Modelling A System of Remote Video Monitoring Applications using MATLAB

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Abstract— *All objects (like human, saplings, animals etc.) detection and tracking is one of the important research fields that have gained a lot of attention in the last few years. Although person detection and counting systems are commercially available today, there is a need for further research to address the challenges of real world scenarios. There is lot of surveillance cameras installed around us but there are no means to monitor all of them continuously. It is necessary to develop a computer vision based technologies that automatically process those images in order to detect problematic situations or unusual behavior. Automated video surveillance system addresses real-time observation of people within a busy environment leading to the description of their actions and interactions. It requires detection and tracking of people to ensure security, safety and site management. Object detection is one of the fundamental steps in automated video surveillance. Object detection from the video sequence is mainly performed by background subtraction technique. It is widely used approach for detecting moving objects from static cameras. As the name suggests, background subtraction is the process of separating out the foreground objects from the background in a sequence of video frames. The main aim of the surveillance system here is, to detect and track an object in motion by using single camera. Camera is fixed at the required place background subtraction algorithm is used for segmenting moving object in video. If human entity is detected the tracking lines are formed around human and the object is tracked. The system when realizes the human entry, it is processed in a second and the alert is produced for the security purpose. The main aim is to develop a real-time security system.*

Keywords— Video surveillance system; Moving object detection; Tracking, Background subtraction; Producing alarm

1. INTRODUCTION

Leaf area is considered to be one of the most important agronomic parameters and leaf growth is linked to plant growth and health [1,2]. In predictive research, leaf parameters (area, height, width, average width and perimeter) represent a very important data source for making decisions. Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting them.

This can include observation from a distance by means of electronic equipment or interception of electronically transmitted information and it can refer to simple, relatively no- or low-technology methods such as human intelligence agents and postal interception.

2. NON-DIGITAL METHODS

A grid paper is used in this approach. After placing the leaf on the grid paper, the number of grid squares is calculated. Area of the leaf is calculated according to the following formula.

Leaf Area = GN × GA

Where GN is the number of grid squares and GA is area of one grid square.

3. WORKING PROCESS OF VIDEO PROCESSING

Object Tracking stations Receive analogue or IP camera images directly and perform the most time consuming video content analysis and image processing tasks. OTS Stations implement the camera level and the scene level intelligent functions, like object tracking based on multiple camera views, shape classification, and detection of crossing perimeters of virtual zones. Thus with the help of all these methods input data are collected on this basis the video processing has been done. Results of the OTS [4] calculations are collected and processed in a central Site Wide Object Tracking Server, which implements the site level intelligent functions, like identity tracking, evaluation of complex rules based on the identity and security clearance of moving persons or vehicles, and moreover this module is capable of recognizing the suspicious activities.

The optional 3D World Model Server provides 3D calculation services for the other IDENTRACE modules. It can help OTS Stations in automatic calibration of the positions and viewing angles of cameras, while it can provide 3D location information to the SWOT Server, [5] and the generation of synthesized virtual images for the central monitoring console. The Remote Identification Server helps the SWOT Server to handle the inevitable uncertainties of object tracking (e.g. when the system loses track of persons in blind areas, like rest rooms).

In these situations the task is "just" to decide whether a person currently visible in the scene is or is not the same as the person who was seen before. So the RID Server should determine the identity of persons from a limited set of alternatives, which can be solved with a much higher reliability than those identification solutions have, which try to identify a person out of the 6 billion living on Earth. Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. The given below figure show the process of video processing.

