Implementation of Recognition of Moving Object Through the Use of Sensors

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Abstract : The user checks the level of acceptance of the system. This includes well organized procedure of training the user. Instead of being threatened by the system,the user must accept the fact of being used. To educate the user about the system and to make him more knowledgeable with the system and the methods used to make the system known to the system are the major requirements of level of acceptance. Final user of the system raises the level of confidence which can make him for constructive criticisim. The process of detection of a change in the position of an object with respect to the objects surroundings or the change in the surroundings of the object in relation with an object. By means of both mechanical and electronic methods Motion detection can be achieved.

IndexTerms - Moving Object Recognition,Mechanical methods, Constructive Criticism.

I. INTRODUCTION

1. Infrared (Passive and active sensors)
2. Optics (video and camera systems)
3. Radio Frequency Energy (radar, microwave and tomographic motion detection)
4. Sound (microphones and acoustic sensors)
5. Vibration (triboelectric, seismic, and inertia-switch sensors)
6. Magnetism (magnetic sensors and magnetometers)

The most basic form of mechanical motion detection is in the form of a switch or trigger. These motion detection devices are common in our everyday lives. The keys of a typewriter, or even the keys on the keyboards used to type this article make use of a a mechanical method of detecting motion. Each key is a manual switch that is either off or on. Each letter that appears is a result of motion on that equivalent key as the switch is being turned on. This simple binary code concept is like the heart of the digital age, with mechanical switches being replaced by over shrinking transistors. The primary methods to indicate motion electronically are optical detection method and acoustical detection method. Infrared light or the laser technology may be expended for optical detection. Devices used for Motion detection, such as PIR[1] motion detectors, have a sensor that is used to detect a disturbance in the infrared spectrum, such as a person or an animal. Once detection is done, an electronic signal can be activated an alarm or a camera that captures an image or video of the motioned. The chief applications for such detection are (a) detection of unauthorized entry, (b) detection of cessation of time of occupying of an area to extinguish lighting and (c) detection of a moving object which sets off a mechanism on a camera to record subsequent events. The motion detector is thus a essential element of electronic security systems, but is also a valuable tool in preventing the illumination of unoccupied spaces. A basic algorithm for motion detection by a fixed camera estimates the current image with a reference image and simply counts the number of different pixels. Since images will differ as expected due to factors such as varying lighting, camera flicker, and CCD dark currents, pre-processing is useful to reduce the number of false positive alarms. More complicated algorithms are used to detect motion when the camera is moving, or when the motion of a specific object is detected in a field containing other movement. An illustration might be a painting which is surrounded by visitors in an art gallery as shown in fig.5.

II. SENSORS USED FOR MOTION DETECTION

Motion sensors are mostly used in indoor spaces to control the electric lighting. If no motion is discovered, it is assumed that the space is empty, and thus does not need to be lit. Turning off the lights in such situations can saveconsiderableamount of energy. In lighting practice tenancy sensors are alsocalled as "presence sensors" or "vacancy sensors". Some occupancy sensors (e.g. LSG's[2] Pixelview, Philips Lumimotion, etc.) Classify the number of occupants, their direction of motion, etc., through the processing of the image. Pixel view is a camera-based tenancysensor that is implemented using a camera which is built into each light fixture.

III. COMPONENTS AND SYSTEM DESIGN

Tenancy sensors for lighting control typically use infrared (IR)[3], ultrasonic, tomographic motion detection, microwave sensors, or camera-based sensors (image processing). The field of view of the sensor must be selected/adjusted with due care so that it responds only to the motion in the space served by the controlled lighting. For example, a tenancy sensor controlling lights in an office should not detect motion in the corridor outside the office. Tomographic motion detection systems have the unique benefit of detecting motion through walls and act of blocking, still do not be triggered as easily from the motion on the outside of the detection area like traditional microwave sensors.Sensors and their deployments are never perfect, therefore most of the systems incorporate a delay time before switching. This delay time is often selected by the user, but with a typical default value is 15 minutes. This means that the sensor detection must be with no motion for the entire delay time before the lights are turned on. Most systems turn off lights at the end of the delay time, but more knowledgeable and cultured systems with dimming technology reduce lighting slowly to a minimum level (or zero) over several minutes, in order to minimize the potential disruption in adjacent spaces. If lights are in the state of off condition and an occupant is re-entered a space, most current systems switch lights back on when motion is detected. However, systems designed to turn off lights automatically with no occupancy, and that require the occupant to switch lights on when they re-enter are gaining in popularity due to their potential for increased energy savings. These savings collected in spaces with access to daylight the occupant may decide on their return that they no longer require supplemental electric light.

