DETECTION AND TRACKING OF MOVING OBJECTS USING IMAGE PROCESSING

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***Abstract*— Detecting and tracking of moving objects has become important area of research and is use for motion of various objects on a given video. In this work we are presenting a new model to detect and track the moving objects in a given video. The proposed work includes identifying an efficient motion feature to detect the moving objects. This model will be implemented using MATLAB and performance of the system is evaluated.**

The surf approach is a quick and robust algorithm for local, similarity invariant illustration and assessment of images. Similarly too many different nearby descriptor-based totally approaches, interest factors of a given photograph are described as salient features from a scale-invariant illustration. Any such a couple of scale evaluation is furnished by the convolution of the initial photograph with discrete kernels at several scales (box filters). The second step consists in constructing orientation invariant descriptors, by way of the use of local gradient data (intensity and orientation). The principle interest of the surf method lies in its fast computation of operatorsthe use of box filters, accordingly enabling actual-time packages consisting of monitoring and objects popularity.

***Index Terms*— Detect the moving objects; frame differencing; Extracting images; Constructing orientation; surf method;color differencing;Preprocessing;Binarizing.**

1 INTRODUCTION

THE TECHNIQUE OF SPEEDED UP STRONG FEATURES "SURF" ALGORITHM MAY BE DIVIDED INTO THREE PRINCIPAL STEPS. FIRST STEP IS "DETECTION STEP", IN THIS STEP INTEREST POINTS ARE DECIDED ON AT DISTINCTIVE LOCATIONS INSIDE THE BEGINNING PHOTOGRAPH, INCLUSIVE OF CORNERS, BLOBS AND T-JUNCTIONS AND THIS SYSTEM OUGHT TO BE ROBUSTLY. THE MAXIMUM TREASURED ASSETS OF AN INTEREST FACTORS IT'S REPEATABILITY. REPEATABILITY EXPLICIT THE RELIABILITY OF THE DETECTOR FOR FINDING THE SAME PHYSICAL HOBBY POINTS BENEATH DISTINCT SCENE CONDITIONS. 2ND STEP IS "DESCRIPTION STEP", ON THIS STEP HOBBY POINTS HAVE TO HAVE UNIQUE IDENTIFIERS DOES NOT RELY UPON FUNCTIONS SCALE AND ROTATIONS WHICH MIGHT BE KNOWN AS DESCRIPTOR, THE RECORDS OF HOBBY FACTORS REPRESENTED BY DESCRIPTOR THAT ARE VECTORS THAT CONTAIN INFORMATION APPROXIMATELY THE FACTORS ITSELF AND THE SURROUNDINGS. THIRD STEP IS "MATCHING STEP", ON THIS STEP DESCRIPTOR VECTORS ARE IN COMPARISON BETWEEN THE ITEM IMAGES AND THE BRAND NEW ENTER OR STARTING PLACE IMAGE, THE MATCHING SCORE IS CALCULATED BASED TOTALLY ON THE GAP BETWEEN VECTORS

Image processing is a method to perform some operation on an image, in order to get an enhanced image or to extract some useful information from it.It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image.Analysis of object motion is one of the recent and popular research topics in digital image processing.In which the movement of objects is the important part of object detection and motion analysis.

Videos are actually sequence of images,each of which called a frame,displayed in fast enough frequency so that human eyes can percept the continuity of its content.It is obvious that all image processing techniques can be applied to individual frames.Besides,the contents of two consecutive frames are usually closely related.Object detection in videos involves verifying the presence of an object in image sequences and possibly locating it precisely for recognition.Object tracking is the process of locating an object or multiple objects in a video file.In object detection and tracking we have to target object and track that object in consecutive frames of a video file.

