,

## **1.5 ORGANISATION OF THE THESIS**

The remainder of this thesis is organized as follows: Chapter 2 presents a literature review of the moving object detection and moving object tracking, and recent related work; Chapter 3 deals with the design of the proposed system; Chapter 4 presents the implementation result analysis; Chapter 5 summarizes the thesis.

## **CHAPTER 2**

### **LITERATURE SURVEY**

#### **2.1 INTRODUCTION**

videos are really groupings of pictures, every one of which called a casing, shown in quick enough recurrence so natural eyes can percept the congruity of its substance. Clearly all picture preparing strategies can be applied to singular edges. In addition, the substance of two successive casings are generally firmly related. Visual substance can be displayed as a progressive system of deliberations. At the main level are the crude pixels with shading or splendor data. Further preparing yields highlights like edges, corners, lines, bends, and shading districts. A higher deliberation layer may consolidate and decipher these highlights as articles and their qualities. At the most significant level are the human level ideas including at least one articles and connections among them. Article identification in recordings includes checking the presence of an item in picture arrangements and perhaps finding it decisively for acknowledgment. Item following is to screen an article spatial and fleeting change during a video succession, including its essence, position, size, shape, and so on This is finished by tackling the worldly correspondence issue, the issue of coordinating with the objective district in progressive edges of a succession of pictures taken at intently separated time spans. These two cycles are firmly related on the grounds that following normally begins with distinguishing objects, while recognizing an article more than once in resulting picture succession is frequently important to help and check following. A technique for finishing an article progressive picture edges to decide its general development as for different items. Items can be addressed by their shapes.

#### **2.2 EXISTING SYSTEMS**

Works reported in this detection and tracking literature surveyed as follows,

### **2.2.1 Moving Object Detection and Tracking**

Badri Narayan Subudhi et al (2011) have proposed “A Change Information Based Fast Algorithm for Video Object Detection and Tracking” Spatio-temporal spatial and temporal segmentation is used to identify moving objects and to track them. A compound Markov arbitrary field (MRF) model is utilized as the earlier picture trait model. To track down the spatial conveyance of shading, transient shading soundness and edge map. It manages location and following of sluggish articles. This reduces the effect of silhouette on the generated VOP. A centroid based tracking process is considered to track the objects.

The main disadvantage of this method, it is not dealing with human behavior analysis and in real time situations. For temporal segmentation a CDM based on a difference of labels of two frames is considered.

Shengluan Huang et al (2010) have proposed the method that the system is designed for tracking moving targets and it has good robustness. To improve the matching accuracy of the candidate target and object target. Hybrid algorithm is used with occlusion handling, it is more robust and achieve a good tracking and to overcome the defect of occlusion in the process of tracking moving object.

The main disadvantage of this method is, Camshift affected by the probability distribution of the color image. It does not deal with the robustness improvement for target location. In the occlusion processing, the program of linear prediction is combined with kalman filter.

Mark S. Drew et al (2009) have proposed “Action Detection in Cluttered Video with Successive Convex Matching” Successive convex programming scheme is used to match video sequences using intra-frame and inter-frame constrained local features. Human activities are addressed as groupings of stances, and explicit activities are recognized by coordinating with present successions. Address activities as the advancement of postures and shapes, the proposed technique can distinguish activities in recordings that include quick camera movements.

The main disadvantage of this method is by convexifying the optimization

problem sequentially with an efficient linear programming scheme which can be globally optimized in each step, and gradually shrinking the trust region. Successive convex matching has unique features: it involves a very small number of basis points and thus can be applied to large-scale problems that involve a large number of target points.

Khurram Shafique et al (2009) have proposed the technique Markov Chain Monte-Carlo (MCMC) based system for creating the most probable ways in the scene, improving foreground recognition, steady naming of items during following.

It is used in the applications such as scene analysis and surveillance. It encodes the probabilistic idea of the conduct of moving articles in the scene and is valuable for action investigation applications. The main disadvantage of this method is it does not deal with full occlusions.

Yaakov Tsaig et al (2008) have proposed “Automatic Segmentation of Moving Objects in Video Sequences: A Region Labeling Approach” A new algorithm is introduced for automatic segmentation of moving objects in image sequences for VOP extraction. The algorithm is based on a MRF model defined over region adjacency graph uses motion information to classify regions as foreground or background. A dynamic memory, in light of article following, is consolidated into the division interaction to keep up worldly intelligibility of the division.

The main disadvantage is the robustness for separation foreground and background regions. MRF model defined over a region adjacency graph, which uses motion information to classify regions as foreground or background. The location of object boundaries is guided by the initial partition, which consists of color-based watershed segmentation. A hierarchical motion estimation and validation scheme detects moving regions in the scene, while avoiding misdetections caused by the occlusion problem.

### **2.2.2 Action Tracking**

Yang Wang et al (2011) have proposed a technique hidden conditional random field (HCRF) for object recognition. For object acknowledgment, this technique consolidates both huge scope worldwide highlights and neighborhood fix highlights to recognize different activities. The max-margin hidden conditional random field (MMHCRF) out performs HCRF in human action recognition. MMHCRF can handle a much broader range of complex hidden structures arising in various problems in computer vision.

The main disadvantage of this method, does not deal with handle things like partial occlusion, viewpoint change, etc. It requires more robust features.

Liang Wang et al (2011) have proposed "Elastic Sequence Correlation for Human Action Analysis" Elastic sequence correlation framework analysis based on action pattern retrieval and action recognition. Getting query sequence  $q$  of length  $m$  as input and database  $r$  of length  $n$  and compare the query with database for action detection. It deals with scale space issue and speed up with non-repetitive patterns temporal scaling spaces.

Chang Liu et al (2011) have proposed "A Boosted Co-Training Algorithm for Human Action Recognition" two new confidence measures namely, inter-view confidence and intra-view confidence are proposed. To address the view-sufficiency and view-dependency issues in co-training process. Common data is utilized to evaluate the between see vulnerability and measure the autonomy among separate perspectives. Intra-view confidence is estimated from boosted hypotheses to measure the total data inconsistency of labeled data and unlabeled data. The disadvantage is the optimization of the multi-class semi-boost.

Chong Ding et al (2010) have proposed "Tracking and Activity Recognition through Consensus in Distributed Camera Networks" distributed scene analysis algorithms by leveraging upon concepts of consensus that have been studied in the context of multiagent systems. Camera assesses certain boundaries dependent on its own detected information which is then shared locally with the adjoining cameras in an iterative design, and a last gauge is shown up at in the organization utilizing consensus algorithms.

The main disadvantage of this method is the integration of tracking and activity recognition into a single framework and more complex activities that span a larger area.

Teresa A. Vidal-Calleja et al (2010) have proposed a proper movement orders during 6-DOF visual concurrent restriction and planning with a handheld camera. Framework has been ported to a mobile robotic platform, thus closing the control-estimation loop. SLAM implementations: 1) a video-rate handheld SLAM system; 2) a mobile robot with non-holonomic and terrain constraints; and 3) an APF for obstacle avoidance. The environment is changing with time in an unknown manner; sensors that can enable the vehicle to navigate in these environments are well motivated.

The main disadvantage of this method is the requirement of computational complexity in computing entropy does not permit large maps. The information-based approach to action selection is that it estimates the utility of measures, assuming correct motion and measurement models.

### **2.3 ISSUES IN THE EXISTING SYSTEMS**

The following are the main issues surveyed from the literature of detection and tracking, and the human behavior analysis.

1. Existing methods are not concentrating on the action tracking.
2. Not dealing with the partial and full occlusion in human detection.
3. Requirement of target points is large.
4. Detection and tracking method requires better feature extraction.
5. Existing does not deal with the real time applications.
6. Requires robustness improvement in target location.
7. Existing methods not handle detection and tracking for fast moving objects.

### **2.4 PROPOSED SYSTEM**

### **Proposed algorithm 1**

**Video/Image Acquisition - Video Acquisition using Frame converser system of ATM video**

### **Proposed algorithm 2**

**Anomaly detection - Human segmentation Fuzzy C Means Clustering Technique**

### **Proposed Algorithm 3**

**Feature Extraction**

**GLCM, KL (Karhunen–Loève) Transform, Edge Gradient Features, Color Histogram**

### **Proposed Algorithm 4**

**Human Skelton Mapping using Adaptive Multiple Importance Sampling (AMIS) for detection of anomaly**

Detection and Tracking is a common phenomenon in video motion analysis. Detection and tracking is used for detect the moving object and to track the action of the moving object in the video using image frame sequence. It is mainly used in the video surveillance for security purpose.

This project proposes a novel approach to detect and to track the action of the moving object.

- Motion of the moving object is detected from the image sequences.
- Motion based tracking is carried out from the detect object.
- Database is created with some suspicious action from the set of videos and then it is get compared with detect moving object.

- Moving detected object is undergone with some suspicious action the alarm is indicating.

## **2.5 SUMMARY**

This chapter covered the state-of-art research works in the field of detection and tracking of moving object. Also, the challenges and the issues in the related works have been listed in this chapter. It also highlights the brief overview of the proposed system for which the design layout is covered in the next chapter.