IV. PROCESS OF IMPLEMENTATION OF VIDEO CAPTURING BY THE WEB CAMERA

Digital video refers to the capturing, manipulation, and storage of moving images that can be displaced on computer screens. First, a camera and a microphone capture the picture and sound of a video session and send analog signals to a video-capture adapter board as shown in fig.1.

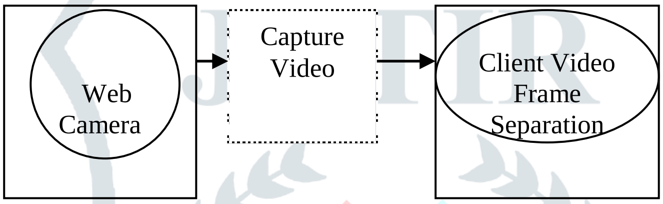

Fig. 1 Video Captured by the web camera

V. MECHANISMS INVOLVED IN PROCESS OF MOVING OBJECT DETECTION

In an open area the objects will be able to move in any direction, and with a camera setup typical of surveillance systems, this will give movement in all directions of the surveillance video, and objects will enter and leave the field of view on all its boundaries . Furthermore the video will show some perspective, i.e. the size of an object changes whenever it has movement towards or away from the camera. The freedom of movement of the object also expresses that they can move in a way where they could occlude each other, or they may stop moving for a while. In the case of people the occlusion and stopping will be very likely when they are interacting, e.g. two people stopping and talking to each other and then shaking hands or hugging before departure. People may also be moving in groups or form and leave groups in an arbitrary fashion as shown in fig.2. These challenges could be solved by restricting the movement of the objects, but this would limit the system from being applied in many situations. Different types of objects: In some open areas many different types of objects will be present. A surveillance video of a parking lot for example will contain vehicles, persons, and maybe birds or dogs. People may also leave or pick up other objects in the scene. The most general surveillance system would be able to distinguish between these objects, and treat them in the way most appropriate to that type of object. Constraints in this respect would limit the system to areas with only a certain type of objects.

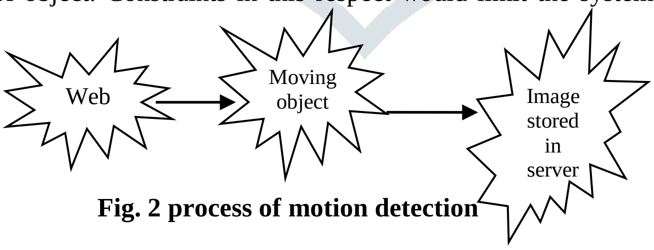

Fig. 2 process of motion detection

a. Process Implementation of Motion segmentation

Background subtraction is the first step in the process of segmenting and tracking people. Distinguishing between foreground and background in a very dynamic and unconstrained outdoor environment over several hours is a challenging task. The background model is kept in the data storage and four individual modules do training of the model, updating of the model, foreground/background classification and post processing. The first k video frames are used to train the background model to achieve a model that represents the variation in the background during this period as shown in fig.3. The following frames (from k + 1 and onwards) are each processed by the background subtraction module to produce a mask that describes the foreground regions identified by comparing the incoming frame with the background model. Information from frames k + 1 and onwards are used to update the background model either by the continuous update mechanism, the layered Updating, or both. The mask[5] obtained from the background subtraction is processed further in the post processing module, which minimizes the effect of noise in the mask.