In this proposed system, aims to detect and track the moving object in a given video.This project uses two methods,frame differencing and color differencing methods to detect and track the moving objects.The frame differencing method is use to detect the moving objects from the difference between the current frame and the reference frame.The frame difference method is commonly used method for detection of motion.This method adopts pixel by pixel based difference to find the moving objects.In morphological method first we divide the video into image frames.Then we consider two consecutive frames,one is reference frame and another one is current frame.The next step is subtracting RGB values of each pixel of current frame from RGB values of reference frame.

In the resultant image (which is obtained after subtracting the image frame) objects which are in motion are highlighted in grey shades and rest all is black out.In the proposed system, extracting given video into image frames is the initial step.Thenwe take two consecutive frames and subtract the one from another.After subtraction we get some values that values undergoes a series of processing stages.

1.1APPLICATIONS

Objects detecting and tracking has a wide variety of applications in video surveillance, vision-based control,human-computer interfaces,medicalimaging,augmented reality and robotics.Additionally, it provides into higher level vision tasks,such as 3D reconstruction and 3D representation.It also plays an important role in video database such as content-based indexing and retrieval.

A. Automated video surveillance:

In these applications computer vision system is designed to monitor the movements of objects in an area, identify the moving objects and report any doubtful situation.The system needs to discriminate between natural entities and humans, which require a good object tracking system.

B. Robot vision:

In robot navigation, the steering system needs to identify different obstacles in the path to avoid collision.If the obstacles themselves are other moving objects then it calls for a real-time object tracking system.

C. Traffic monitoring:

In some countries highway traffic is continuously using cameras.Any vehicle that breaks the traffic rules or is involved in other illegal act can be tracked down easily if the surveillance system is supported by an object tracking system.

D. Animation:

Object tracking algorithm can also be extended for animation.

E. Security:

With increasing calls for security at place such as airport, government building, public transportation and public institution computer recognition has become an invaluable tool.

1.2 LIMITATIONS

Object tracking fundamentally entails estimating the location of a particular region in successive frames in a video sequence.Properly detecting objects can be a particularly challenging task,especially since objects can have rather complicated structures and may change in shape,size,location and orientation over subsequent video frames.Various algorithm and schemes have been introduced in the few decades,that can track objects in a particular video sequence,and each algorithm has their own advantages and drawbacks.In object tracking the,important challenge that has to consider while the operating a video tracker are when the background is appear which is similar to interested object or another object which are present in the scene.

A. Ambient illumination:

In a video, it is possible to change in intensity, direction and color of ambient light in appearance of interested objects in a video frame plane.

B. Noise:

In the acquisitions process of video,it may possible to introduce a certain amount of noise in the image or video signal.The amount of noise depends upon sensor qualities which are used in acquitting the video.

C. Occlusions:

In a video file, moving object may fall behind some other object which is present in the current scene.In that case tracker may not observe the interested object.This is known as occlusion.

2 LITERATURE SURVEY:

Object detection in video image obtained from single camera with static background that means fixing camera is achieved by background subtraction approach

A general moving item location and following in light of vision framework utilizing picture distinction calculation. This paper focuses on revelation of moving things in a scene for example moving people meeting each other, and taking after and perceived people the length of they stay in the scene. This is finished by picture contrast calculation with MATLAB programming. In the present work the ideas of dynamic layout coordinating and outline differencing have been utilized to execute a hearty robotized single protest following framework. In this execution a monochrome mechanical camera has been utilized to snatch the video edges and track a protest. Assuming any is distinguished with high exactness and proficiency. Once the question has been distinguished it is followed by utilizing a productive Template coordinating calculation. The layout utilized for the coordinating objects are produced dynamically. This ensures that any change in the pose of the object does not hinder the tracking procedure .They simulated image difference algorithm in MATLAB with different videos.

The displayed framework contains vision framework that can catch recordings and other is picture distinction calculation that can procedure for moving item discovery and following. Framework included high determination camera and equipment card (supported to camera), camera is interface to PC. From vision system computer should installed frame grabber card which is support to camera and it should have fast processor for capturing frame with snapshot. The video captured from image acquisition system. Read all images or frame in MATLAB platform the first image is called background or reference image. All the no of pictures subtract to foundation then contrast is more noteworthy than limit the protest is identified .for following side utilized locale props charge of MATLAB with properties of centroid , jumping box and region of white pixels. So they utilized jumping box to speak to moving articles. They exhibited and executed of moving item identification and following with the assistance of picture distinction in MATLAB.