## **CHAPTER 3**

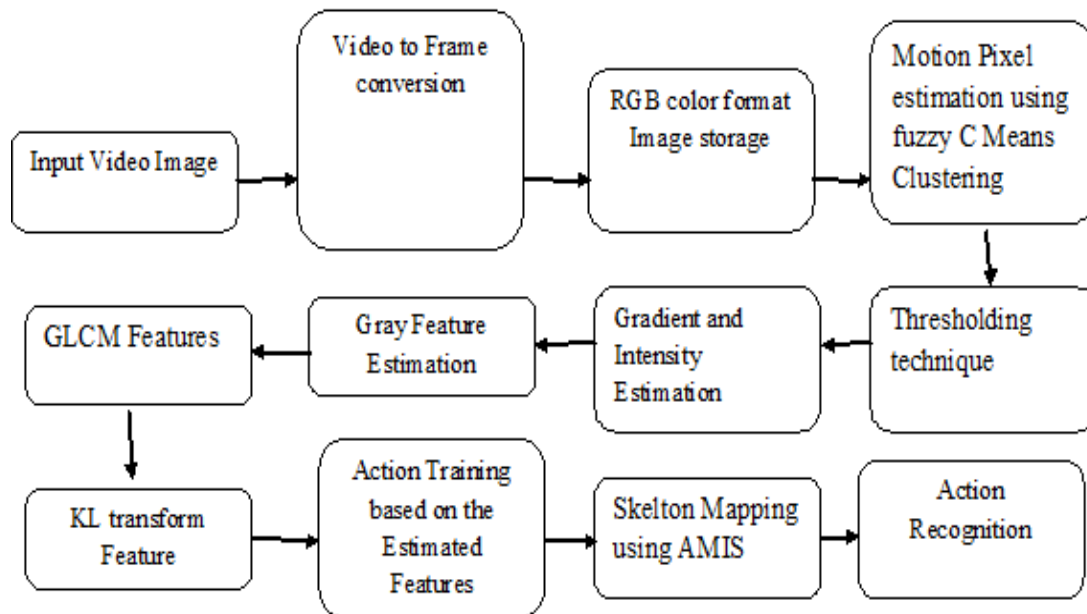
### **SYSTEM DESIGN**

#### **3.1 INTRODUCTION**

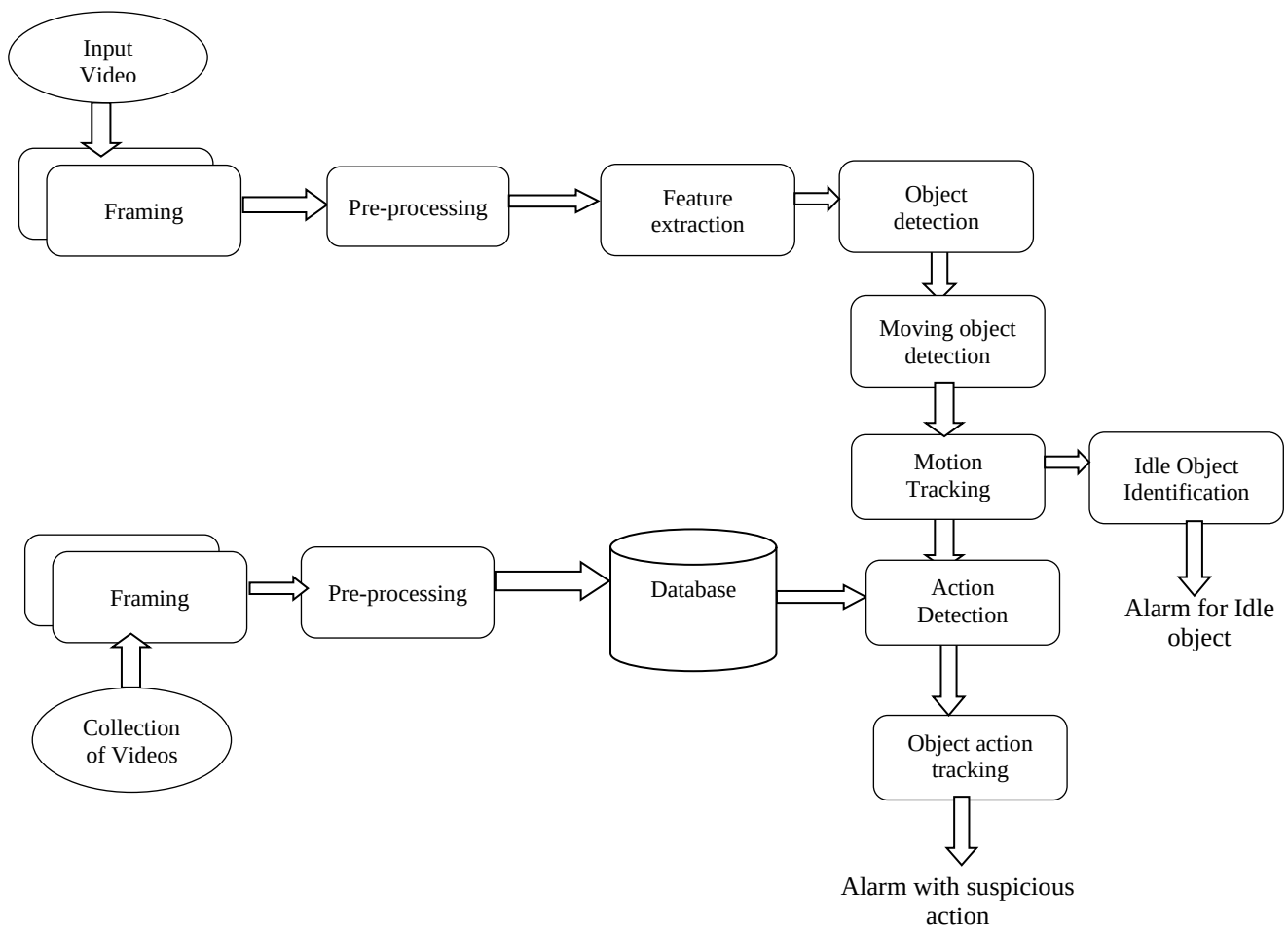
The design stage takes as its underlying info the necessities recognized in the affirmed prerequisites record. For every necessity, a bunch of at least one plan components will be produced. Design elements are required to describe the software features in detail. These design programmers can convert them into code directly without any additional input. Thus, the logical system of the product is developed in this stage. This stage also tries to create the architecture of the entire system. This is a benchmark stage since any errors performed till this stage and in this stage can be cleared. Design focuses mainly on high level design (what programs are needed), low level design (how the individual programs are going to work), interface design (how the interfaces going to look like).and data design (what data will be used). The deliverable in this phase is FDD (Functional Design document).

This chapter deals with the design documents created for the proposed system consists of a functional architecture, activity diagram, pseudo code, flow chart. The system architecture deals with the physical structure of the proposed system. The functional architecture provides a modular level design and their interactions. The activity diagram provides a graphical representation for the stepwise activity. The flow chart visually represents the flow of data, the operations performed and the exact steps followed. It will be useful during advanced stages of coding. Thus, the design documents created are used as a continuous reference point for coding.

### 3.2 FUNCTIONAL ARCHITECTURE



### Proposed Block diagram



**Figure 3.1 Functional Architecture of Object Detection and ATM anomaly action Tracking**

The system architecture of the proposed system is given in Figure 3.1. Video is taken as an input; video is converted into frames and the frames are considered as the image sequences. The image sequences are stored with the extension of JPEG. The frames are undergone with preprocessing technique. Noise from the video is to be removed, done only by means of filtration. An effective method is threshold filtration just after background elimination. There are two main disparity of this method: fixed threshold, at the point when it is resolved exactly from the test sequence. Histogram-derived threshold, at the point when the last is chosen from the brightness histogram of the segmented region. Isolated points and little blobs that remain after threshold filtration and it are removed by using median filtering.

Feature extraction extracts the features such as color, edges, optical flow and texture. Based on the features extracted, the moving object is detected. If the detected object is idle for some period of time, the alarm is indicating for idle object. To additional track protests and examine their practices, it is fundamental to accurately order moving articles. For example, the moving items are people, vehicles, or objects of revenue of a researched application. Article characterization can be considered as a standard example acknowledgment task. There are two primary classes of approaches for ordering moving items: shape-based arrangement and movement based grouping. Different portrayals of shape data of movement districts like focuses, boxes, outlines and masses are accessible for characterizing moving articles. When all is said in done, human movement displays an intermittent property, so this has been utilized as a solid sign for grouping of moving items too. Our shape coordinating with metric depends on the locale convergence distance between the layout volume and the arrangement of over-sectioned volumes in the video. The shape template can be efficiently scanned over the video and events are detected when the matching distance falls below a specified threshold. Action is the key content of all other contents in the video. Action recognition is a new technology with many potential applications. Action recognition can be described as the analysis and recognition of human motion patterns. Understanding activities of objects, especially humans, moving in a scene by the utilization of video is both a difficult logical issue and a ripe space with many promising applications. The action is detected from the detected object. The action of the moving object is compare with the database set which contains suspicious

action. The moving object does suspicious action then alarm is indicated.

### **3.3 MODULAR STRUCTURE**

The following section gives the detailed description of the modules of the proposed system.

#### **3.3.1 Object Detection**

Video is taken as the input. The videos are converted into sequence of images. The images are stored in JPEG format. The picture successions are gone through with preprocessing strategies. P-Filter (Particle) is utilized to eliminate the masses and to help the P-filter Kalman filter is utilized to for object following. The Kalman filter is a technique for consolidating uproarious (and potentially missing) estimations and expectations of the condition of an item to accomplish a gauge of its actual present status dependent on position, speed and size. The dark scale esteems are passing to the sectioned picture. To figure the uprooting of the pixel esteems square base of sigma is to be taken. Sigma is estimated as inclination of the picture and the drive reaction coefficient. The fragmented picture is changed over into dim closer view outlined picture to establish the forefront and foundation pixels for object discovery, since shading picture doesn't uphold the frontal area planning. The edge detection is done by curvelet transformation based on the detected edge the objects are identified. It computes a beta probability density on image coordinates with pos. pos is a matrix of column-vectors that each must specify a point within the image of HEIGHT-by-WIDTH size. The casing arrangement contains number of articles and it is distinguished by extreme focus esteems and it is contrasted and closer view object.

#### **3.3.2 ATM anomaly detection**

Detection of moving object in video is based on the analysis of the 3D array of motion of the objects. The moving object is detected by means of motion estimation to calculate the position of the moving object in the video plane. To detect the blocks containing moving object boundaries by using the information of the motion vector field.

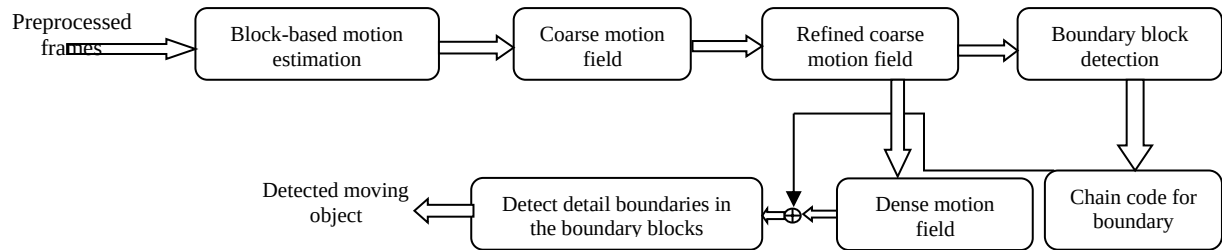
### **3.3.2.1 Human anomaly Estimation**

A new algorithm of moving objects detection and description is proposed to detect and track the moving object in video. In light of the examination of projection of the 3D exhibit movement of articles, the data of movement field is abused to make moving item identification more proficient. The discontinuities of movement vector field on the limits of moving articles empower us to recognize the moving items blocks in which the expected limits of the moving articles find. A further refinement of the limit of moving items and proficient descriptor for moving articles are proposed also. As the ideal imaging model, perspective projection model is adopted in this proposed system. Calculate the first pixel value of the first frame named as  $p_1$  and the first pixel value of the second frame and named as  $p_2$ . Find the mean value, add all the pixel values in all the frames. It is reasonable to assume the motion in same objects should be same. In addition, it is also convenient considering the connected objects with same motion as one moving object. The motion vector associated with the points in one moving object should be linear interpolated. For temporal segmentation a motion detection scheme is used. Image difference of two consecutive frames, i.e., the  $t$  Th and the  $(t-1)$  Th outline and is thresholded by an appropriate limit esteem. The thresholded picture itself addresses the measure of development performed by objects in the scene from the  $(t-1)$  Th moment to the  $t$  Th moment of time. The spatial division consequence of the  $t$  Th outline, the  $(t-1)$  Th outline, alongside VOP of the  $(t-1)$  Th outline were utilized to play out a fleeting division of the  $t$  Th outline. The pixels relating to the item locales of the fleeting portioned yield are supplanted by the first pixels of the  $t$  Th edge to acquire the VOP of the  $t$  Th outline.

### **3.3.2.2 Boundary Detection**

From Figure 3.2, detect the blocks containing moving object boundaries by using the information of the motion vector field generated by video compression. The motion vector derived by motion estimation is the common motion vector for all pixels in one block. However, we can assume it is the motion vector of the critical points locating in the centroid of each block. As mentioned above, pixels in the same object should satisfy the condition of linear interpolation. Hence the critical points in

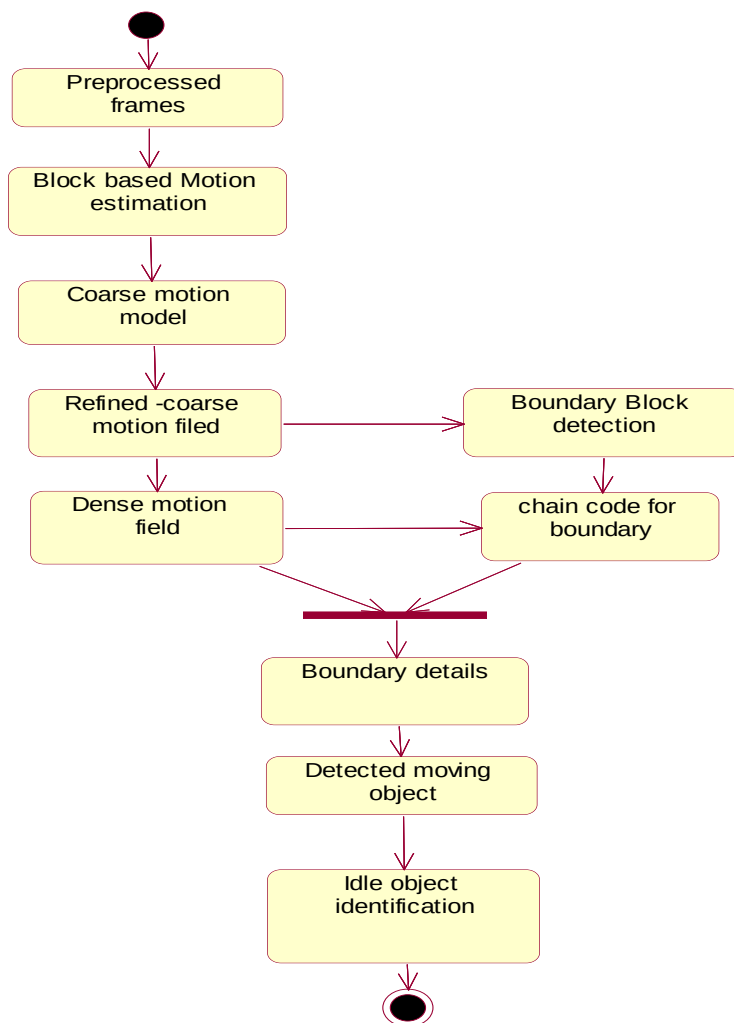
one moving objects should satisfy this condition. When this condition is violated, the discontinuity of motion vector field exists and implies the existence of the boundary in associated block.



**Figure 3.2 Functional Architecture for Moving Object Detection**

### 3.3.2.3 Activity Diagram for Moving Object Detection

An activity diagram is used to describe the operational step-by-step workflows of components in a system. Activity diagrams can show activities that are conditional or parallel. From Figure 3.3, Pre-processed frames are given as input to estimate motion estimation for the video object plane. Refined coarse field, boundary blocks detection and dense motion field is used to detect the detail boundaries in the boundary block, from the boundary value calculation the moving object is detected.



**Figure 3.3 Activity Diagram for Moving Object Detection**

### 3.3.3 Motion Tracking

Video segmentation is the action of any algorithm that separates regions of a video in a way that resembles how a human would naturally perceive them. Since the motion tracking is needed, a characteristic methodology is to fragment those locales of the video that are moving comparative with the foundation. This permits us to run the model assessment separately for every district, rather than on the entire video. Video segmentation is to isolate foundation spaces of the video from forefront areas of movement that are of interest for human following. The camera is fixed and that lighting doesn't change out of nowhere. It is feasible to accomplish exact video division without this supposition, however such consensus

would require all the more computationally costly calculations. The calculation of decision is foundation deduction, in which to process a model of the video foundation over the long haul. For some random casing of video, take away this foundation video from it. Those pixels with an outcome close to zero are treated as foundation and those pixels with a bigger outcome are treated as foreground. The districts shaping the forefront part in the fleeting division is distinguished as moving item areas, and the pixels comparing to the foregroundpart of the first casing form the VOP. After obtaining the VOP from the different image frames we can track the moving objects. After obtaining a temporal segmentation, a centroid based tracking is performed to track moving objects from the considered video image sequence. The centroid  $(\hat{u}_{nc}, \hat{v}_{nc})$  of the moving object is computed by using equation (1) and (2) Where  $(u_{ni}, v_{ni})$  represents the co-ordinate of a pixel in the temporal segmentation and the value of  $c(i)$  is considered as 0 as background pixel and one as object regions from equation 3. By calculating the  $(\hat{u}_{nc}, \hat{v}_{nc})$  for different frames, the movement of an object can be tracked.