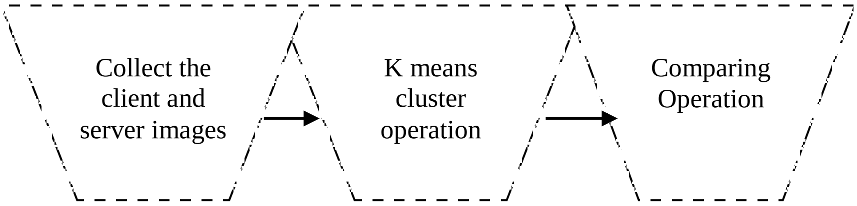

Fig. 3process of motion segmentation

b. Process of Implementation of SMS Alert System (*Short Message Service*):

After detecting the changes in video frames, we are alerting the central control unit or the user through SMS using the GSM Modem. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves as shown in fig.4. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. Like a GSM[6] mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

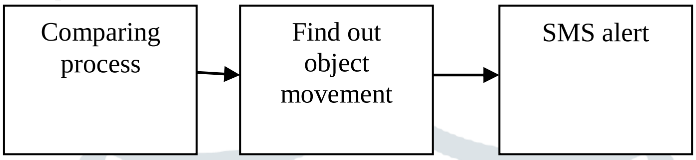

Fig. 4 SMS Alert System Implemented in the image processing

c. Requirements Stage

The requirements documents are tested by disciplined inspection and review. The preparation of test plan, which should include:

1. Specification
2. Description of test precious
3. Test milestones
4. Test Schedule
5. Test data reduction
6. Evaluation criteria

i. Design Stage

Design products are tested by analysis, simulation, walkthrough and inspection. Test data for functions are generated. Test cases based on structure of system are generated.

ii. Construction Stage

This stage includes the actual execution of code with test data. Code walkthrough and inspection are conducted. Static analysis, Dynamic analysis, Construction of test drivers, hair nesses and stubs are done. Control and management[4] of test process is critical. All test sets, test results and test reports should be catalogued and stored.

iii Operation and Maintenance Stage

Modifications that are preordained to the software which require a retesting which is termed as regression testing. Changes at a given level will necessitate retesting at all levels below it.

iv. Approaches of Moving Object Detection

Two basics approach:

1. Black box or "Functional" analysis
2. White box or "Structural" analysis

v. Boundary value analysis (Stress Testing)

In this method the input data is partitioned and data inside and at the boundary of each partition is tested.

vi. Design based functional testing

Functional hierarchy is constructed. For each function at each level external, non-external and special value test data are identified. Test data is identified such that it will generate external, non-external and special output values.

vii. Cause-effect graphing

In this method the characteristic input stimuli (Causes), characteristic output classes (effects) are identified. The dependencies are identified using specification. These details are presented as directed graph. Test cases are chosen to test dependencies.

viii. Coverage-Based Testing

The Program is represented as control-flow graph. The paths are identified. Data are chosen to maximize paths executed under test conditions. For paths that are not always finite and those infeasible, Coverage metrics can be applied.

ix. Complexity-based testing

The Cyclomatic Complexity is measured. The paths actually executed by program running on test data are identified and the actual complexity is set. A test set is devised which will drive actual complexity closer to Cyclomatic complexity.

x. Test Data Analysis

During Test Data Analysis “The Goodness of the test data set" is taken into major consideration.

Statistical analysis and error seeding

Known errors are seeded into the code so that their placement is statistically similar to that of actual errors.

xi. Mutation Analysis

It is assumed that a set of test data that can uncover all simple faults in a program is capable of detecting more complex faults. In mutation analysis a large number of simple faults, called mutation, are introduced in a program one at a time .The resulting changed versions of the test program are called mutates. Test data is then be constructed to cause these mutants to fail. The effectiveness of the test data set is measured by the percentage to mutants killed as shown in fig.5.