By exploratory outcome they got decent outcome contrast with other research by utilizing such sorts of commotion evacuation channel and furthermore such sorts of structure component for morphological operation.

3 PROPOSED METHODS:

Object detection and Tracking is a process of detecting and tracking the moving object in a video file. An object can be human, animal or vehicles. This method is able to detect and track all kinds of objects in a given video using some efficient methods and algorithms

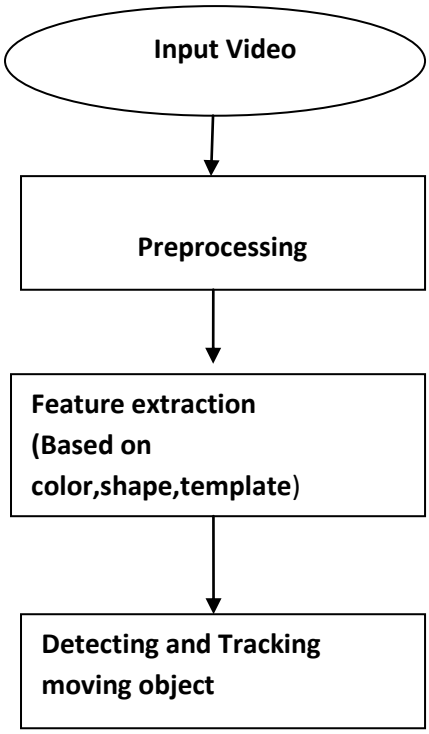


Figure 3: Architecture of object detection and tracking

Input video:

User has to input the video first. Video can be read from webcam or use a prerecorded video. A video may contain different kinds of objects like human, animals or vehicles.

Pre-processing:

Pre-processing is the term for operations on object in a given video. The ultimate goal of this step is to extract the features of an object in a video. This step is done before processing the major task of this work.

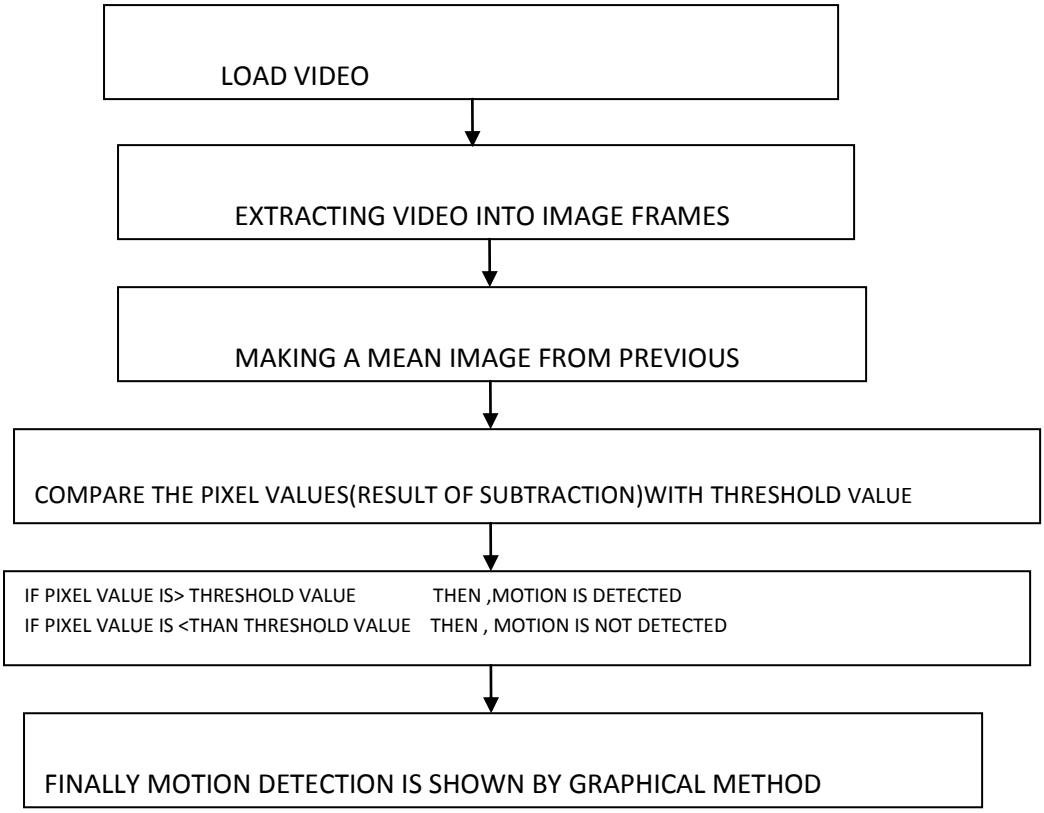
Feature extraction:

Feature extraction is important stage in a detecting and tracking of moving objects through the video. Detection of moving objects in video streams is the first relevant step of information extraction in many computers vision applications. In object detection various features are extracted in ordered to track the moving objects.

Object detection and tracking :

After features are extracted then moving object is detected and tracked in a set of video database.

3.1: FRAME DIFFERENCING



Load video: User has to input the video first. Video can be read from webcam or use a prerecorded video. A video may contain different kinds of objects like human, animals or vehicles

Differnce of two conscecutive images: At first the given video is extracted into image frames. This is the step taken before the major image processing task. The image must be converted to grayscale image before detecting and tracking moving objects in a given video frame. Otherwise, we cannot observe the movement of the objects in a frame properly
.We are taking two images one is reference image and another is current image .Then subtract current image from reference image
Resultant value =abs(reference image – current image)
where Resultant value is result of subtraction .

Binarizing the resultant frame and comparing resultant frame with threshold value:There are holes in moving object area , and contour of moving object is not closed. The absolute differential image is transferred to gray image to facilitate further operations.
If Resultant value is greater than threshold value then movement is detected in frame otherwise there is no movement in given frame.
Shows binarization of resultant frame. We have to binarize the resultant frame. The main purpose of binarization is to make resultant frame in 2 colors black and white so it is easier to calculate blobs in the image.

Detect and track the moving objects represented by graphical method: In present system, when the movement is detected, it's represented by drawing a box around the objects in a frame. This system uses the bounding box technique to draw the box around the objects in a frame.

Shows bounding box around moving objects in frame .After binarization of resultant frame, we compare that resultant value with particular threshold value. If resultant value is greater than threshold value then movement is detected .Moving objects are represented by drawing bounding box around them.

3.2 SURF METHOD

Surf set of rules utilized in numerous computer imaginative and prescient and real time software, surf algorithm considered one of the fast and robust approach for object detection and reputation which has been proposed .

Surf features used for detection the site visitors sign in discipline programmable gate array (fpga) which is hardware to manner video streams in actual time has been used . there are numerous research published so that it will improve the overall performance of surf algorithm for varies application, an photograph matching set of rules combined with surf and daisy descriptor is proposed for increase the matching , going for walks time, functionality of surf in rotation state of affairs. the robust of surf feature instead of different algorithm for fast matching cause use in a few unique applications which includes face popularity, object detection, item popularity and picture retrieval the use of surf and hobby points' detection and outline principles as. it has been proposed a way to boom matching performance which can be acquire in relation of underline detector of hobby factors in each algorithms scale invariant characteristic remodel "sift" and surf. many research paintings and computer vision software use surf algorithm for picture retrieval and content based image retrieval (cbir) by way of indexing the capabilities vectors and calculate the features for input or question photo then locate the matching pictures primarily based on similarity measures after that retrieving matching pictures result such. our proposed techniques that used superior surf method in actual time for detect interest objects from examined images by using locating the most powerful functions then ransac set of rules mixed in our work for eliminated the mistake matching functions in matching technique, ransac is insensitive to outlier then our method for counting the proportion of inlier and outlier capabilities hired right here to present a selection in file record and visualize mode