### **3.3.3.1 Algorithm for Moving anomaly detection and Tracking**

Object detection algorithms are introduced step by step as detecting boundary blocks from Figure 3.2, writing chain codes, and detecting boundaries in the boundary blocks, where the boundary block is defined as a block containing boundary of a certain moving object. To simplify the moving object boundary detection, some assumptions are drawn:

1. At most two objects boundaries in one block;
2. Any object cannot be hold in one block;
3. The boundary of moving object is a simple closed curve.

The steps of the algorithm are the following:

1. Read two consecutive frames from the image sequence called as current frame and previous frame.
2. Calculate the first pixel value of the first frame named as p1.

3. Calculate the first pixel value of the second frame and named as p2.
4. To find the mean value, add all the pixel values in all the frames.
5. Repeat step 6 for each of the newly added pixels; stop if no more pixels can be added.
6. More than one pixel can be used to segment the image.
7. Motion estimation is done by temporal and spatial segmentation by comparing two consecutive frames.
8. After segmentation based on the variation of pixel values the moving object is detected by using the details of boundary values.
9. The centroid ( $\hat{u}_{nc}$ ,  $\hat{v}_{nc}$ ) of the moving object is computed by using equation (3.1) and (3.2)

$$\hat{u}_{nc} = \frac{\sum_i u_{ni} c(i)}{\sum_{i \in T} c(i)} \quad (3.1)$$

$$\hat{v}_{nc} = \frac{\sum_i v_{ni} c(i)}{\sum_{i \in T} c(i)} \quad (3.2)$$

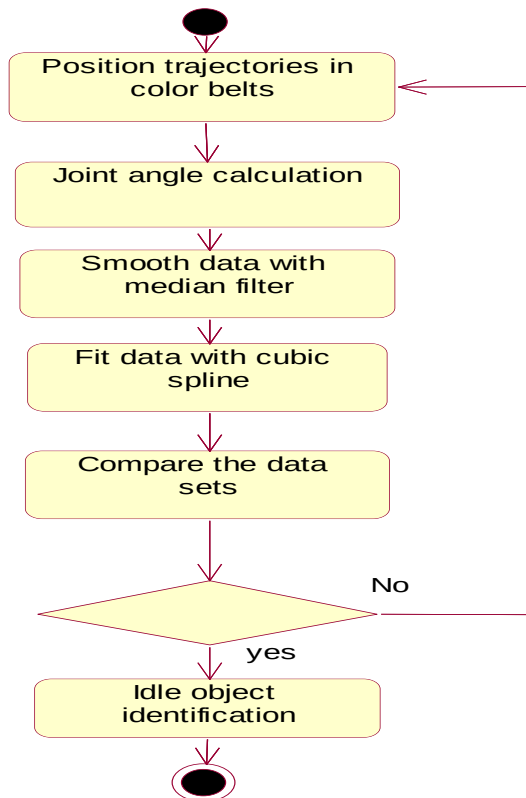
Where ( $u_{ni}$ ,  $v_{ni}$ ) represents the co-ordinate of a pixel in the temporal segmentation and the value of  $c(i)$  considered as,

$$c(i) = \begin{cases} 1, & \text{if pixel } i \text{ is identified as an object pixel} \\ 0, & \text{if pixel } i \text{ is identified as a background pixel.} \end{cases}$$

10. Centroid calculation is done for tracking the moving object.

The idea of proposed moving objects detection is to exploit the motion vector detected in video compression as the clue for the moving objects and then refine the moving objects boundaries. This scheme will speed up the moving object detection significant.

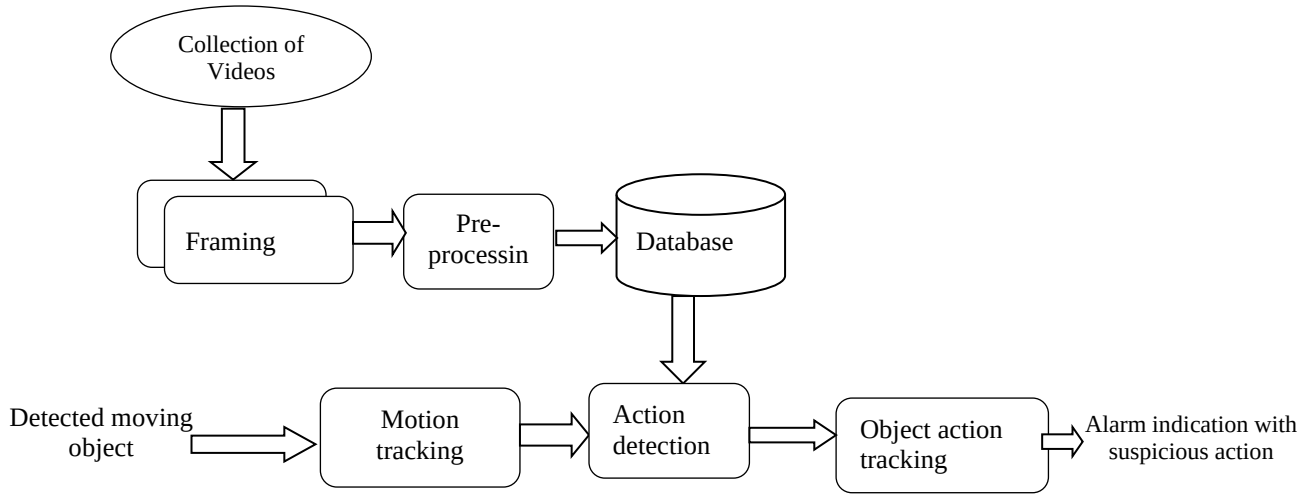
### 3.3.3.2 Activity Diagram for Motion Tracking



**Figure 3.4 Activity Diagram for Motion Tracking**

From Figure 3.4, the position of the detected moving object in the current frame is compared with the previous frame. If the moving object is same in the current and the previous frame then the object is identified whether it is idle for particular period of time.

### 3.3.4 Action Tracking



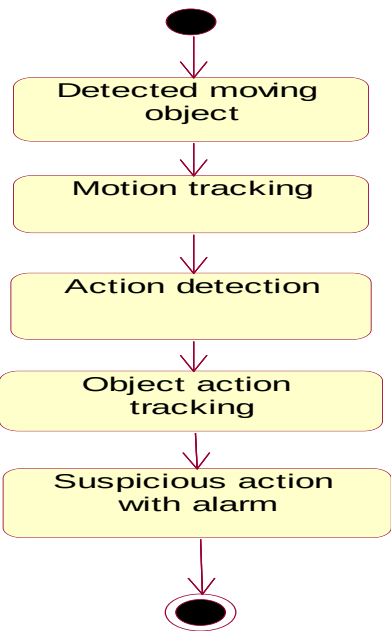
**Figure 3.5 Functional Architecture for Action Tracking**

From Figure 3.5, an “action correlation” framework, elastic sequence correlation (ESC), is proposed to identify action subsequences from a database of (possibly long) video sequences that are similar to a given query video action clip. Specifically, we show that two notable calculations, in particular surmised design coordinating in PC and Information sciences and dynamic time traveling (DTW) strategy in signal preparing are uncommon instances of our ESC structure. The proposed framework is applied to two important real-world applications: action pattern extract, action segmentation and recognition, where, on average, its run time speed (in mat lab) is about 3.3 frames per second.

Human movement shows an occasional property, so this has been utilized as a solid prompt for arrangement of moving articles too. Our shape coordinating with metric depends on the area convergence distance between the layout volume and the arrangement of over-sectioned volumes in the video. The shape template can be efficiently scanned over the video and events are detected when the matching distance falls below a specified threshold. Action is the key content of all other contents in the video. Action recognition is a new technology with many potential applications. Action recognition can be described as the analysis and recognition of human motion patterns. Understanding activities of objects, especially humans, moving in a scene by the utilization of video is both a difficult logical issue

and a prolific area with many promising applications. In action tracking, action sequences from training samples and compare with both database. Based on classification, the action of the moving object has been detected. After action tracking is done by action detection. The suspicious action is indicated by alarm.

**3.3.4.1 Activity Diagram for Action Tracking**



**Figure 3.6 Activity Diagram for Action Tracking**

From Figure 3.6, in action tracking, action sequences from training samples and compare with both database. Based on classification, the action of the moving object has been detected. After action tracking is done by action detection. The suspicious action is indicated by alarm.

**3.4 SYSTEM REQUIREMENTS**  
**HARDWARE SPECIFICATION**

|           |   |            |
|-----------|---|------------|
| Processor | : | Pentium IV |
| RAM       | : | 2GB        |

|                    |   |                        |
|--------------------|---|------------------------|
| Hard Disk Capacity | : | 4GB                    |
| Cache Memory       | : | 512 KB                 |
| Operating System   | : | Windows2007            |
| Monitor            | : | 15inches               |
| Pointing device    | : | Scroll Mouse           |
| Keyboard           | : | 101 Standard Key-board |

## **SOFTWARE SPECIFICATION**

|          |   |            |
|----------|---|------------|
| Platform | : | MATLAB 7.0 |
|----------|---|------------|

### **3.5 SUMMARY**

Thus, the design documents are presented in this chapter. These diagrams serve as a bridge between the software engineers and the architects. The diagrams represent the architecture in a way that the software engineers understand. The architects create the “Big Picture” that the software engineer has to build. These diagrams together from the FDD (Functional Design Documents) and are used as a continual reference during coding.

## **CHAPTER 4**

### **IMPLEMENTATION**

#### **4.1 INTRODUCTION**

Content based image retrieval use the library depended on physically clarified pictures, which is costly and tedious, particularly given the huge and constantly-growing image databases in existence. To annotate image patches by using multi label image annotation for effective retrieval of image in large database. This chapter brings out the implementation details of Multi label image annotation by learning the correlation between labels. It gives the overview of the platform and the following sections presents the snapshots to annotate image patches for image retrieval.

#### **4.2 OVERVIEW OF THE PLATFORM**

MATLAB (MATrixLABoratory) is a tool to do numerical computations, displays information graphically in 2D and 3D and solve many other problems in engineering and science. Kept up by the Math Works, MATLAB permits simple framework control, plotting of capacities and information, execution of calculations, formation of the UI, and interfacing with programs in different dialects. In spite of the fact that it is numeric just, a discretionary tool kit utilizes the MuPad representative motor, permitting admittance to PC variable based math abilities.

MATLAB is build around the MATLAB languages, sometimes called M-code or simply M. The easiest method to execute M-code is to type it in at the brief, `>>`, in the Command Window, one of the components of the MATLAB Desktop. In this way, MATLAB can be used as an interactive mathematically shells. Sequence of commands can be saved in the text files, normally utilizing the MATLAB Editor as a content or exemplified into a capacity, expanding the order accessible. MATLAB is utilized in wide scope of uses, including sign and picture handling, correspondences, control configuration, test and estimation, monetary

demonstrating and investigation, and computational science. Add-on toolboxes (collections of special-purpose MATLAB environment to solve particular classes of problems in these application areas.

### **KEY FEATURES OF MATLAB**

- High-level language for technical computing.
- Development environment for managing code, files, and data.
- Interactive tools for iterative exploration, design, and problem solving.
- Mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, and numerical integration.
- 2-D and 3-D graphics functions for visualizing data.
- Tools for building custom graphical user interfaces.
- Functions for integrating MATLAB based algorithm with external applications and languages, such as C, C++, FORTRAN, Java, COM, and Microsoft Excel.