VI. TEST RESULTS

The listed tests were conducted in the software at the various developments stages. Unit testing was conducted. The errors were debugged and regression testing was performed. The integration testing will be performed once the system is integrated with other related systems like Inventory, Budget etc. Once the design stage was over the Black Box and White Box Testing was performed on the entire application. The results were analyzed and the appropriate alterations were made. The test results proved to be positive and henceforth the application is feasible and test approved.

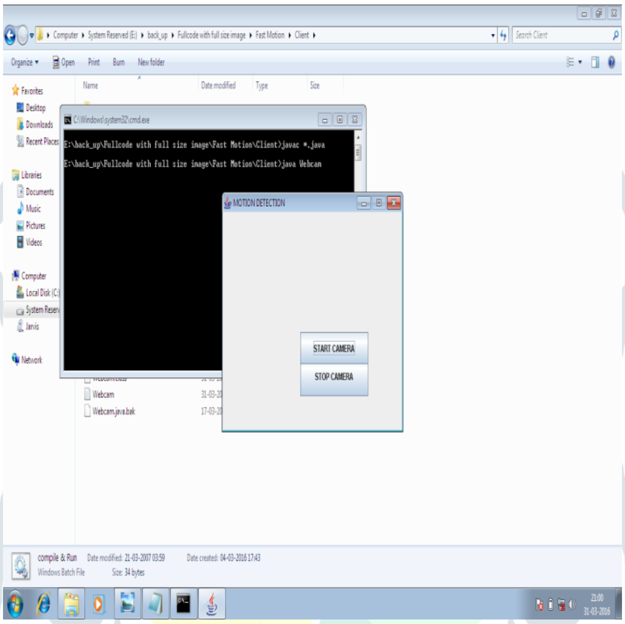

Fig. 5 Analysis of Motion Detection

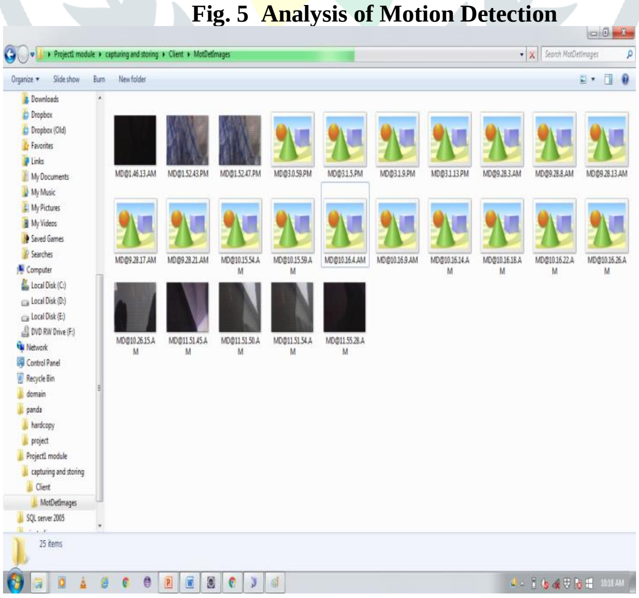

Fig. 6 Analysis of DECOLOR CONCLUSION

In this paper, a new framework proposed named as DECOLOR[5] for the purpose to segment the moving objects from image sequences. It avoids complicated motion computation by formulating the problem as outlier detection and makes use of the low-rank modelling to deal with complex background. The link between DECOLOR and PCP have been established. When compared with PCP, the DECOLOR mechanism as shown in fig.6 uses the non convex penalty and MRFs for outlier detection, which is more greedy to detect outlier regions that are relatively dense and contiguous. Despite its satisfactory performance in the experiments agreed and done, the mechanism of DECOLOR has some disadvantages. Because the mechanism of DECOLOR minimized a energy of non convex via alternating optimization, DECOLOR converges to a local optimum with results depending on initialization of ^ S, while PCP always minimizes its energy globally. In all our experiments, we simply start from ^ S ¼ 0. Also, other random initialization of ^ S has been checked and it proved that it generally converges to a satisfactory result. This is all because of the SOFT-IMPUTE[4] step will output similar results for each randomly generated S as long as S is not too dense.

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