

# Efficient Tracking of Image Sequence Inspection and Moving Object Recognition

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## ABSTRACT:

We address the problem of detection and tracking of moving objects in a video stream obtained from a moving airborne platform. The proposed method relies on a graph representation of moving objects which allows to derive and maintain a dynamic template of each moving object by enforcing their temporal coherence. This inferred template along with the graph representation used in our approach allows us to characterize object trajectories as an optimal path in a graph. The proposed tracker allows to deal with partial occlusions, stop and go motion in very challenging situations. We demonstrate results on a number of different real sequences. We then define an evaluation methodology to quantify our results and show how tracking overcome detection error.

## Keywords:

Tracking of Image Sequence, Moving Object Recognition, video stream, temporal coherence, consecutive frames, temporal information

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## INTRODUCTION:

The aim of object tracking and detection is to establish a correspondence between objects or object parts in consecutive frames and to extract temporal information about objects such as trajectory, posture, speed and direction. Tracking detected object frame by frame in the video is a significant and difficult task. It is a crucial part of the smart surveillance systems since without object tracking, the system could not extract cohesive temporal information about objects and higher level behaviour analysis steps would not be possible. Moving object detection is the first step in video analysis. It can be used in many regions such as video surveillance, traffic monitoring and people tracking. The rest of this paper is organized as follows describes the object detection and tracking contains various method and algorithm. Describes the video surveillance and its importance with the use of tracking. Describes how tracking is useful for video surveillance and its application. Finally, Section V presents our conclusions and future work.

## OBJECT DETECTION:

The system is divided into two main stages: Detection stage and Tracking stage.

The flowchart of the system architecture approach is shown in figure. This chart gives an overview of the main stages of the methodology; Detection stage is able to distinguish moving foreground objects from static background objects in dynamic scenes. Tracking stage generates trajectory information in video imagery. This system is assumed to work real time as a part of a video-based surveillance system. The computational complexity and even the constant factors of the algorithms are important for real time performance. Furthermore, these systems use is limited only to stationary cameras and video inputs from Sony/Kodak/Zoom cameras. The system is initialized by feeding video imagery from a static camera, monitoring a site. Most of the methods are able to work on both colour and monochrome video imagery. The first step of our approach is distinguishing foreground objects from stationary background. To achieve this, we use a combination of adaptive background subtraction and low-level image post-processing methods to create a foreground pixel map at every frame. We have then grouped the connected regions in the foreground map to extract individual object features such as bounding box, area and centre of mass.