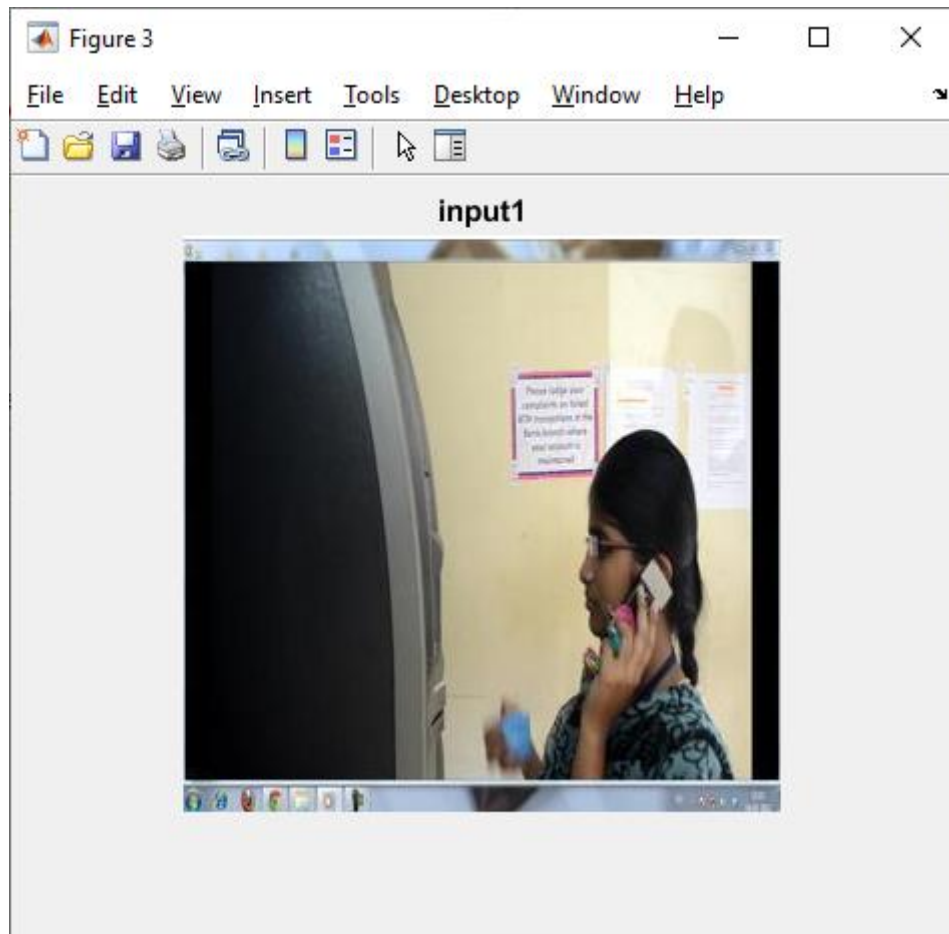
### **IMAGE FORMATS SUPPORTED BY MATLAB**

The following image formats are supported by MatLab:

- BMP
- HDF
- JPEG
- PCX
- TIFF
- XWB
- PNG

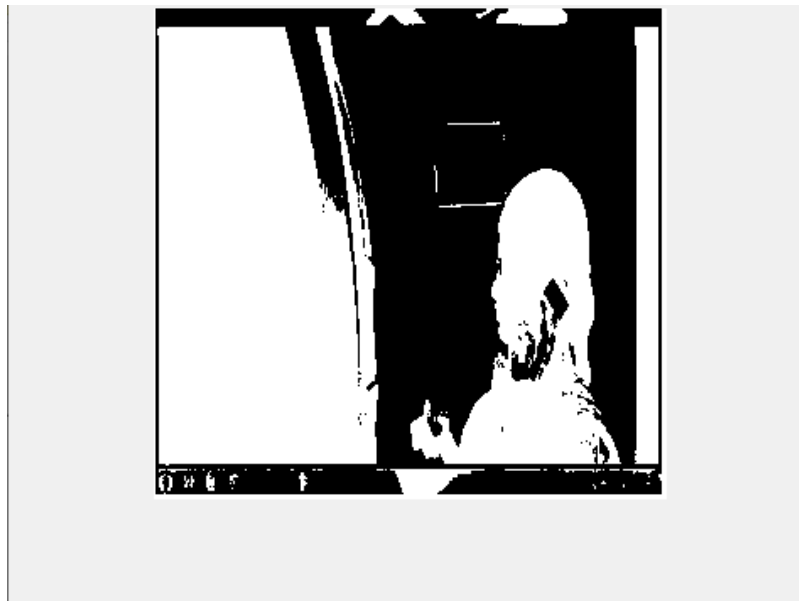
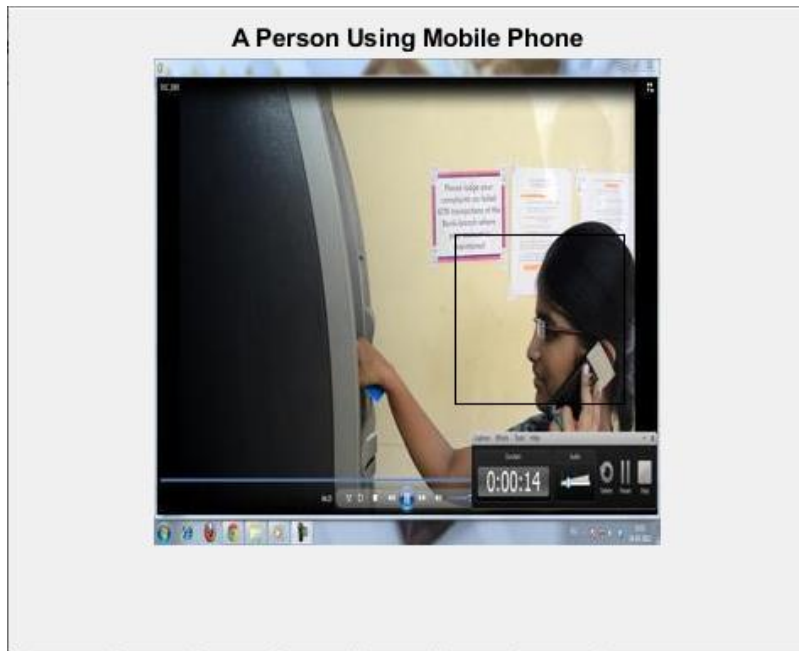
### **STRENGTH OF MATLAB**

- MATLAB is relatively easy to learn.
- MATLAB code is optimized to be relatively quick when performing matrix operations.
- MATLAB may behave like a calculator or as a programming language.
- MATLAB is interpreted, errors are easier to fix.



The above image represents that the woman present in the atm is using mobile phone. It is obvious that using mobile in the atm is prohibited because for example if they distracted during the transaction there is a chance, they may get robbed.

It is the input of the video that is being recorded in ATM. By video acquisition process the image is turned into frames.

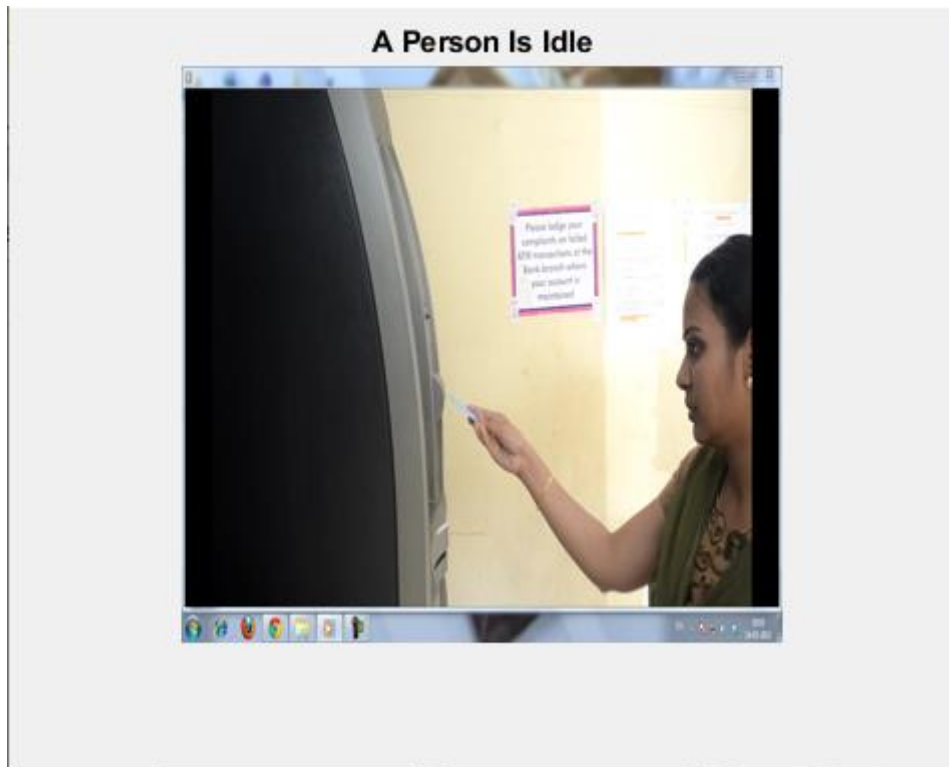


By using Feature Extraction, it detects that the person is using mobile phone and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling it indicates that the person is using mobile phones.



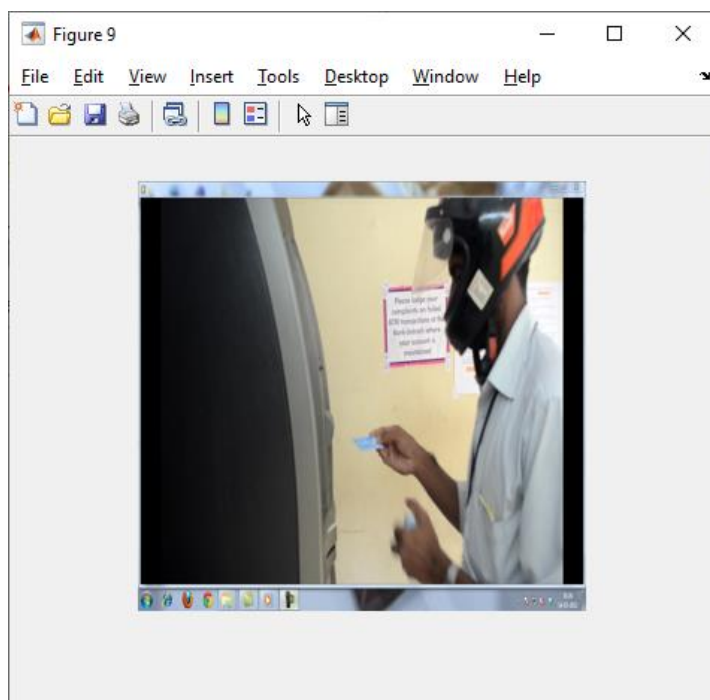
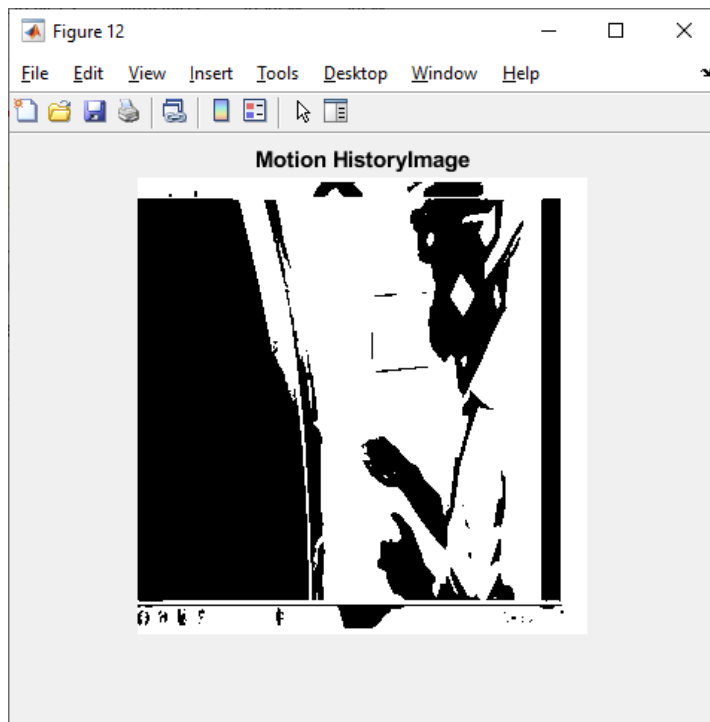
The above image represents that the people in the ATM are crowded or multiple people are present in ATM it is also prohibited in ATM because they may plan robbery or some one may force another person.

By using Feature Extraction, it detects that there are multiple people present and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling it indicates that there are multiple people present in the ATM.



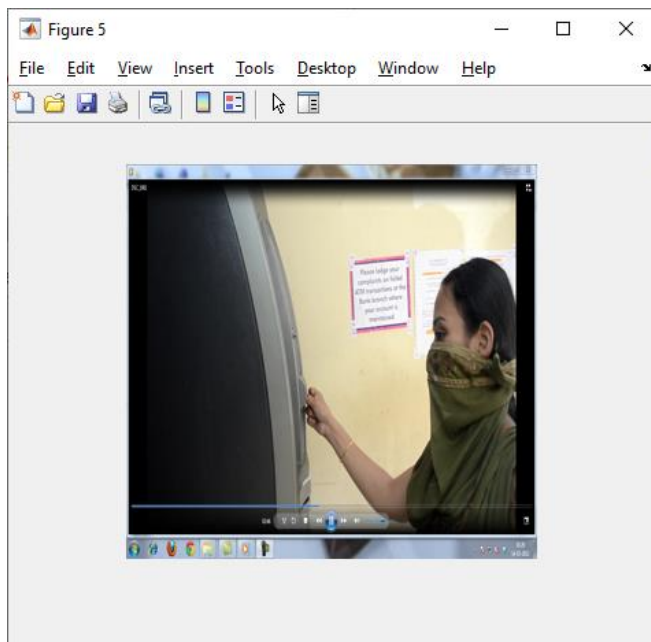
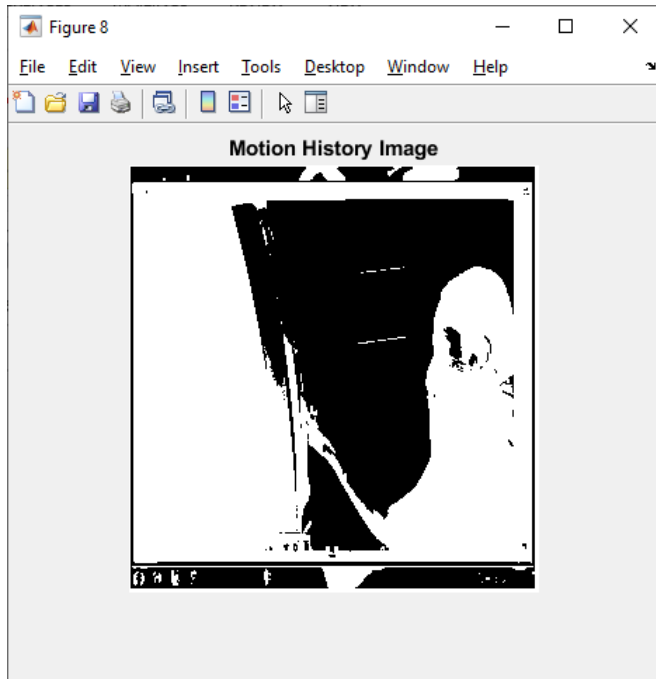
A person should not be idle for more time inside the ATM because they may be doing suspicious activities, we set the time according to our requirement like if the person is idle for more than five minutes then the alarm must turn on and it displays that the person is being idle.