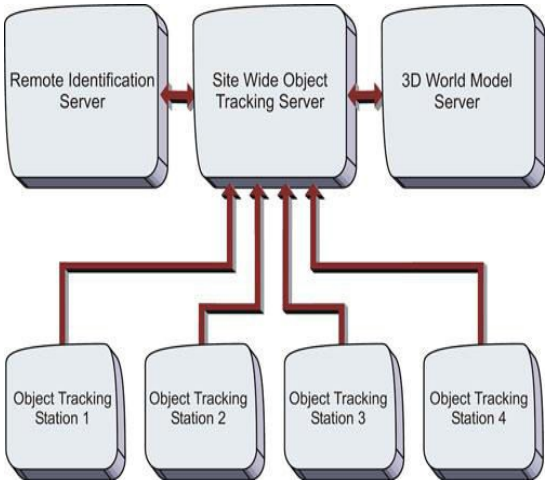


Figure 1 Online video objects tacking for live video and movies

This not only creates a focus of attention for higher level processing but also decreases computation time considerably. Commonly used techniques for object detection are background subtraction, statistical models, temporal differencing and optical flow. Due to dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind object segmentation is a difficult and significant problem that needs to be handled well for a robust visual surveillance system. Object classification step categorizes detected objects into predefined classes such as human, vehicle, animal, clutter, etc. It is necessary to distinguish objects from each other in order to track and analyse their actions reliably. Currently, there are two major approaches towards moving object classification, which are shape-based and motion-based methods.

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 tracking, which can be simply defined as the creation of temporal correspondence among detected objects from frame to frame. This procedure provides temporal identification of the segmented regions and generates cohesive information about the objects in the monitored area such as trajectory, speed and direction. 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 smart 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-labeled reference signals representing typical human actions. The outputs of these algorithms 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. Monitoring of banks, department stores, Airports, museums, stations, private properties, parking lots for crime prevention, detection patrolling of highways, Railways for accident detection.[8] Measuring traffic flow, pedestrian congestion and athletic performance Compiling consumer demographics in shopping canters and amusement parks Extracting statistics from sport activities Counting endangered species Logging routine maintenance tasks at nuclear and industrial facilities Artistic performance evaluation and self- learning Law enforcement: Measuring speed of vehicles Detecting red light crossings and unnecessary lane occupation Military security: Patrolling national borders Measuring flow of refugees Monitoring peace treaties Providing secure regions around bases Detecting the natural phenomenon fire besides normal object motion would be an advantage of a visual surveillance system, thus, the presented system is able to detect fire in indoor and outdoor environments. Conventional point smoke and fire detectors typically detect the presence of certain particles generated by smoke and fire by ionization or photometry.

An important weakness of point detectors is that they are distance limited and fail in open or large spaces. The strength of using video in fire detection is the ability to serve large and open spaces. [9] Current fire and flame detection algorithms are based on the use of colour and simple motion information in video. In addition to detecting fire and flame colour moving regions, the method presented in this thesis analyses the motion patterns, the temporal periodicity and spatial variance of high-frequency.

Detecting regions that correspond to/ moving objects such as people and vehicles in video is the first basic step of almost every vision system since it provides a focus of attention and simples the processing on subsequent analysis steps. [9] Due to dynamic changes in natural scenes such as sudden illumination and weather changes, repetitive motions that cause clutter (tree leaves moving in blowing wind), motion detection is a difficult problem to process reliably. Frequently used techniques for moving object detection are background subtraction, statistical methods, temporal differencing and optical flow whose descriptions are given below. Background subtraction is particularly a commonly used technique for motion segmentation in static scenes. It attempts to detect moving regions by subtracting the current image pixel-by-pixel from a reference background image that is created by averaging images over time in an initialization period. The pixels where the difference is above a threshold are classified as foreground.

After creating a foreground pixel map, some morphological post processing operations such as erosion, dilation and closing are performed to reduce the effects of noise and enhance the detected regions. The reference background is updated with new images over time to adapt to dynamic scene changes.