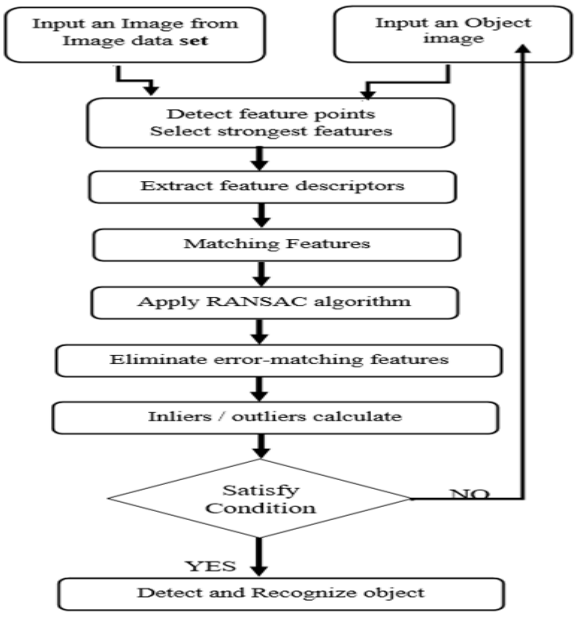


Figure 3.2: Architecture of SURF method

3.3: COLOUR DIFFERENCING

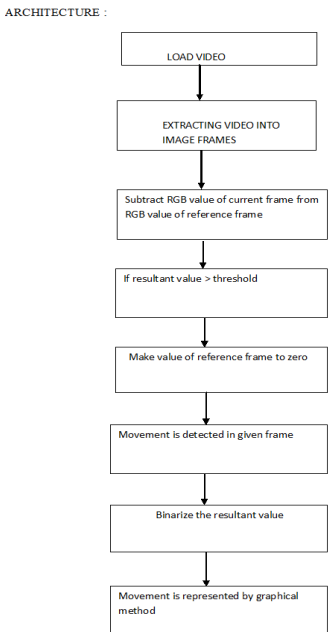


Figure 3.3: Architecture of COLOR differencing method

Load video: User has to Load the video first. Video can be read from webcam or use a prerecorded video. A video may contain different kinds of objects like human,animals or vehicles.
Difference of two consecutive images based on RGB colors: In this step RGB value of each pixel of current image is subtracted from RGB values of reference image.
First we subtract red pixel of the current from the red pixel of the reference frame
Red=ImagePixels1(Red,i,j)-ImagePixel2(Red,i,j)
Green=ImagePixels1(Green,i,j)-ImagePixel2(Green,i,j)
Blue=ImagePixels1(Blue,i,j)-ImagePixel2(Blue,i,j)
shows subtraction of red pixel of current frame from the red pixel of reference frame,subtraction of green pixel of current frame from the green pixel of reference frame and subtraction of blue pixel of current frame from the blue pixel of reference frame.

Comparison of resultant value with threshold value: Compare the resultant value with threshold value. If resultant value is greater than threshold that means movement is detected in given image frame.And make reference image value to zero.

Binarize the resultant value: The main purpose of Binarization is to make the resultant image in 2 color black and white so that it is easier to calculate blobs in the image. The minimum and maximum values of the RGB components are set.