By using Feature Extraction, it detects that the person is being idle for certain time and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling it indicates that the person being idle.



Wearing a helmet in ATM is prohibited because they may be covering their face to avoid from the CCTV footage.

By using Feature Extraction, it detects that the person is covering their face with helmet and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling it indicates that the person wearing a helmet.



At present situation wearing a mask not a problem but after pandemic it may be used as allay to cover their face and avoid from CCTV footage.

### **4.3 IMPLEMENTATION PROCEDURE FOR MOTION TRACKING**

After segmentation of a frame, the output of the segmentation is denoted as foreground and background. The districts shaping the closer view part in the fleeting division is distinguished as moving article locales, and the pixels relating to the frontal area part of the first edge form the VOP. After obtaining the VOP from the different image frames we can track the moving objects. The motion of the detected object is tracked based on the centroid calculation.

The Segmentation of the image is given as segment image (Weights, Sigmas, active\_gaussian, BACKGROUND\_THRESH, K);

### **4.4 SUMMARY**

This chapter gives the overview of the MATLAB, its underlying technologies and its features. The implementation procedure of the preprocessing techniques, feature extraction, object detection, moving object detection and the motion tracking of the moving object in video is explained and the snapshots of each task concerned are also explained.

## CHAPTER 5

### CONCLUSION AND FUTURE WORK

Our ATM anomaly detection approach is based on the assumption that a significant deviation from the normal behavior is a strong indicator of an attack. To the best of our knowledge, we are the first who utilize the data stream produced inside an ATM to automatically generate a model of normal behavior, which is then used to detect anomalies (or attacks respectively). The formulation of this approach as a sequence-based anomaly detection problem and the empirical evaluation of three respective methods using a real-world data set show its practical applicability.

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# DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING

*by* Chenna Bherunadh Dantham Dharma Teja

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# DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING

9

Submitted in partial fulfilment of the requirements for the award of  
Bachelor of Engineering degree in  
Electronics and Communication Engineering

By

CHENNA BHERUNADH (Reg no 37130081)  
DANTHAM DHARMA TEJA (Reg no 37130097)



SCHOOL OF ELECTRICAL AND ELECTRONICS  
ENGINEERING  
DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**BONAFIDE CERTIFICATE**

This is to certify that this Project Report is the bonafide work of **CHENNA BHERUNADH (37130081) AND DANTHAM DHARMA TEJA (37130097)** who carried out the Project entitled "**DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING**". Under the guidance of **DR. P. CHITRA, Ph.D.**, during the period NOV 2020 to APRIL 2021

**INTERNAL GUIDE**  
**Dr.P. CHITRA, Ph.D.**

**HEAD OF THE DEPARTMENT**  
**Dr.T.RAVI ,M.E.,Ph.D**

Submitted for Viva voce Examination held on \_\_\_\_\_

**Internal Examiner**

**External Examiner**

## DECLARATION

I, CHENNA BHERUNADH (37130081) AND DANTHAM DHARMA TEJA (37130097) Here by declare that the Project report entitled **DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING** is done under the guidance of **Dr.P. CHITRA Ph.D.**, is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in ELECTRONICS AND COMMUNICATION ENGINEERING.

**DATE:**

**PLACE:**

**SIGNATURE OF CANDIDATE.**

(CHENNA BHERUNADH (37130081))

(DANTHAM DHARMA TEJA (37130097))

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## **ABSTRACT**

The rapid production of cash machines has made life easy for the lifestyle, even for the managers who supervise it. Banks do not demand ATMs, instead they are outsourced from purchasing to maintaining machines to managed service provider (MSPs). There are some parameters such as funding, cash and protection. Since the whole motivation behind an ATM advantage is the reduction of manual connection and management by means of mechanization, the protection provided is equally programmed and profitable. Because of lower security, ATM exchanges are rapidly expanding alongside some different exercises. Thus the traditional human position and the detection of anomalies and analyzes using the SIFT (Scale-Invariant Feature Transform) and the Gabor method include extraction processes and the ATM system grading technique focuses.

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## **CHAPTER1**

### **INTRODUCTION**

#### **1.1 OVERVIEW**

Image processing is a technique in which information is, for example, a photo or video outline; a picture or a set of qualities or limits found in the photo may result in the production of images. Image preparation usually applies to computational image processing, but optical and simple image preparation are also possible. Image processing is used in various applications such as:

- Computer Vision
- Face Detection
- Machine Vision
- Medical Imaging
- Remote Sensing

Computer vision is the subject of automated processing of real-world images for the extraction and real-time interpretation of information. It's machinery science and technology. PC vision covers the center innovation of computerized picture investigation which is utilized in numerous fields.

The applications of computer vision include systems for:

- Controlling processes.
- Navigation
- Detecting events.
- Organizing information
- Modeling objects or environments

Video reconnaissance is expanding importance approach as associations try to safe gatekeeper physical and capital resources. Simultaneously, the need to notice more individuals, spots, and things combined with a craving to pull out more helpful data from video information is inspiring new requests for versatility, abilities and limit. The demands are beyond the conventional methods of analog video surveillance. Tracking is generally the monitoring of people's actions, behaviors or other information that changes. It's done occasionally in a sudden way. Surveillance video recording is getting universal in day by day life for public territories like general stores, banks, and air terminals. Investigating human action is one of the critical assignments to comprehend and look through observation recordings. It often refers to perception by Government associations of persons or meetings, surveillance is useful for governments and legal authorisations, in order to monitor, monitor and regulate the risk, forestall and investigate crime amicably. Observation video recording is getting pervasive in every day life for public territories like stores, banks, and air terminals.

## **1.2 PROBLEM STATEMENT**

Detection and Tracking is a common phenomenon in video motion analysis. Detect and monitor the moving object and track the action of the moving object through the frame sequence of the image. Moving object detection in a Video is the process of identifying various object regions that move from the context and the movement of objects is restricted by environments in action tracking system. In action tracking, the human motion analysis monitors the behavior, activities or other changing information. So it creates a need to develop the action tracking in video surveillance for security purpose.

## **1.2 OBJECTIVES**

- The objectives of the proposed system are the moving object in video
- Detection is used to detect the moving object in sequence of frames.
- To track the motion of the moving object. Motion tracking is used to compare the object with the current and previous frame to track the particular movement of the object.
- To track the action of the moving object.
- Action tracking is used to identify the behavior of the moving object.

## **1.4 APPLICATIONS**

The study of detection and tracking of moving object attracted more attention recently for its application in many areas including:

- People tracking
- Video surveillance
- Safety monitoring
- Security and Biometrics

- Traffic and road management
- Web Applications
- Medical and biomedical
- Sports analysis, etc.,

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## 1.5

### ORGANISATION OF THE THESIS

The rest of this thesis is structured accordingly: Chapter 2 presents a literature review of the moving object detection and moving object tracking, and recent related work; Chapter 3 deals with the design of the proposed system; Chapter 4 presents the implementation result analysis; Chapter 5 summarizes the thesis.

## **CHAPTER 2**

### **LITERATURE SURVEY**

#### **2.1 INTRODUCTION**

videos are really groupings of pictures, every one of which called a casing, shown in quick enough recurrence so natural eyes can percept the congruity of its substance. Clearly all picture preparing strategies can be applied to singular edges. Furthermore, two consecutive cases are typically strongly related to their material. Visual substance can be seen as a radical deliberation tool. At the forefront are rough pixels with shading or splendor details. Returns that need additional planning, such as corners, curves, lines, and shading districts. A higher degree of discourse will help to reinforce and decode these highlights. The most critical levels are human-level ideas with at least one article and connections between them. The presence of an item in the picture arrangements is verified and possibly found to be conclusive for acknowledgement in the articles in the recordings. The next step is to watch a video sequence of an article with fluid and spatial changes, such as its essence, position, size, shape, and so on. Finally, I answer the worldly issue of correspondence, which is the problem of organizing a series of photographs taken over time with the objective district on progressive edges. These two cycles are firmly related on the grounds that following normally begins with distinguishing objects, while recognizing an article more than once in resulting picture succession is frequently important to help and check following. A technique for finishing an article progressive picture edges to decide its general development as for different items. Items can be addressed by their shapes.

#### **2.2 EXISTING SYSTEMS**

Works reported in this detection and tracking literature surveyed as follows.

### 2.2.1 <sup>1</sup> Moving Object Detection and Tracking

Badri Narayan Subudhi et al (2011) have proposed “A Change Information Based Fast Algorithm for Video Object Detection and Tracking” <sup>14</sup> Spatio-temporal spatial and temporal segmentation is used to identify moving objects and to track them. A compound Markov arbitrary field (MRF) model is utilized as the earlier picture trait model. To track down the spatial conveyance of shading, transient shading soundness and edge map. It manages location and following of sluggish articles.

The main disadvantage of this method, it is not dealing with human behavior analysis and in real time situations. A CDM dependent on the difference in labels of two frames is considered for temporal segmentation.

Shengluan Huang et al (2010) have proposed the method that The device is planned and has a good robustness for tracking moving targets. Improve the consistency of the goal and objective of the candidate. Hybrid algorithm is used in the manipulation of the occlusion, is more stable and achievable in the detection of moving objects and overcomes the occlusion defect.

The main disadvantage of this method is, Camshift affected by the probability distribution of the color image. It does not deal with the robustness improvement for target location. The linear prediction software is paired with a kalman filter in the processing of occlusion.

Mark S. Drew et al (2009) have proposed “Action Detection in Cluttered Video with Successive Convex Matching” <sup>4</sup> In order to compatible intra-frame and inter-frame constrained local features, successive convex programming schemes are utilized. Human activities are addressed as groupings of stances, and explicit activities are recognized by coordinating with present successions. Address activities <sup>4</sup> as the advancement of postures and shapes, the proposed technique can distinguish activities in recordings that include quick camera movements.

<sup>4</sup> The key disadvantage of this approach is that it convexifies the optimization problem sequentially using an efficient linear programming scheme that can be optimized globally in each step and gradually reduces the confidence field. Successive coexistence has a unique feature in that <sup>4</sup> it involves a relatively limited number of basis points and can thus be extended to large-scale problems with a large number of targets.

Khurram Shafique et al (2009) have proposed the technique Markov Chain Monte-Carlo (MCMC) based system for creating the most probable ways in the scene, improving foreground recognition, steady naming of items during following.

It is used in the applications such as scene analysis and surveillance. It encodes the probabilistic idea of the conduct of moving articles in the scene and is valuable for action investigation applications. The main disadvantage of this method is it does not deal with full occlusions.

Yaakov Tsaig et al (2008) have proposed "Automatic Segmentation of Moving Objects in Video Sequences: A Region Labeling Approach" A new algorithm is implemented <sup>3</sup> in image sequences for VOP extraction <sup>3</sup> for automatic segmentation of moving objects. <sup>3</sup> It uses motion information to identify regions as the foreground or context, based upon an MRF model specified by a region adjacent graph. A dynamic memory, in light of article following, is consolidated into the division interaction to keep up worldly intelligibility of the division.

The main disadvantage is the robustness for separation foreground and background regions. An adjacent area graph describes an MRF model that <sup>3</sup> uses motion information to classify regions as an input or background. <sup>3</sup> The initial partition, which consists of a color portion of the watershed, guides the location of object limits. A <sup>3</sup> hierarchical motion estimation and confirmation scheme detects moving objects in the scene while avoiding occlusion errors.

### 2.2.2 Action Tracking

Yang Wang et al (2011) have proposed a technique <sup>8</sup> hidden conditional random field (HCRF) for object recognition. For object acknowledgment, this technique consolidates both huge scope worldwide highlights and neighborhood fix highlights to recognize different activities. In human behavior recognition, the <sup>8</sup> max-margin concealed conditional random field (MMHCRF). In many machine view problems <sup>8</sup> MMHCRF can handle a wider variety of complex hidden structures.

The main disadvantage of this method, does not deal with <sup>8</sup> handle things like partial occlusion, viewpoint change, etc. It requires more robust features.

Liang Wang et al (2011) have proposed "Elastic Sequence Correlation for Human Action Analysis" Elastic sequence correlation framework analysis based on action pattern retrieval and action recognition. Getting query sequence q of length m as input and database r of length n and compare the query with database for action detection. It deals with scale space issue and speed up with non-repetitive patterns temporal scaling spaces.

Chang Liu et al (2011) have proposed "A Boosted Co-Training Algorithm for Human Action Recognition" It proposes two new trust measures: interview trust and intrerview trust. In order to deal with co-training questions of insight and dependence. Common data is utilized to evaluate the between see vulnerability and measure the autonomy among separate perspectives. The belief in the interior is calculated from the increased hypotheses in order to measure the overall incoherence of the data labelled and un labeled. The downside is optimizing the semi-boost multi-class.

