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MOVEMENT DETECTION OF REAL WORLD OBJECTS USING IMPROVED FRAME SUBTRACTION TECHNIQUE

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ABSTRACT

The ability to reliably detect and track human motion is a useful tool for higher-level applications that rely on visual input. Interacting with humans and understanding their activities are at the core of many problems in intelligent systems, such as human-computer interaction and robotics. Proposed system detect the motion of real world objects with the help of stationary camera and from video using Improved frame subtraction technique. Results of proposed system are evaluated on various sample data collected from real world situations and experiments shows that the accuracy of the proposed system is better than of existing systems.

KEYWORDS: Motion detection, Motion Monitoring, Security, Frame Subtraction Technique.

INTRODUCTION

Movement is the act or process of moving an object or person .The movement system provides a continual care and the movement of persons from the site. One can use this system anywhere in homes, hospitals, malls, banks and at any public place, where we want to detect the movement.

A. Motion Detection

The scene analysis often starts with segmenting the foreground objects from the background of the image. This basic image motion detection step is the second part of this work. The focus is on the real-time surveillance systems. The image subtraction algorithm should be robust and able to adapt to difficult and changing conditions. Furthermore, only the common case is analyzed when the camera is mostly static. This presents an analysis of the common pixel-based image subtraction. The assumption is that the images of the scene without the intruding objects exhibits some regular behavior and that the scene can be described by a probability density function for each pixel in the image. If the image acquisition of the scene is available the foreground objects are detected by spotting the parts of the image that don't fit the scene model. The main problem is updating and adapting the scene model. An efficient algorithm that has an RGB value subtraction for each image pixel is developed. The first application is a traffic monitoring problem. The algorithms were directly applied since the camera was static. Final demonstrational system was able to automatically extract some important traffic parameters and detect some traffic events of interest. The second application was a more challenging case of tennis game matches. The movements of the player are recognized using an appropriate set of features. Two interesting and timely problems of a practical nature are considered and the results could be of interest to many professionals in the field including video surveillance, gaming and the security system. Although very specific, the two applications have many elements that are important for any surveillance/monitoring system.

B. Measuring Motion

Detecting objects was analyzed in the previously described. Tracking objects is another basic operation a computer should perform in order to understand the environment. The image motion or 'optical flow' can be defined as the movement of the image patterns in an image sequence. This basic motion is important for many computer vision tasks and closely related to the object tracking problem. Measuring the motion of a single point in the image presents an 'ill-posed' problem. However, it is usually reasonable to assume that the points from a small image neighborhood have some similar motion. The movement is then calculated for a small image patch

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by searching the next image from the sequence for a similar patch. In a similar way an object can be tracked. A larger part of the image is considered then and therefore a more elaborate model is needed to model the possible transformation from one image to another. This type of object tracking is usually known as frame comparison. The third part of the thesis presents some improvements for the basic image motion problem. The chapter will discuss later gives an analysis of the problem of choosing the points in an image for calculating the image movement. These points are usually called 'feature points'. Not every point from an image is suitable for computing the optical flow. This problem is known as 'the aperture problem'. Consider for example an area of uniform intensity in an image. The movement of a small patch within the area would not be visible and the calculated optical flow will depend on noise. There are some standard procedures for selecting suitable points. This chapter points out that most feature point selection criteria are more concerned with the accuracy, rather than with the robustness of the results. A way of estimating the 'percentage of detection w.r.t time' is proposed. The size of the 'percentage of detection w.r.t time' can be used as a measure of feature point robustness.

LITERATURE SURVEY

Zhang shun, Xie Liyin [2010], "Global Motion Compensation for Image Sequences and Motion Object detection" presents a key object in the region of the computer video. Under the complex background the global background changes because of sensor motion and change of illumination. In this paper they used an effective approach to global motion and moving object extraction is proposed. They firstly used the feature block detection and searching algorithm used to attain the background motion vector. After global motion is estimated background can be eliminated through the registration difference algorithm. At the end they use higher order statistics to attain motion target exactly. In this algorithm it improves the performance of the detection moving targets.

Chandana S* [2011], "Real Time Video Surveillance System Using Motion Detection" presents the area of video surveillance usage, it began with the simple video closed circuit television monitoring. In this paper they used the system for security systems such as borders or buffer zones is of utmost importance in particular with world wide increase of of military conflicts, illegal immigrants and terrorism over the past decade. The purpose of this is to design the a surveillance system which would detect motion in a live video feed and record the video deed only at the moment where the motion was detected also to track the moving object based on background subtraction using video surveillance. The moving object is identified using the image subtraction method.

