OBJECT TRACKING SYSTEM USING IMAGE PROCESSING

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ABSTRACT

Now a day, video surveillance is a part of our day to day life. In every private institute, company, government hospitals, offices, school, colleges, everywhere we need object tracking system for security purpose. Visual monitoring of activities using cameras automatically without human intervention is a challenging problem. Moving object detection is very important in intelligent surveillance. In this paper, an improved algorithm based on frame difference is presented for moving object detection. The method of motion detection and tracking is background subtraction. This paper presents a new object tracking model that systematically combines region and shape features. We design a new object detector for accurate and robust tracking in low-contrast, in noisy environment and complex scenes, which usually appear in the commonly used surveillance systems.

KEYWORDS: CPU Time, People, Faces, Computers, Robots

INTRODUCTION

Tracking a moving object in a video sequence is an important application of image sequence analysis. Tracking is useful in many problems like collision avoidance, surveillance, gesture recognition, distance education with live teacher, searching sport clips, etc.

In most tracking applications a portion of an object of interest is identified in the rst frame and we need to track its position through the sequence of images. Ideally, if the object to be tracked can be modeled well so that its presence can be inferred by detecting some feature sets in each frames we can look for objects with required features. In many scientific and commercial applications, it is usually necessary to predict what an object might be doing in the near future.

Difficulties in object tracking

- Abrupt object motion.
- Changing appearance patterns of both the object and the scene.
- Non rigid object structures.
- Object-to-object and object-to-scene occlusions.
- Camera motion Tracking.

Motion detection is the process of confirming a change in position of an object related to its surrounding or the change in the surrounding relative to an object. Motion detection helps to save CPU time since the region of investigation is narrowed. Object detection is the process of detecting and spotting object in an image. Object detection is a process of scanning an image for an object of interest like people, faces, computers, robots or any object.
METHODOLOGY

In most tracking applications a portion of an object of interest is identified in the first frame and we need to track its position through the sequence of images. Ideally, if the object to be tracked can be modeled well so that its presence can be inferred by detecting some feature sets in each frames we can look for objects with required features. Many generic features such as, active blobs, Kalman snakes or characteristics of object boundary are used as features [1]. If the object of interest is highly articulated then features based detection would be good [2], [3] The aim of this work is to propose such an algorithm for an AIBO robot. This algorithm can be adapted for almost any kind of mobile robot. These fixed shapes have problems to characterize real-time object shape variations in frame sequences, e.g. nonrigid objects. In addition, such simple shape-based tracking cannot be applied for high-level motion analysis like pose recognition. Comaneci et al. [4] characterize moving objects with color histograms and the most probable object locations are found by the mean shift algorithm. Compared to color, texture is more robust to illumination variations in tracking. Bretzner and Lindeberg [5] show how the performance of feature trackers can be improved by building a view-based object representation consisting of qualitative relations between image structures at different scales. [6] process is used to quickly detect the texture boundary along a line, from which the projected contour of the object can be reconstructed. A fixed feature is generally insufficient to track objects in complex scenes.

Abdol-Reza Mansouri [7], with the assumption that the object color remains constant over frames, the object contour tracking is modeled as a Bayesian estimation problem. Markov Blake and Isard [8] track outlines and features of objects, modeled as curves. They established a stochastic framework for tracking curves in visual clutter using a sampling algorithm. A tracker establishes the correspondence of the object locations over frames based on the distance measure unifying color, texture and motion.

IMPLEMENTED BLOCK DIAGRAM

It is proposed to implement object tracking system using motion detection with region and shape features such as frame difference, centroid etc. It is proposed to compute processing time for object tracking.

Input Image

The sequence of images is taken from the video database these sequences of images having same background and same size.

Preprocessing

In preprocessing, first we convert color image to gray because it is easy to process the gray image in single color instead of three colors. Gray scale is single channel of multi channel color images. Gray images required less time.
processing. Then we apply median filter to remove noise from images. Median filter is a low pass filter. Median filter removes the paper & salt noise. Also preserves the edges of object in image.

**Motion Detection**

We are only detecting the motion between all the images. If there is no motion then it is shown by black color. Motion Detection means finding out difference between two images i.e. subtract first image from next image.

**Motion Estimation**

Here we are calculating the residual error i.e. frame difference between all frames using sum of absolute difference.

**Contour Tracking**

Here the tracking is done by applying motion detection algorithm.

**EXPERIMENTAL EVALUATION**

We have a image database which is downloaded from internet such as ‘highway.bmp’, ‘editing sequences. bmp’. In general, the tracking performance is highly dependent on whether the selected features can efficiently distinguish the objects of interest from the background. Regular features include color, texture, edge, motion, and frame difference.

For all type of programming here we use MATLAB Software. MATLAB is a very powerful toolbox. Following is the flow of work:

- Take video as a input to the system.
- Convert video into frames (i.e. Images).
- Subtract current image from background image. Update the current image every time after subtraction.
- Calculate absolute difference between two images to detect the motion between them.
- Abs difference = |I_{ref} (x,y) – I_{cur} (x,y)|
- Find shape feature like Centroid of the selected object for object detection.

\[
\begin{align*}
    c_x &= \frac{\Sigma(p_{i,j} \cdot i)}{\Sigma(p_{i,j})} \\
    c_y &= \frac{\Sigma(p_{i,j} \cdot j)}{\Sigma(p_{i,j})}
\end{align*}
\]

**RESULTS**

Following are the results of motion detection and motion estimation blocks.
Figure 2: Difference between Background and Current Image

For detecting motion first find out the difference between background and current image as shown in figure 2 and the difference is mentioned in table 1. i.e. motion is detected.

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<th>Frame No.</th>
<th>Motion Vector (Degree)</th>
<th>Frame Difference</th>
<th>Centroid</th>
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CONCLUSIONS

In this paper, we propose a new object tracking model to systematically combine both region and shape features. Compared with existing approaches, our work has major contribution in tracking object from any video in noisy environment.

REFERENCES

5. Lars Bretzner, and Tony Lindeberg, Qualitative Multi-Scale Feature Hierarchies for Object Tracking Technical report ISRN.