Chong Ding et al (2010) have proposed "Tracking and Activity Recognition through Consensus in Distributed Camera Networks" Distributed scene analysis algorithms based on conceptual consensus are investigated in the sense of a multiagent framework. In an iterative design, the camera assesses those boundaries based on its own data, which is then shared with the adjacent cameras locally and displays a last gauge using consensus algorithms in the

organization.

The principal drawback of this approach is that monitoring and identification of events are integrated into a single system and complex activities covering a broader field.

<sup>12</sup> Teresa A. Vidal-Calleja et al (2010) have proposed a proper movement orders during 6-DOF visual concurrent restriction and planning with a handheld camera. The system has been moved to a mobile robotic platform, and thus the control estimation loop has been closed. Handheld SLAM video rate scheme, non-holonomically and ground-restricted mobile robot, and obstacle-prevention APF are all implemented by SLAM. The environment changes in an unpredictable way over time; there are well-motivated sensors that enable the vehicle to maneuver in such environments.

The main disadvantage of this approach is that large maps in computational entropy do not allow for computational complexity. Measurements are used in the information-based approach to choosing behavior, assuming that the movement and measurement models are right.

### **2.3 ISSUES IN THE EXISTING SYSTEMS**

The following are the main issues surveyed from the literature of detection and tracking, and the human behavior analysis.

1. Existing methods are not concentrating on the action tracking.
2. Not dealing with the partial and full occlusion in human detection.
3. Requirement of target points is large.
4. Detection and tracking method requires better feature extraction.
5. Existing does not deal with the real time applications.
6. Requires robustness improvement in target location.
7. Existing methods not handle detection and tracking for fast moving objects.

## 2.4 PROPOSED SYSTEM

### Proposed algorithm 1

Video/Image Acquisition - Video Acquisition using Frame converser system of ATM video

### Proposed algorithm 2

Anomaly detection - Human segmentation Fuzzy C Means Clustering Technique

### Proposed Algorithm 3

Feature Extraction

GLCM, KL (Karhunen–Loève) Transform, Edge Gradient Features, Color Histogram

### Proposed Algorithm 4

Human Skelton Mapping using Adaptive Multiple Importance Sampling (AMIS) for detection of anomaly

Detection and Tracking is a common phenomenon in video motion analysis. Detection and tracking is used for detect the moving object and to track the action of the moving object in the video using image frame sequence. It is mainly used in the video surveillance for security purpose.

This project proposes a novel approach to detect and to track the action of the moving object.

- Motion of the moving object is detected from the image sequences.
- Motion based tracking is carried out from the detect object.
- Database is created with some suspicious action from the set of videos and then it is get compared with detect moving object.

- Moving detected object is undergone with some suspicious action the alarm is indicating.

## **2.5 SUMMARY**

This section covers cutting-edge studies in the area of sensing and tracking moving objects. The difficulties and problems in the related works were also discussed in this chapter. It also includes a brief overview of the structure that will be discussed in the following sections. Form of design

## **CHAPTER 3**

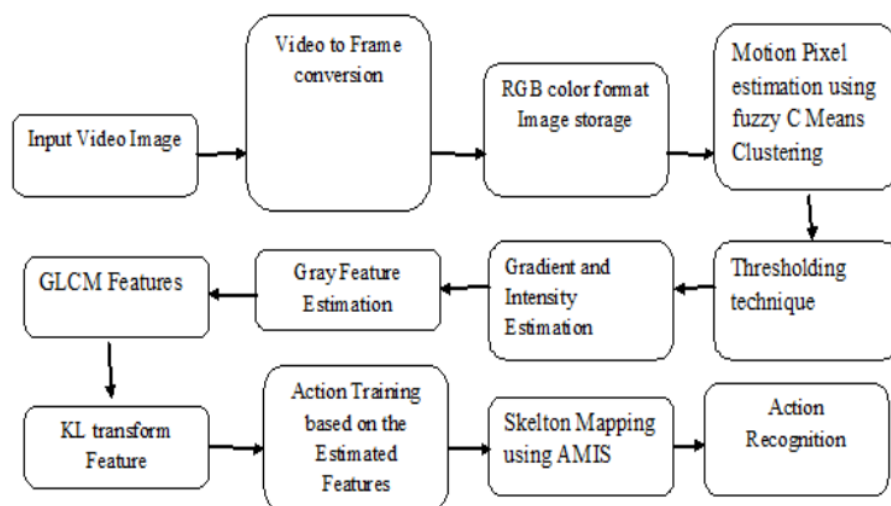
### **SYSTEM DESIGN**

#### **3.1 INTRODUCTION**

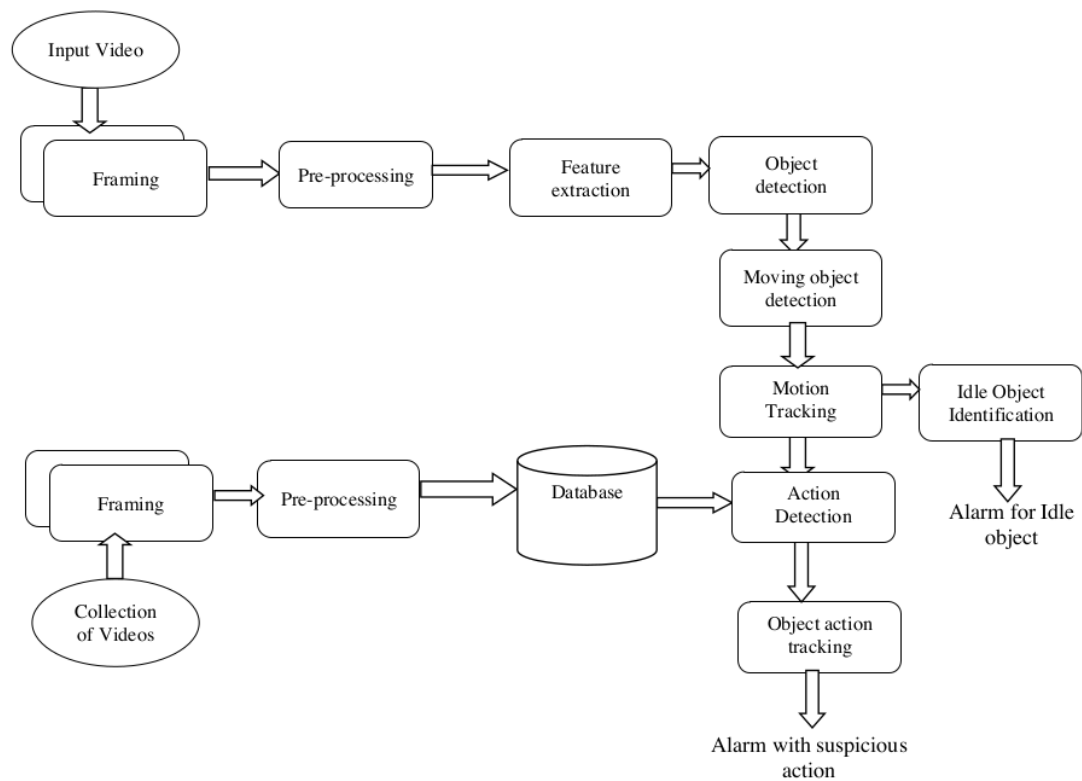
The design stage takes as its underlying info the necessities recognized in the affirmed prerequisites record. For every necessity, a bunch of at least one plan components will be produced. Design elements are required to describe the software features in detail. These design programmers can convert them into code directly without any additional input. Thus, the logical system of the product is developed in this stage. This stage also tries to create the architecture of the entire system. This is a benchmark stage since any errors performed till this stage and in this stage can be cleared. Design focuses primarily on design of a high standard (what programs are needed), low level design (how each program works), interface design (how the interfaces going to look like). and design of data (what data will be used). FDD is available at this stage (Functional Design document).

This chapter deals with the design documents created for the proposed system consists of a functional architecture, activity diagram, pseudo code, flow chart. The system architecture deals with the physical structure of the proposed system. The functional architecture provides a modular level design and their interactions. The activity diagram provides a graphical representation for the stepwise activity. The flow chart visually represents the flow of data, the operations performed and the exact steps followed. It will be useful during advanced stages of coding. Thus, the design documents created are used as a continuous reference point for coding.

### 3.2 FUNCTIONAL ARCHITECTURE



### Proposed Block diagram



**Figure 3.1 Functional Architecture of Object Detection and ATM anomaly action Tracking**

The system architecture of the proposed system is given in Figure 3.1. Video is taken as an input; video is converted into frames and the frames are considered as the image sequences. The image sequences are stored with the extension of JPEG. The frames are undergone with preprocessing technique. Noise from the video is to be filtered using only filtration. Threshold filtration, used immediately after background removal, is an efficient procedure. This approach has two major flaws: set threshold, at the stage where it is resolved exactly from the test sequence. Histogram-derived threshold, at the point where the last is selected from the segmented region's brightness histogram. Isolated points and small blobs that remain after threshold filtration are extracted with median filtering.

Feature extraction extracts the features such as color, edges, optical flow and texture. Based on the features extracted, the moving object is detected. If the detected object is idle for some period of time, the alarm is indicating for idle object. To additionally track protests and examine their practices, it is fundamental to accurately order moving articles. For example, the moving items are people, vehicles, or objects of revenue of a researched application. Article characterization can be considered as a standard example acknowledgment task. There are two primary classes of approaches for ordering moving items: shape-based arrangement and movement based grouping. Different portrayals of shape data of movement districts like focuses, boxes, outlines and masses are accessible for characterizing moving articles. When all is said and done, human movement displays an intermittent property, so this has been utilized as a solid sign for grouping of moving items too. The local convergence distance between the volume of the system and the arrangement of the excess volumes of the film determines the form of our metric coordination. The form prototype will effectively be screened over the video. Events are observed when the matching length falls below a certain threshold. The most critical content of all other video contents is action. Action recognition is a cutting-edge technology with many applications. The analysis and identification of patterns of human motion can be described as action recognition. Understanding the activities of objects, especially people, in a scene using video is both a difficult conceptual problem and a fertile ground for a variety of promising applications. The action is detected from the detected object. The action of the moving object is compared with the database set which contains

suspicious action. The moving object does suspicious action then alarm is indicated.

### **3.3 MODULAR STRUCTURE**

The following section gives the detailed description of the modules of the proposed system.

#### **3.3.1 Object Detection**

The input is the video. The videos are transformed into picture series. The images are saved as JPEG. Preprocessing tactics have passed through the successions. To exclude the masses, the P-Filter (Part) is used to aid the filter P-Filter Kalman is used for the following object. The Kalman filter is a technique for consolidating uproarious (and potentially missing) estimations and expectations of the condition of an item to accomplish a gauge of its actual present status dependent on position, speed and size. The dark scale esteems are passing to the sectioned picture. To figure the uprooting of the pixel esteems square base of sigma is to be taken. Sigma is estimated as inclination of the picture and the drive reaction coefficient. The fragmented picture is changed over into dim closer view outlined picture to establish the forefront and foundation pixels for object discovery, since shading picture doesn't uphold the frontal area planning. The edge detection is done by curvelet transformation based on the detected edge the objects are identified. It computes a beta probability density on image coordinates with pos. pos is a matrix of column-vectors that each must specify a point within the image of HEIGHT-by-WIDTH size. The casing arrangement contains number of articles and it is distinguished by extreme focus esteems and it is contrasted and closer view object.

#### **3.3.2 ATM anomaly detection**

The study of the 3 D motion array of the objects is used to detect moving objects in video. The moving object is identified with a motion estimate in order to determine the video plane location of the moving object. The blocks with moveable object boundary can be detected by using the vector field information.

### 3.3.2.1 Human anomaly Estimation

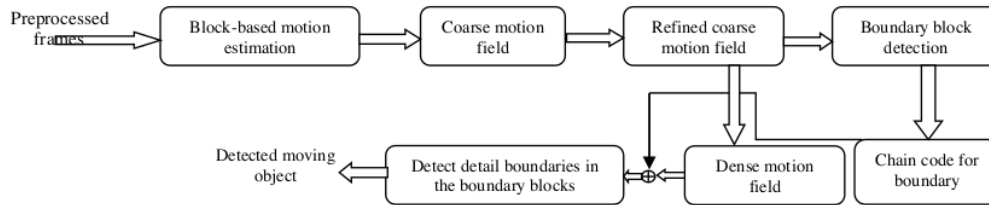
To detect and monitor a moving object in video, a new algorithm of detection and description is offered. Taking into account the projection of the movement of articles on the 3D display, movement data are being abused to increase the competence of the moving object recognition. The interruptions on the moving articles of movement vector field allow us to recognize the moving blocks of articles in which moving articles are predicted to be confined. Further refinements are also suggested on the limit of movable objects and a skilled descriptor for moveable items. In this proposed method, the ideal image model is adopted as the perspective projection model. In the first frame, calculate the first pixel value, called  $p_1$  and the first pixel value, called  $p_2$ . Find the median value, and in all frames add all the pixel values. The motion should be the same in the same things.

In addition, the related objects with the same movement as a moving object are also convenient. The motion vector of one moving object should be linearly interpolated with the points. A motion detection scheme is used for temporary segmentation. Image differentiation of  $t_{Th}$  and  $(t-1)$  Two consecutive frames The outline and is thresholded by an appropriate limit esteem. The thresholded picture itself addresses the measure of development performed by objects in the scene from the  $(t-1)$   $t_{Th}$  moment to the  $t$   $t_{Th}$  moment of time. The spatial division consequence of the  $t$   $t_{Th}$  outline, the  $(t-1)$   $t_{Th}$  outline, alongside VOP of the  $(t-1)$   $t_{Th}$  outline were utilized to play out a fleeting division of the  $t$   $t_{Th}$  outline. The pixels relating to the item locales of the fleeting portioned yield are supplanted by the first pixels of the  $t$   $t_{Th}$  edge to acquire the VOP of the  $t$   $t_{Th}$  outline.