Detect and track the moving objects represented by graphical method: In present system, when the movement is detected, it ‘s represented by drawing a box around the objects in a frame

4 EXPERIMENTAL RESULTS AND ANALYSIS

4.1 OBJECT DETECTION AND TRACKING:

Result obtained frame differencing method

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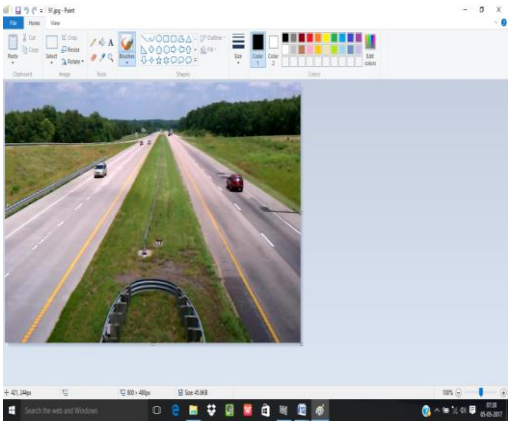
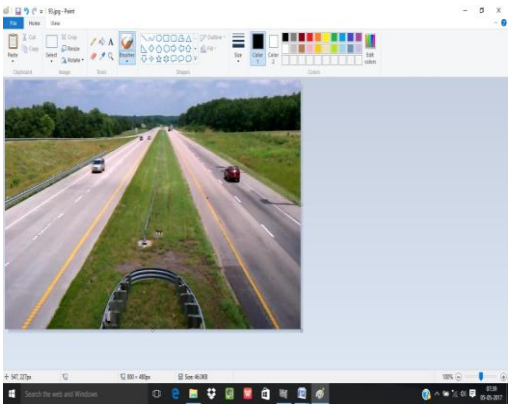
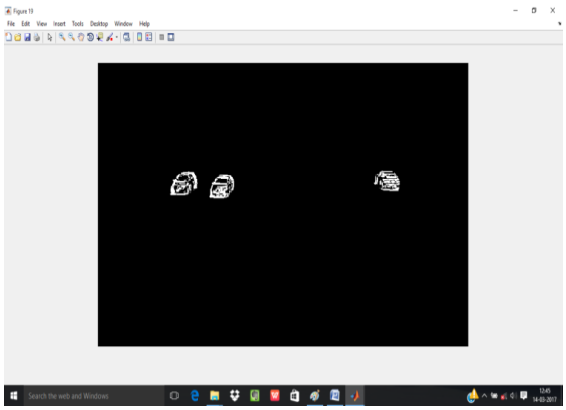


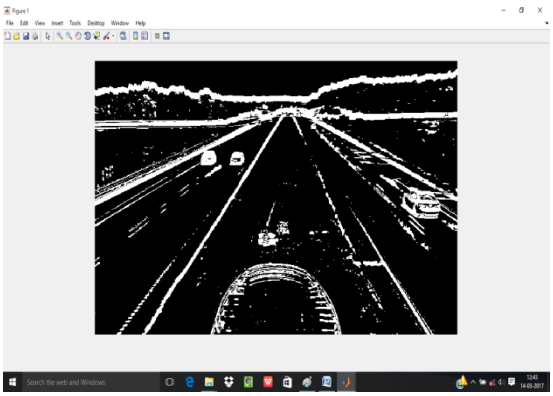


Current and reference frame

First we extract the given video into frames .Iinthat ,first frame is take as reference frame as second frame is taken as current frame.

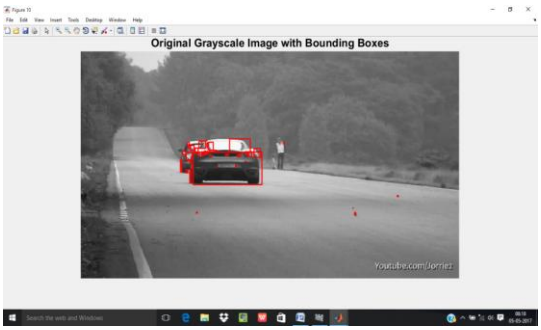
After subtraction we got some values . If that value is greater than threshold value then binarize the reference frame. Here we can observe the movement from first frame to second frame .figure shows binarization of resultant image obtained from subtraction of reference frame and current frame .we have to remove the smaller objects fewer than 30 pixels. By doing like this we can represents the moving objects by drawing bounding box around the objects properly.