Milos Pilipovic [2011], "A Real-Time Projection System Based on Object Motion Detection and Tracking using Optical Camera" this paper presents the real time system for projection of image / video content on moving object regions of interest using projector based on object motion detection and tracking the object using optical camera. They present a technique for correlation camera and projector i/o image/video stream design to successfully combat different coordinate spaces and we discuss their performance. In this the interest object is marked in the first frame and afterward detect the movement in small area to reduce the processing time. They use the single low cost optical camera to reduce the overall cost of the system.

Chunrong Yuan [2010], "Detection of Moving Objects by Statistical Motion Analysis" In this work they present the movement detection system observed by a mobile camera which is a critical issue related to antonymous robot navigation as well as driver pilot assistance system. In order to separate individual object motion from the self motion of the observing camera. they implement a linear method to recover the full set of 3D motion parameters. They use statistical analysis of probably distribution function of the points motion characteristics. The approach is unique in that it can detect moving object using a single pair of images and is completely automated. In this paper the results shows that it made some false alarms compared to standard one.

Maha M. Azab [2010], "A New Technique For Background Modeling and Subtraction For Motion Detection in a Real Time" presents that Background modeling and subtraction is a core component in motion detection and analysis, using a stationary camera and proposes a new technique for background modeling and subtraction capable of processing a real-time video and achieving high detection rates. Color information alone can't handle dynamic environments. On the other hand, edge□or texture information alone is not sufficient for uniform regions. To overcome these limitations, the proposed technique integrates Local Binary Pattern (LBP) texture feature, RGB color feature and Sober edge feature, using "Choquet" fuzzy integral to avoid the uncertainty in the classification. This is performed by extracting the color and the edge gray scale confidence maps and introducing the texture confidence map. Then, a single median filtering and a connected components algorithms are applied to remove the noise and label the connected regions. Experimental results for both indoor and outdoor dataset sequences confirmed the robustness and the effectiveness of the proposed technique against illumination variation and scene motion.

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PROPOSED METHODOLOGY

Detection of changes made by the person or object in video is one of the most important and fundamental technology to develop the real world computer vision systems, such as video surveillance, security systems, video monitoring system etc.

Detection of changes from a stationary camera is simpler because it involves fewer estimation procedures steps. Automatic detection of the movements of person or object in the video may facilitate this application in certain significant aspects. Those certain significant aspects are: First, Detecting unusual changes and abnormal behaviour in a scene so that an alarm can be whistled in case of an unusual event. Second, controlling the camera automatically to present a neat and clean view of the object and organizing the video data according to the movement activity of the patient. This approach helps in testing that whether a pixel or a region between two images is significantly different or not. In most comparison methods, images are decomposed into blocks containing pixels which are then transformed into DCT coefficients. Whereas, we use image subtraction of consecutive frame to detect changes criteria. In this, a real time algorithm for detecting the changes subjects is proposed.

The usual method for detecting changes objects is very simple that is to compare current image with respect to the previous image. However, there exist gradual illumination changes; sudden changes in illumination and other scene parameters alter the appearance of the current or the previous image. When the brightness difference between both that is in the current and in the previous image is small, it detect the difference. These algorithms such as color based subtraction technique and the technique based on optical flows have been proposed. This technique is very robust to extract the movement exactly. The commonly used method for changes subject detection is frame difference. Changes are detected from the difference of two frames.

Working of the proposed system is performed in the following steps:

1. First we attach a stationary High quality camera with the system.
2. After this we use GUI start monitoring button for start the movement capturing.
3. The stationary camera captures the real time video by which the system can store the current frame and last frame of video.
4. Then the algorithm divides the each frame in to pixel by pixel and finds the RGB value of each pixel.
5. Then convert the value of pixels into blocks of 8x8 pixels.
6. Remove the noise from each block and then Normalize the values of the every block.
7. After this subtract the normalized RGB value of each block of last frame from the current frame.
8. Then after subtraction of RGB values of two frame, it calculates the absolute value of each pixel.
9. By using absolute value, if the result is in the negative integer it converts into the positive integer.
10. Then convert the RGB value in to black & white which shows only two values of each block i.e. 0 and 1.
11. After this combine the binary value of each block to make a new image and open it into black & white area in which the changes show the white i.e. 1 & unchanged portion shows the black i.e. 0.
12. Then calculate the percentage of changes of the selected portion , by using the changed area w.r.t whole selected area.
13. Store the current frame into previous frame.
14. At the end the graph will show the percentage of movement w.r.t time in seconds.
15. Repeat steps from 3 to 13 until there is last frame.