### 3.3.2.2 Boundary Detection

Using information from the video compression-generated motion vector area, find blocks that contain moveable object limits from Figure 3.2. The famous motion vector in one block is the motion vector derived by motion assessment for all pixels. However, we can deduce that the motion vector is the critical points in the center of a block. In the same object as before, pixels will fulfill the condition of

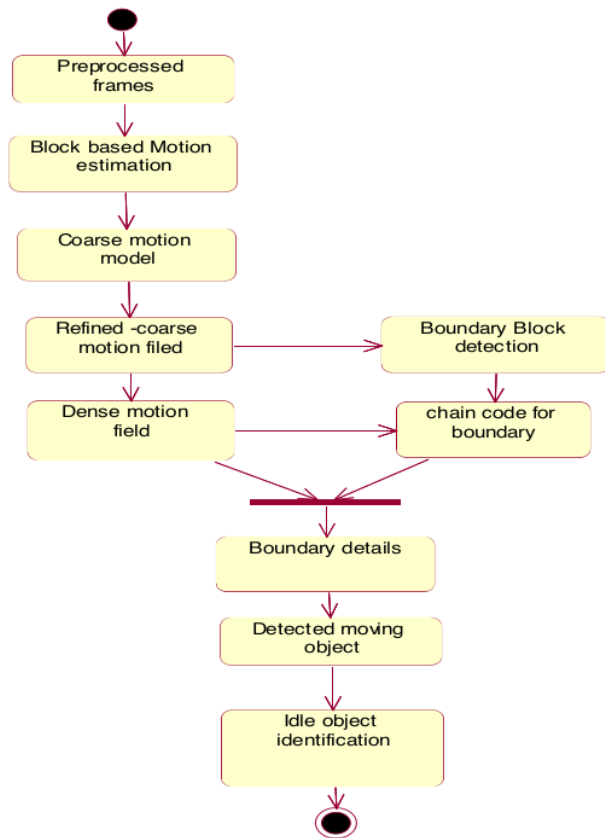
linear interpolation. As a result, critical points in a single moving object can satisfy this condition. When this condition is violated, the vector field becomes discontinuous, but the block's boundary remains.



**Figure 3.2 Functional Architecture for Moving Object Detection**

### 3.3.2.3 Activity Diagram for Moving Object Detection

The operational step-by-step workflows of components in the system are defined in an activity scheme. Diagrams of activity can display activities that are either parallel or conditional. From Figure 3.3, Pre-processed frames are given as input to estimate motion estimation for the video object plane. Refined coarse field, boundary blocks detection and dense motion field is used to detect the detail boundaries in the boundary block, from the boundary value calculation the moving object is detected.



**Figure 3.3 Activity Diagram for Moving Object Detection**

### 3.3.3 Motion Tracking

Segmentation of video is the operation of any algorithm separating regions of a video in ways similar to how a person might view them naturally. Since the motion tracking is needed, a characteristic methodology is to fragment those locales of the video that are moving comparative with the foundation. This permits us to run the model assessment separately for every district, rather than on the entire video. Video segmentation is to isolate foundation spaces of the video from forefront areas of movement that are of interest for human following. The camera is fixed and that lighting doesn't change out of nowhere. It is feasible to accomplish exact video division without this supposition, however such consensus would

require all the more computationally costly calculations. The calculation of decision is foundation deduction, in which to process a model of the video foundation over the long haul. For some random casing of video, take away this foundation video from it. Those pixels with an outcome close to zero are treated as foundation and those pixels with a bigger outcome are treated as foreground. The districts shaping the forefront <sup>10</sup>part in the fleeting division is distinguished as moving item areas, and the pixels comparing to the foregroundpart of the first casing form the VOP. We can monitor moving objects after the VOP is obtained from the various image frames.

### 3.3.3.1 Algorithm for Moving anomaly detection and Tracking

Object detection algorithms are gradually implemented as a border block detection from Figure 3.2, the written chain codes and boundary detection of boundary blocks where the boundary block is identified as a boundary block with a certain moving object. Some conclusions are drawn in order to simplify the moving object limit detection:

1. At most two objects boundaries in one block;
2. Any object cannot be hold in one block;
3. The boundary of moving object is a simple closed curve.

The steps of the algorithm are the following:

- <sup>18</sup>1. Read two consecutive frames from the image sequence called as current frame and previous frame.
2. Calculate the first pixel value of the first frame named as p1.
3. Calculate the first pixel value of the second frame and named as p2.
4. To find the mean value, add all the pixel values in all the frames.
5. Repeat step 6 for each of the newly added pixels; stop if no more pixels can be added.

6. More than one pixel can be used to segment the image.
7. Motion estimation is done by temporal and spatial segmentation by comparing two consecutive frames.
8. After segmentation based on the variation of pixel values the moving object is detected by using the details of boundary values.
9. The centroid ( $\hat{u}_{nc}$ ,  $\hat{v}_{nc}$ ) of the moving object is computed by using equation (3.1) and (3.2)

$$\hat{u}_{nc} = \frac{\sum_i u_{n_i} c(i)}{\sum_{i \in T} c(i)} \quad (3.1)$$

$$\hat{v}_{nc} = \frac{\sum_i v_{n_i} c(i)}{\sum_{i \in T} c(i)} \quad (3.2)$$

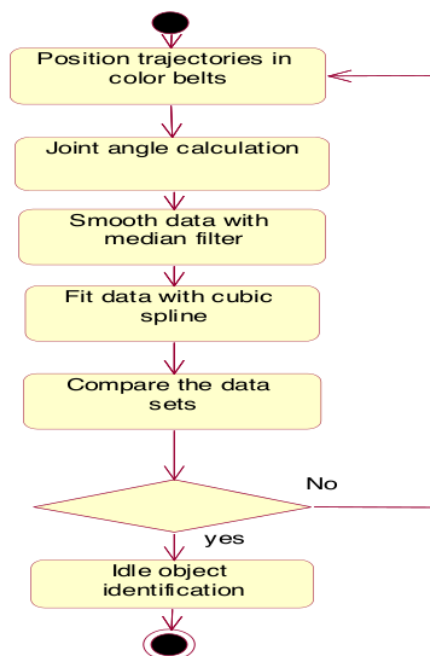
Where ( $u_{ni}$ ,  $v_{ni}$ ) represents the co-ordinate of a pixel in the temporal segmentation and the value of  $c(i)$  considered as,

$$c(i) = \begin{cases} 1, & \text{if pixel } i \text{ is identified as an object pixel} \\ 0, & \text{if pixel } i \text{ is identified as a background pixel.} \end{cases}$$

10. Centroid calculation is done for tracking the moving object.

The idea of the motion detection is to take advantage of the vector detected in video compression to provide an indication of moving objects and then to refine the boundaries of moving objects. The move object detection will be speeded up by this scheme.

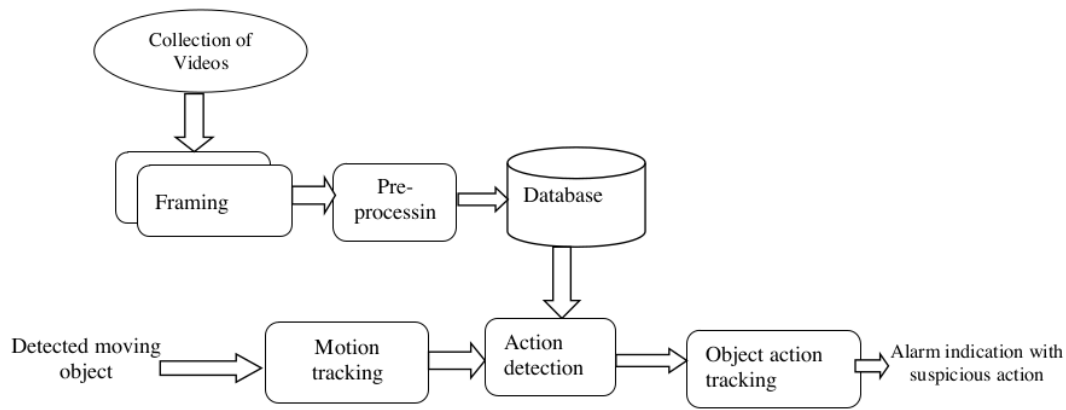
### 3.3.3.2 Activity Diagram for Motion Tracking



**Figure 3.4 Activity Diagram for Motion Tracking**

The location of the moving object observed is comparable in Figure 3.4 to the previous frame <sup>1</sup> in the current frame. If the moving object is same in the current and the previous frame then the object is identified whether it is idle for particular period of time.

### 3.3.4 Action Tracking



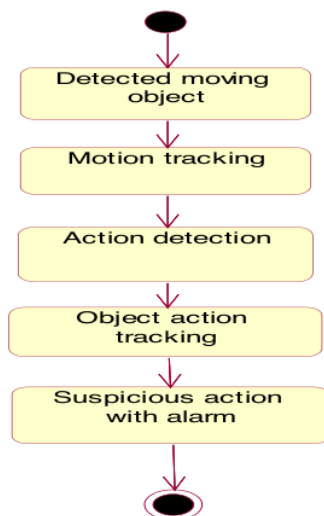
**Figure 3.5 Functional Architecture for Action Tracking**

From Figure 3.5 proposes the frame for a 'action connection' (ESC) to distinguish action subsequences that may be close to a given video-action clip from the database (possibly long). We have shown that two notable calculations are not typical instances of our ESC structure, in particular the configuration of PC and information science coordinates and the strategic time traveling (DTW) in signal preparation. Two major real-world applications are covered by the proposed framework: action pattern extraction and action segments, with an average speed of about 3.3 frames per second in mat laboratory.

Human movement shows an occasional property, so this has been utilized as a solid prompt for arrangement of moving articles too. Our shape, which coordinates with metrics, is determined by the distance between the display volume and the sectional volume arrangement in the video. The type template can be effectively scanned through the video, and the corresponding distance is calculated if events are detected below the given threshold. Any other video content's most critical content is action. Action is a new technology with many applications. Recognizing Action The study of human motion patterns and their identification can be described as action recognition. Understanding the movements of objects, especially people, in a scene using video is both a difficult conceptual problem and a wide field of promising applications. In action tracking,

action sequences from training samples and compare with both database. Based on classification, the action of the moving object has been detected. After action tracking is done by action detection. The suspicious action is indicated by alarm.

#### 3.3.4.1 Activity Diagram for Action Tracking



**Figure 3.6 Activity Diagram for Action Tracking**

From Figure 3.6, in action tracking, action sequences from training samples and compare with both database. Based on classification, the action of the moving object has been detected. After action tracking is done by action detection. The suspicious action is indicated by alarm.

### 3.4 SYSTEM REQUIREMENTS

#### HARDWARE SPECIFICATION

|                    |   |            |
|--------------------|---|------------|
| Processor          | : | Pentium IV |
| RAM                | : | 2GB        |
| Hard Disk Capacity | : | 4GB        |

|                  |   |                        |
|------------------|---|------------------------|
| Cache Memory     | : | 512 KB                 |
| Operating System | : | Windows2007            |
| Monitor          | : | 15inches               |
| Pointing device  | : | Scroll Mouse           |
| Keyboard         | : | 101 Standard Key-board |

## **SOFTWARE SPECIFICATION**

|          |   |            |
|----------|---|------------|
| Platform | : | MATLAB 7.0 |
|----------|---|------------|

### **3.5 SUMMARY**

As a result, the design papers are included in this chapter. These diagrams aid in the communication between software engineers and architects. So that software engineers can understand the architecture. The architects create the big picture for the software engineer to create. The FDD diagrams (Functional Design Documents) are used as a guideline in the coding process.

## **CHAPTER 4**

### **IMPLEMENTATION**

#### **4.1 INTRODUCTION**

Content based image retrieval use the library depended on physically clarified pictures, which is costly and tedious, particularly given the huge and constantly-growing image databases in existence. To annotate image patches by using multi label image annotation for effective retrieval of image in large database. This chapter brings out the implementation details of Multi label image annotation by learning the correlation between labels. It gives the overview of the platform and the following sections presents the snapshots to annotate image patches for image retrieval.

#### **4.2 OVERVIEW OF THE PLATFORM**

MATLAB is a method for numerical calculation, showing details in 2D and 3D graphically and resolving many other engineering and science issues. Maintained by mathematical works, MATLAB enables easy application monitoring, capacity and knowledge compilation, calculation execution, user interface creation and program-specific interfacing in different dialects. While numerical, the MuPad representative engine is used in a discretionary toolkit to enable admission to PC-based variable math capacities.

MATLAB constructs are based on the MATLAB language, which is often referred to as M-code. Entering the short, `>>`, section of the MATLAB Desktop in the Command Window is the easiest way to run M-code. Mathematically dynamic shells can also be created with MATLAB. The command sequence in the text files can be saved or exemplified to expand the functional order, typically using the material MATLAB Editor. MATLAB is used in a wide variety of applications, including sign and image processing, communications, monitors, assays and assessments, financial demonstration and study, and computer-based science. In

these applications (collection of special-purpose MATLAB environments), add toolboxes to solve particular classes of problems.