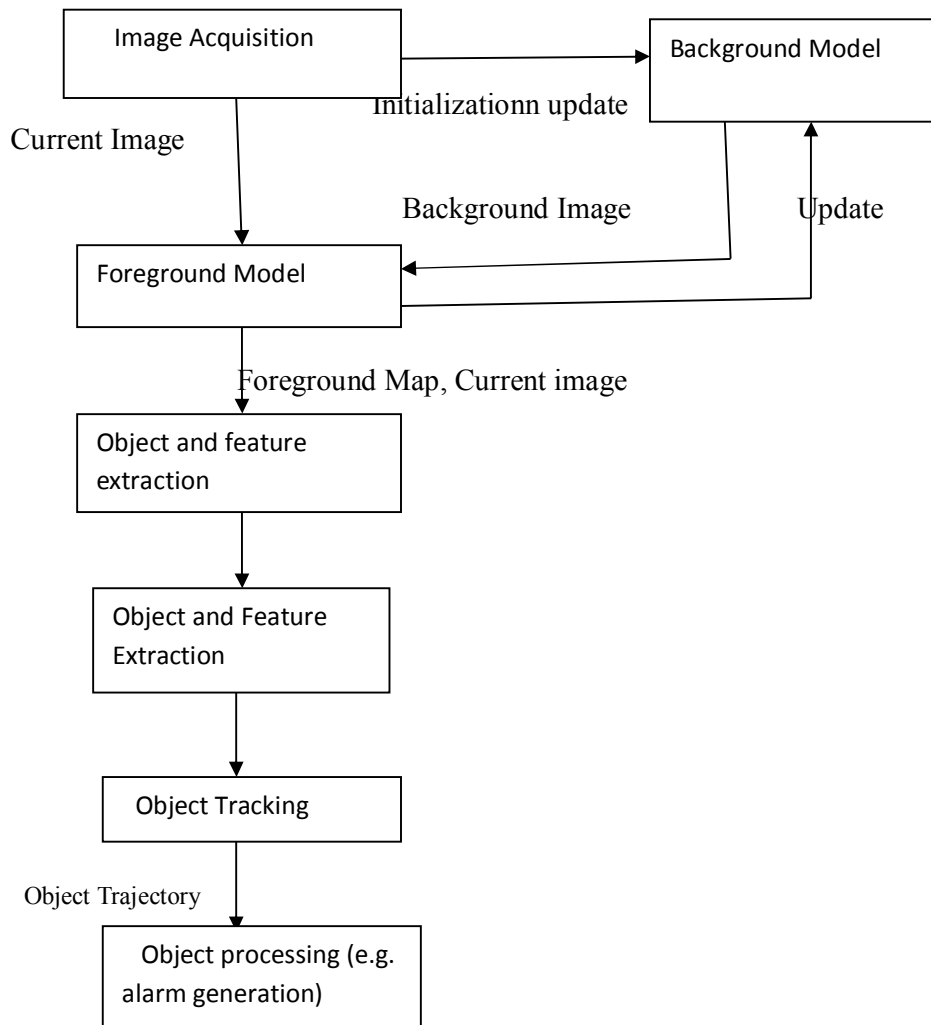


Fig. The System Block Diagram

## OBJECT TRACKING:

The background subtraction algorithm identifies the moving objects in the scene and separates them from the background, while producing accurate change masks. After the object segmentation is achieved, the problem of establishing a correspondence between object masks in successive frames should arise. Indeed, initializing a track, updating it robustly.

The goals of the object tracking stage are to:

1. Tracking algorithms, determine when a new object enters the system's field of view, and initialize motion models for tracking that object.
2. Object tracking is to establish the correspondence between the foreground regions detected by the background subtraction and

- the objects currently being tracked.
3. Tracking algorithms to extract the temporal information about objects such as trajectory, position and speed of each object, and update the motion model.
  4. Tracking of objects in real scenes a difficult task:
  5. Image changes, such as noise, shadows, light changes and surface reflectance, can object features to mislead tracking.
  6. The presence of multiple moving objects further complicates tracking, especially when objects have similar features, when their paths cross, or when they occlude each other.
  7. Inaccurate object segmentation also obscures tracking.
  8. Possible feature changes, e.g., due to object scale change (e.g., object size can change speed) can also confuse the tracking process.

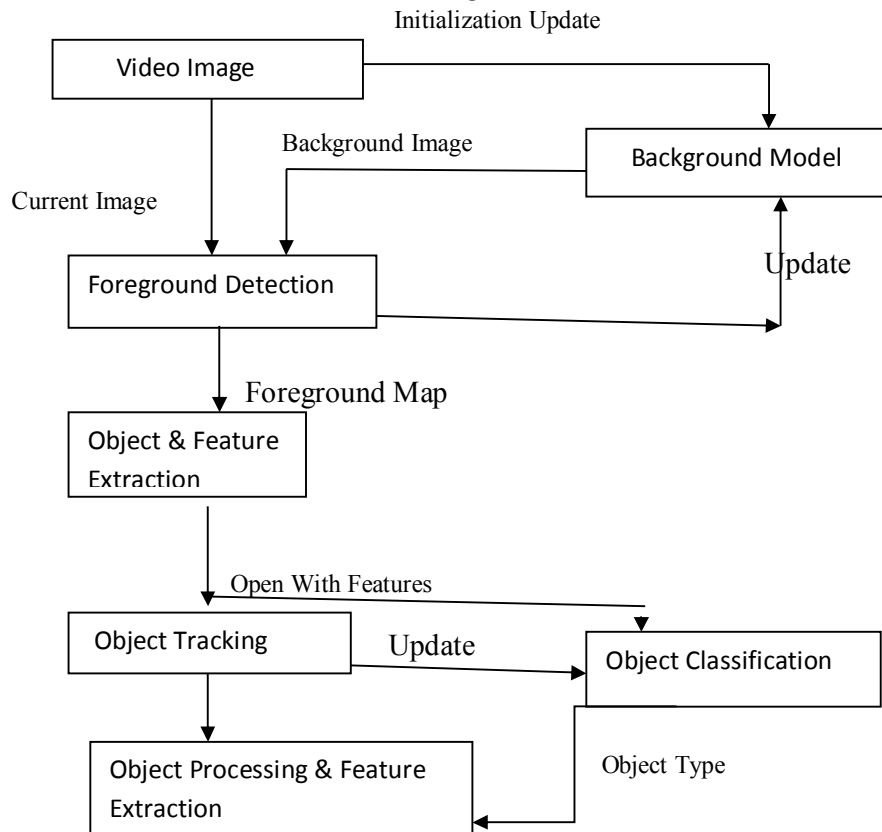


Fig. Tracking Block diagram

## VIDEO SURVEILLANCE:

Video surveillance systems have long been in use to monitor security sensitive areas. The history of video surveillance consists