Resultant frame and removing small objects from frame

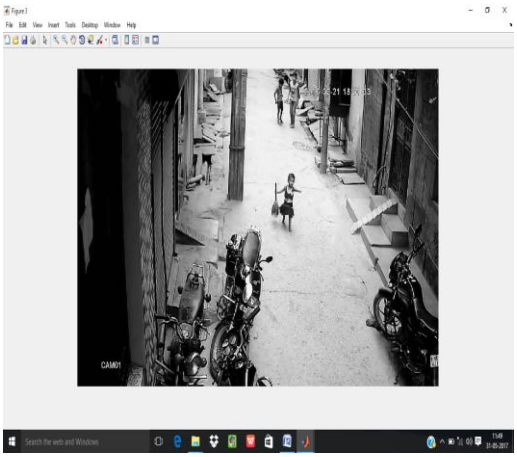
We can represent the moving objects in a frame by drawing bounding box around them.



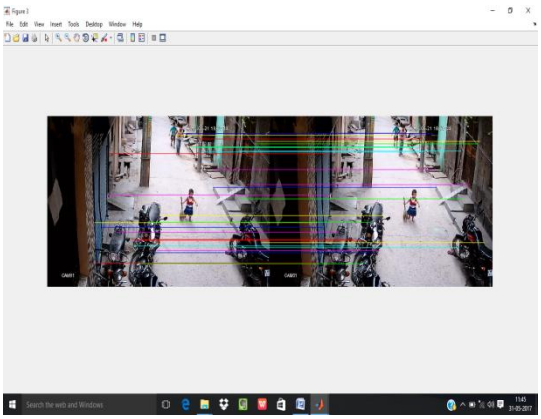
Drawing bounding box around objects

4.2 :

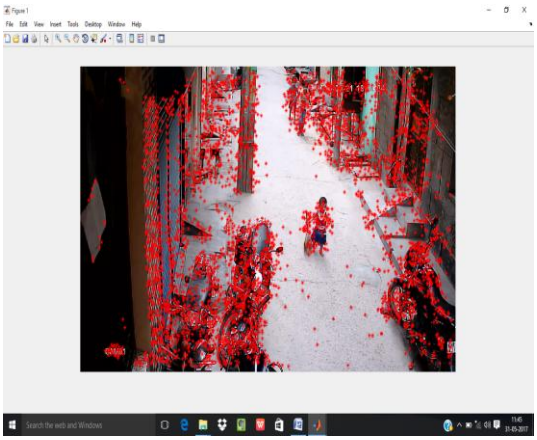
Covert images to gray-scale



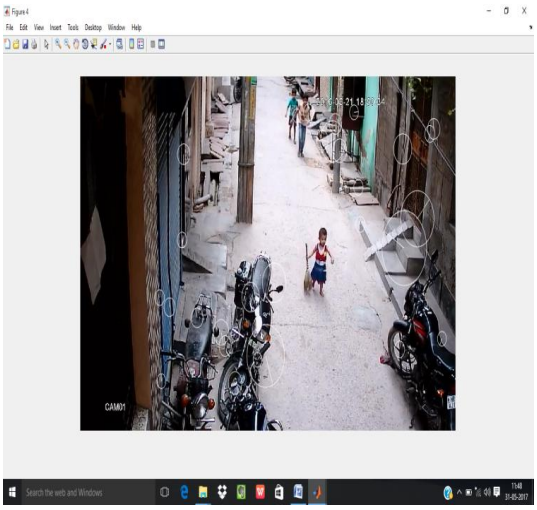
Match the number of strongest features with each image.