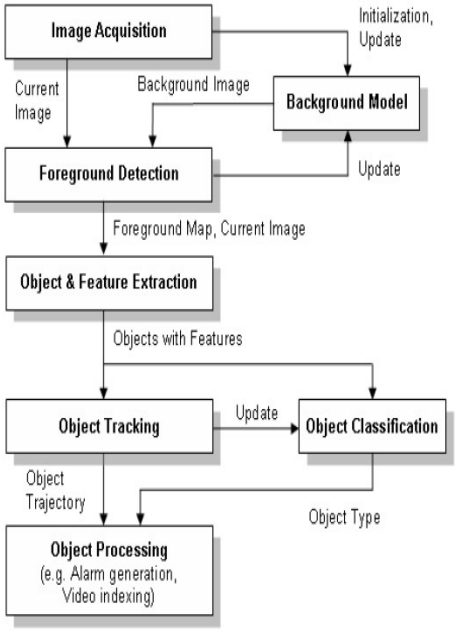
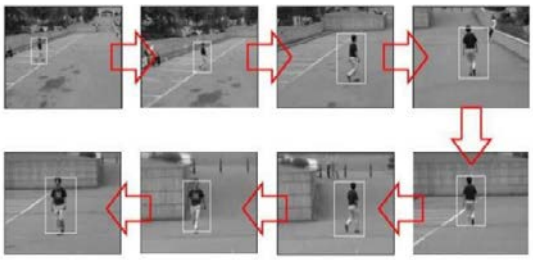
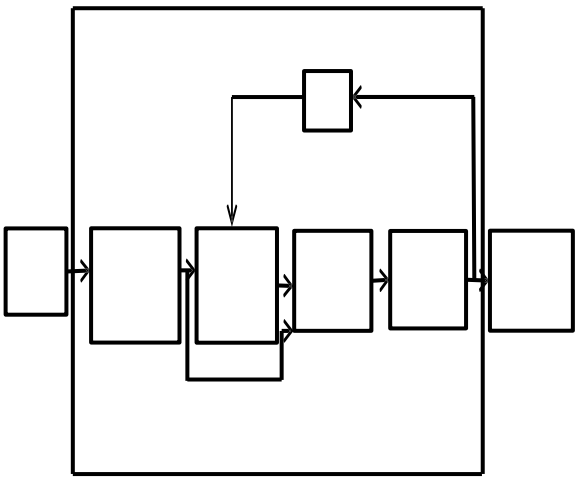


Figure 2. Process of video pre-processing and indexing





50 chili pepper plants, which were planted in the spring in the greenhouse of Hubei Academy of Agricultural Science and Technology, photos have been taken for study, by using single μ300 Olympus digital camera and a tripod metal photographic PTZ. Chili pepper seedlings were transplanted from the seedbed to the greenhouses, as planting spacing of 40cm and seedling spacing of 45cm. One week later, chili pepper plants were photographed once a week for seven weeks. 150 pictures were collected each time, and three pictures were taken from one chili pepper plant.

In the photo collection, the camera was placed on the tripod metal photographic PTZ, just perpendicular to the plant, and shot the plant from above, as shown in Figure 1, in which H is the distance from the camera lens to the ground.

Between three times shooting, the camera was rotated 120 degrees in the horizontal direction. The image resolution is 1024×768, each image is saved as a JPEG file. To improve the adaptability of the analysis method, the shooting was not under extra lighting but natural light. The first three weeks after the beginning of image acquisition, each image contained only one plant. From the fourth week, chili pepper plants grew staggered, and not suitable for image acquisition. So the study object in this paper is the images acquired

4. RESULTS AND DISCUSSION

In this paper, human motion detection and tracking for real time security system was formulated. Video surveillance is focused on people counting and tracking mainly for real-time applications such as security system, traffic monitoring, etc. The object is detected from the live video and tracked using background subtraction, this system is proposed for real-time security purpose. In the live video 18 frames are processed at a unit time. Based on the camera's range the monitoring area may be increased. It is mainly applicable in banks, jeweler shops, military etc. Object detection is made efficiently using the background subtraction technique and the frames processed per second

are improved. For this purpose MATLAB 7.14(R2012A) tool is used. This system increases the efficiency and reduces the cost and total time consumed. Thus the real-time security system is built efficiently.

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