of three generations of systems which are called 1GSS, 2GSS and 3GSS. The first generation surveillance systems (1GSS, 1960-1980) were based on analog sub systems for image acquisition,

transmission and processing. They extended human eye in a spatial sense by transmitting the outputs of several cameras monitoring a set of sites to the displays in a central control room. The next generation surveillance systems (2GSS, 1980-2000) were hybrids in the sense that they used both analog and digital subsystems to resolve some drawbacks of its predecessors. They made use of the early advances in digital video processing methods that provide assistance to the human operators by filtering out spurious events. Most of the work during 2GSS is focused on real time event detection. Third generation surveillance systems (3GSS, 2000-) provide end-to-end digital systems. Image acquisition and processing at the sensor level, communication through mobile and fixed heterogeneous broadband networks and image storage at the central servers benefit from low cost digital infrastructure. Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. This not only creates a focus of attention for higher level processing, but also decreases computation time considerably. Due to dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind object segmentation is a difficult and a significant problem that needs to be handled well for a robust visual surveillance system. It is necessary to distinguish objects from each other in order to track and analyze their actions reliably. There are two major approaches towards moving object classification, which are shape-based and motion-based methods. Shape-based

methods make use of the objects' 2D spatial information, whereas motion-based methods use temporal tracked features of objects for the classification solution. Detecting natural phenomenon such as fire and smoke may be incorporated into object classification components of the visual surveillance systems. Detecting fire and raising alarms make the human operators take precautions in a shorter time, which would save properties, forests and animals from catastrophic consequences. The next step in the video analysis is tracked, which can be simply defined as the creation of temporal correspondence among detected objects from frame to frame. The output produced by tracking step is generally used to support and enhance motion segmentation, object classification and higher level activity analysis. The final step of the video surveillance systems is to recognize the behaviours of objects and create high-level semantic descriptions of their actions. It may simply be considered as a classification problem of the temporal activity signals of the objects according to pre-labelled reference signals representing typical human actions. The outputs of this can be used both for providing the human operator with high level data to help him to make the decisions more accurately and in a shorter time and for offline indexing and searching stored video data effectively. The advances in the development of these algorithms would lead to breakthroughs in applications that use visual surveillance.

### RELATED WORK:

In the present work the concepts of dynamic template matching and frame differencing have been used to implement

a robust automated single object tracking system. In this implementation a monochrome industrial camera has been used to grab the video frames and track an object. Using frame differencing on frame by frame basis a moving object, if any, is detected with high accuracy and efficiency. Once the object has been detected it is tracked by employing an efficient Template Matching algorithm. The templates used for the matching purposes are generated dynamically. This ensures that any change in the pose of the

1. Take current image and previous image.
2. Take difference between them.
3. Select Thresholding.
4. Difference of the image is greater than threshold object is detected
5. Find the centroid of detecting object
6. Generate template and take coordinate of the template.
7. (Template matching algorithm)

IF the template matching is successful

THEN

IF the tracker has NOT detected motion of the object

AND the detector has

THEN goto STEP 1 (get a new template)

ELSE goto STEP 5 (get the x, y position)

ELSE goto STEP 1 (get a new template )

8. Obtain the position P (x, y) of the match and pass it on to the pan tilt automation module for analysis.
9. Get the direction of horizontal and vertical movement of tracking objects.

object does not hinder the tracking procedure. To automate the tracking process the camera is mounted on a pan tilt arrangement, which is synchronized with a tracking algorithm. As and when the object being tracked moves out of the viewing range of the camera, the pan tilt setup is automatically adjusted to move the camera so as to keep the object in view. These are the work on following algorithm which are included, some steps for moving the camera by pan tilt system.

10. On based on movement within a certain dimension, it decides movement of the camera in clockwise or anticlockwise.
11. Else go to step 1.

## CONCLUSION AND FUTURE WORK:

In this paper, Moving object tracking is a key task in video monitoring applications. Object detecting and tracking has a wide variety of applications in computer vision such as video compression video surveillance, vision-based control, human-computer interfaces, medical imaging, augmented reality, and robotics. Additionally, it provides input to 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.

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