RESULTS AND DISCUSSION

A. Dataset

To detect the movement we use video as input. We use .mpg video format. It is of 29 frames per second. We collect the data from various locations like from parking, road traffic, room, corridor, patient, garden and from shopping malls etc. we input these videos in the existing system and proposed system to compare the two systems with same video. We take the videos from low quality camera and high quality camera.

B. Results

We take low quality and high quality videos from two different cameras as input. We run both the low quality as well as high quality video on the proposed system for taking result as output.

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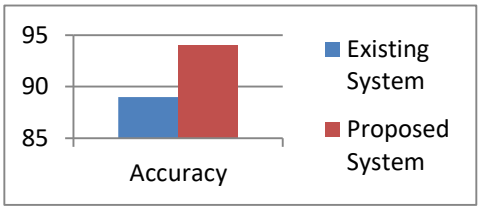
Table 1. Result Statistics

Parameter	Value
No. of Videos Tested	20
No. of Real World Situation Tested	20
Accuracy	94%
Existing Accuracy	89%

The above table shows the results statistics of the proposed system and that of existing system. In the table shown above it is shown that the proposed system is tested on 20 real world scenes and 20 real world videos. Accuracy of the proposed system and existing system is shown in the above table.



Graph1. Comparison graph between existing and proposed system.

Table 2 Comparison table of proposed with existing technique.

Video Name	**Existing Work (Percentage w.r.t Time)**		**Proposed work (Percentage w.r.t Time)**	
	Low quality	*High quality*	*Low quality*	*High quality*
Video1	77	66	99	82
Video2	72	19	88	61
Video3	49	4	91	6.3
Video4	3.5	6.2	5.9	6.4
Garden	3.6	13.5	6.9	64
Kid	3.7	3.1	8.5	7.0
Mall	5.8	3.8	7.3	7.5
Parking	3.3	3.5	6.2	5.8
Road	76	18	99	77
Room 1	3	5.1	3.5	7
Room 2	60	7.1	91	7.4
Shop	7.9	3.4	9	6.5

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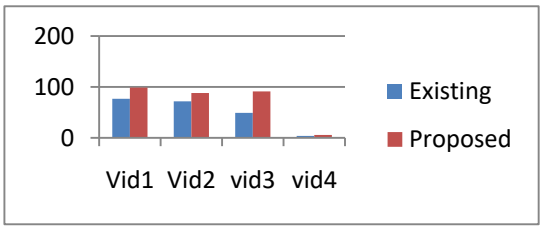
Stadium	9.9	31	9.10	82
Xylophone	2.7		5	

The above table shows the comparison between existing and proposed system on the basis of motion detected from various videos. The above table represents the videos collected from various sources and their corresponding results.



Graph2. Comparison of the existing system and proposed system on low quality videos.

The above graph shows the comparison of the existing system and proposed system on low quality on the basis of videos collected from various sources. As it is shown that the proposed system can better detect the motion than that of existing system.

Table 3 Comparison of arithmetic operations for proposed and existing system.

	MOG	Existing system	Proposed Method
Arithmetic Operations	3k + 6m	W+L+2	W*L/8*8

The above table represents the comparison of arithmetic operations between existing and proposed system. In the above table w,k represents the width of the frame and m,L represents height of the frame. From the above table it is shown that the proposed system requires less number of operations than that of existing systems.

CONCLUSION AND FUTURE SCOPE

A. Conclusion

In this study, a new method of monitoring and movement detection system is proposed. By using the image subtraction of the consecutive frames taken by the camera, we can select the needed part of the video instead of whole video and detect the various changes made by the any person or by object. The identification of the appropriate changes made by the person or by object is shown in the form of graphs. This research work is very helpful for video surveillance, security systems and for patients who were on bed for a long period and are unable to move. Because in these situations, only a minor movement made is detected that plays an important role.

B. Future Scope

The following changes can be made in future to improve the performance of the system:

- An infrastructure for the monitoring devices to push their data into, for example a server with a database.
- It can also be identified in such a way that the monitoring device stores all the data and applications needing data connected directly to the monitoring device.

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