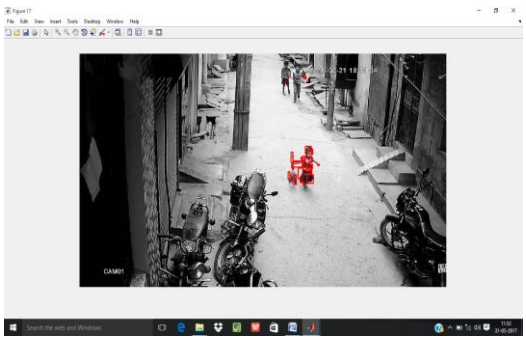
Take the ratio of- number of features matched/ number of strongest features



Detect and track the moving objects represented by graphical method:



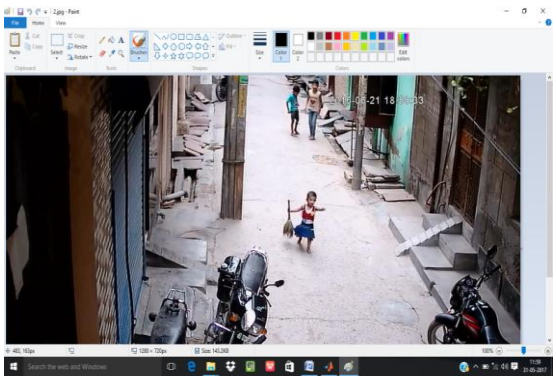
In present system, when the movement is detected, it's represented by drawing a box around the objects in a frame. This system uses the bounding box technique to draw the box around the objects in a frame.



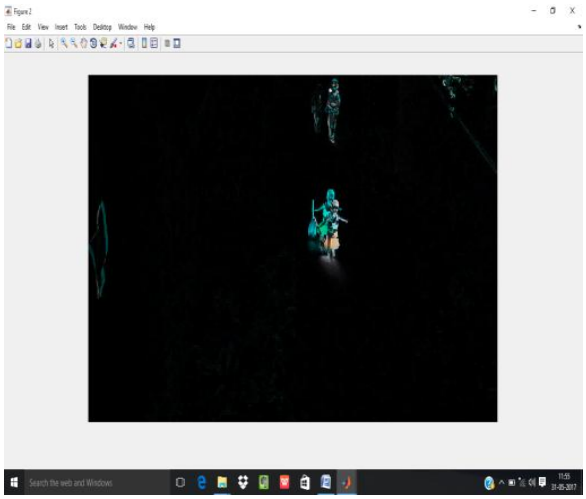
4.3 :

Result obtained frame RGB method :

First we divide the given video into frames .In that , first frame is take as reference frame as second frame is taken as current frame reference and current frame

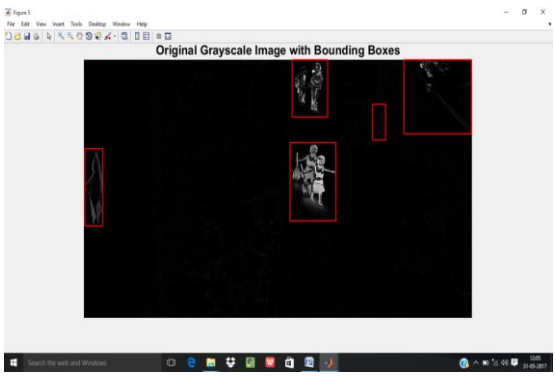


Subtraction of RGB value of each pixel of current frame from the RGB value of each pixel of reference frame.



In this system moving objects are detected by graphical method. We can represent the moving objects in a frame by drawing bounding box around them.

Bounding box around moving objects in frame



5. CONCLUSION

Proposed approach for locate and understand item within the scene is based on surf algorithm, we better the performance of item detection with the aid of choosing the strongest functions descriptor, our proposed technique it is efficaciously discover one or more gadgets in statistics set of images and calculate matching rating for item inside the scene with the aid of making use of 3 forms of thresholds and accuracy measures are objects reputation below variable situations of rotation, partial occlusion, orientation and illumination modifications via more advantageous illumination of photo inputs.

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