## KEY FEATURES OF MATLAB

- <sup>2</sup> High-level language for technical computing.
- Development environment for managing code, files, and data.
- Interactive tools for iterative exploration, design, and problem solving.
- Mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, and numerical integration.
- 2-D and 3-D graphics functions for visualizing data.
- Tools for building custom graphical user interfaces.
- Functions for integrating MATLAB based algorithm with external applications and languages, such as C, C++, FORTRAN, Java, COM, and Microsoft Excel.

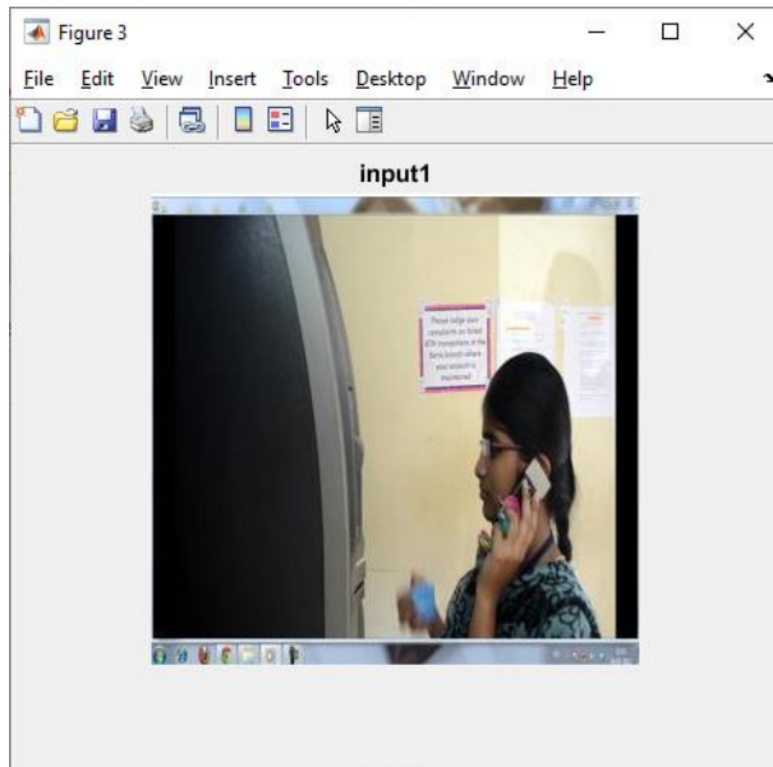
## <sup>15</sup> IMAGE FORMATS SUPPORTED BY MATLAB

The following image formats are supported by MatLab:

- BMP
- HDF
- JPEG
- PCX
- TIFF
- XWB
- PNG

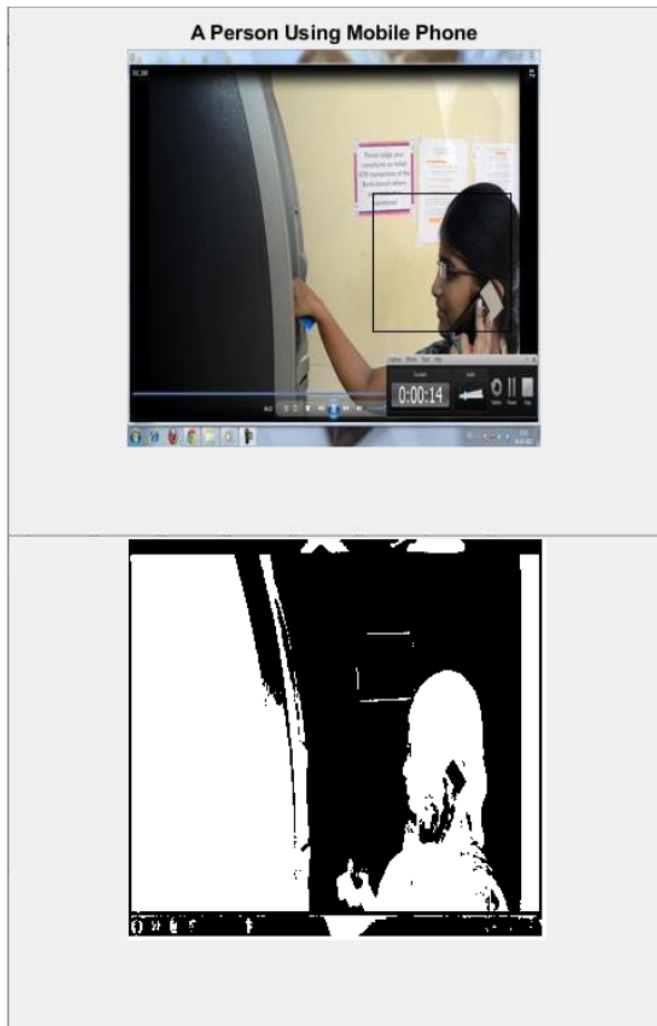
## STRENGTH OF MATLAB

- Code for MATLAB is optimized to make matrix operations relatively simple.
- MATLAB can function as a calculator or as a language for programming.
- Interpreting the MATLAB, fixing errors is simpler.
- MATLAB is relatively easy to learn.



The above image represents that the woman present in the atm is using mobile phone. It is obvious that using mobile in the atm is prohibited because for example if they distracted during the transaction there is a chance, they may get robbed.

It is the input of the video that is being recorded in ATM. By video acquisition process the image is turned into frames.

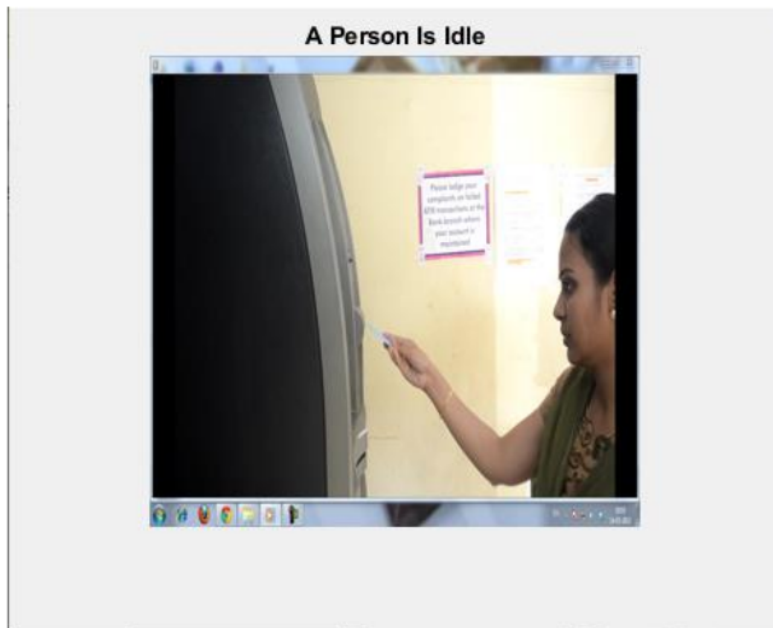


By using Feature Extraction, it detects that the person is using mobile phone and the alarm turns on and using Human Skeleton Mapping using Adaptive Multiple Importance Sampling it indicates that the person is using mobile phones.



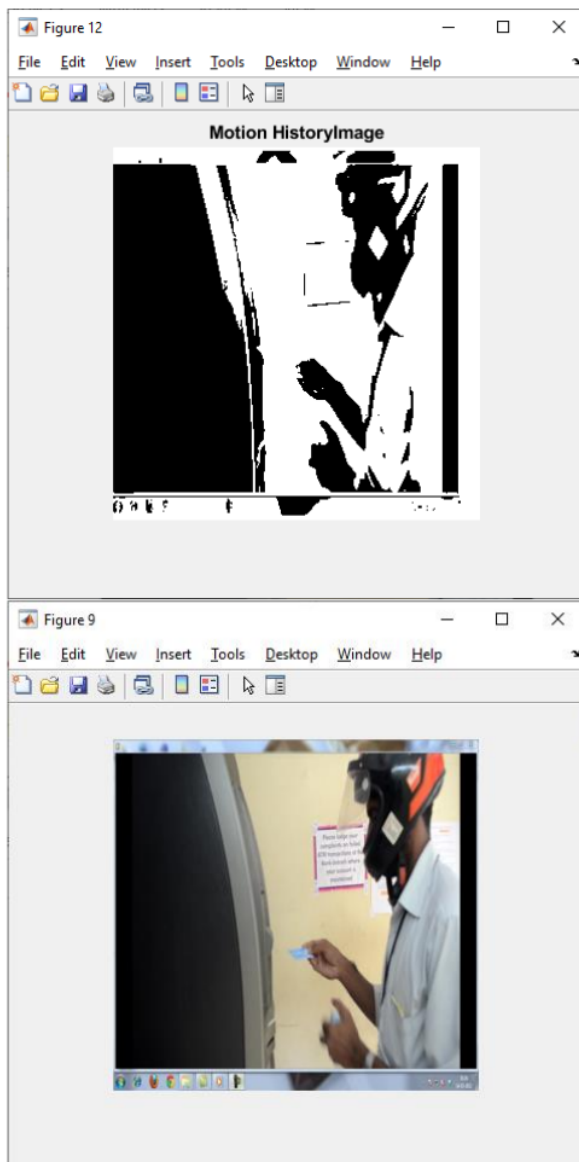
The above image represents that the people in the ATM are crowded or multiple people are present in ATM it is also prohibited in ATM because they may plan robbery or some one may force another person.

By using Feature Extraction, it detects that there are multiple people present and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling it indicates that there are multiple people present in the ATM.



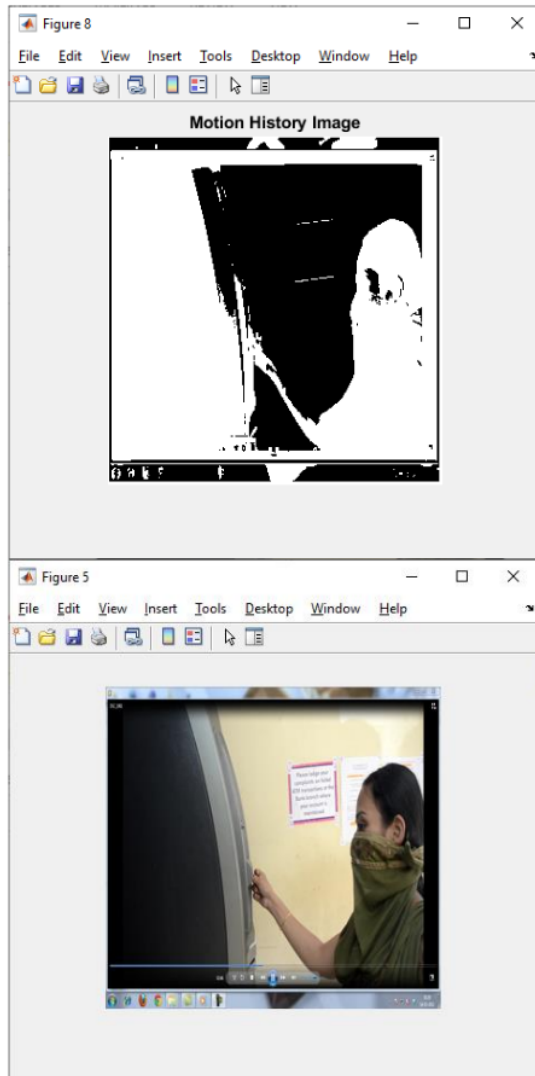
A person should not be ideal for more time inside the ATM because they may be doing suspicious activities, we set the time according to our requirement like if the person is ideal for more than five minutes then the alarm must turn on and it displays that the person is being ideal.

By using Feature Extraction, it detects that the person is being ideal for certain time and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Samplingit indicates that the person being ideal.



Wearing a helmet in ATM is prohibited because they may be covering their face to avoid from the CCTV footage.

By using Feature Extraction, it detects that the person is covering their face with helmet and the alarm turn on and using Human Skelton Mapping using Adaptive Multiple Importance Sampling indicates that the person wearing a helmet.



At present situation wearing a mask not a problem but after pandemic it may be used as allay to cover their face and avoid from CCTV footage.

#### **4.3 IMPLEMENTATION PROCEDURE FOR MOTION TRACKING**

After segmentation of a frame, the output of the segmentation is denoted as foreground and background. The districts shaping the closer view part in the fleeting division is distinguished as moving article locales, and the pixels relating to the frontal area part of the first edgeform the VOP. After obtaining the VOP from the different image frames we can track the moving objects. The motion of the detected object is tracked based on the centroid calculation.

The Segmentation of the image is given assegment image (Weights, Sigmas, active\_gaussian,BACKGROUND\_THRESH, K);

#### **4.4 SUMMARY**

This chapter gives the overview of the MATLAB, its underlying technologies and its features. The implementation procedure of the preprocessing techniques, feature extraction, object detection, moving object detection and the motion tracking of the moving object in video is explained and the snapshots of each task concerned are also explained.

## **CHAPTER 5**

### **CONCLUSION AND FUTURE WORK**

Our ATM anomalous detection approach is based on the assumption that a significant deviation from normal activity is a strong indication of an attack. As far as we know, we are the first to automatically construct a normal behavior model inside an ATM using a data stream, which is then used to detect defects (or attacks respectively). This method can be formalized as a sequential anomaly detection problem, and three different approaches can be empirically evaluated using an actual data set.

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# DETECT OF ABNORMAL EVENT AT ATM SYSTEM BY USING IMAGE PROCESSING

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