



Video Surveillance Technique for Marking Online Attendance in a Classroom

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Abstract—The proposed system is concerned with automated video surveillance that observes the number of students sitting within a classroom. Video surveillance is a procedure of capturing and processing the still images. It can also be used in future evidences and analysis. Basically the idea is to implement a technique using video surveillance that automatically marks attendance of a student sitting in the order of their roll number in front of a personal computer. It also counts the overall strength of students present in a classroom and uploads the online attendance in each student's account on University management system.

Keywords— CCTV, PCA, DCT.

I. INTRODUCTION

The video surveillance systems that addresses for making online attendance in a classroom. Each and every student should sit according to their roll numbers in front of a personal computer. Suppose that the class timing is 10:00 to 11:00 a.m. The students will be allowed in classroom till 10:05 sharp, after this the system will automatically mark attendance as absent. When the time will be 10:05 am, then a hardware device like CCTV or webcam will capture the video frame of the classroom. Here we assume that the position of the camera is located in front and centre of the classroom. After the video frame is captured, we and subsequently extract foreground by background subtraction technique and subsequently will segment this frame according to our desire. The background can be static or dynamic. So we will construct the background and then update background. With the help of extracted foreground, we will build the image of human standard template and will match this template. Video surveillance system has good performance on people detection and counting the number of the people for reducing the consumption of energy to adjust environment equipment. The proposed algorithm, first capture frame from a camera then construct background. Then update background if the distance between two images is less than 10. By using Background Substraction method, we extract foreground. After that construct standard trapezoid templates and when template matching done subsequently estimate the maximum number of peoples in supermarket. [3]

It discussed from any given image, it automatically trace the person's face, head and shoulder and the background scene. The skin color region can classified by chrominance values. Luminance value involves spatial distribution to detect skin color pixels from regularization process which locate the skin color pixel support to facial region and remove those part that are not present.[2] Here this method of human face detection and tracking of skin color use medium filtering. We divide the human face and the background through color segmentation then use morphologic process, convex hull process and searching the facial location. At last, search the most likely oval place in the image. Next add features like mouth detection and eyes detection area to build the system feasible and robust. [1] This paper discuss smart camera designed for detect and track the person in a smart room and buildings. Here we use heterogeneous multiprocessor architecture for human activity recognition. It uses many smart cameras that track, analyze and identify the activity of the people. The architecture used algorithms are as follows:

- 1) Use MPEG motion vector for activity detection: Data compressed and subsequently used PCA.
- 2) Compressed domain used for human detection: DCT coefficient are used.
- 3) Graph/ Template Matching: Each person's head and shoulder region extracted and segments that fitted to super ellipse.[9]

Our algorithm used different operations:

OPERATIONS	ALGORITHMS
PIXEL BY PIXEL OPERATIONS	COLOR SEGMENTATION
PIXEL REGIONS OPERATIONS	REGION IDENTIFICATION
MIXED OPERATIONS	SUPER ELLIPSE FITTING
NON- PIXEL OPERATIONS	GRAPH MATCHING

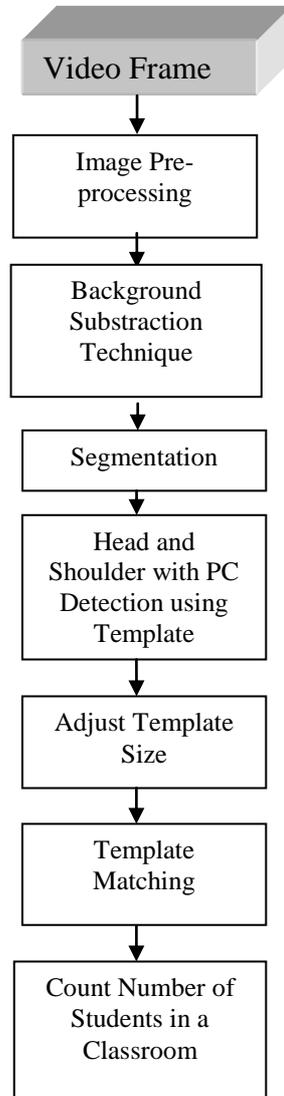
This proposed paper based on viola- Jones method, wavelet transform and principle component analysis for multiple face recognition process in video sequence. This complex algorithm has high speed to recognize multiple faces in real time.

We have object recognition processes:

- 1) Wavelet transform method: Extraction and prevention of identified objects feature that stored in database.
- 2) Principle component analysis: Multiple face recognition in video sequence by comparison of known face image with unknown face image.
- 3) Viola- Jones method: It is used for detecting face region on image because of high efficiency and speed.

Viola- jones method for object detection in real time by integral image, Haar- like features, learning classification using Adaboost. [8].

II. PROPOSED METHOD



First step is to capture a video frame which is monitored by CCTV cameras. The RGB color image captured by digital image which are converted into gray- scale image. During the pre-processing any noise degrade the performance so it eliminated by suitable method. To reduce the noise by applying filtering algorithm. The capturing video frames as initial background and execute substraction method. This method used to extract foreground image. This proposed method apply the morphological operations. So the operations consist of erosion, dilation, corrosion which obtain the foreground. Erosion is used to remove a little bit point of image. Dilation is a process which extent the mask of the region of skin color. Corrosion is used to sharp the corner.

To separate foreground objects from the background. Foreground objects is a noticeable motion object while background objects are non- noticeable motion. So thresh holding is apply on difference frame. It set value by binarization of difference frame as:-

$$\left\{ \begin{array}{ll} b_difference_{a,b} = 255 & \text{if } difference_{a,b} \geq \text{Threshold} \\ 0 & \text{if } difference_{a,b} < \text{Threshold} \end{array} \right\}$$

Then filtering phase occurred by applying adaptive linear filter on difference frame.

1.1 Background Substraction Technique:-

This simple technique update the background. Updated background captured two frames i.e current frame ‘2m’ and previous frame ‘m’. Afterwards foreground will detect by comparing frames of video. If the difference between two frames is smaller than threshold value then background will updated. Assume $I_{a,b}^f$ be the gray level of pixel in (a,b) position in frame ‘f’ and $I_{a,b}^{f+1}$ be the gray level of same pixel in other frame. Comparing the two consecutive frames is calculated by

$$\text{Difference}_{a,b} = |I_{a,b}^f - I_{a,b}^{f+1}|$$

Where a=1,2,3,- - - - -, n is the number of frame lines in row and b=1,2,3,- - - - -, n is the number of frame columns.

1.2 Segmentation:-

Segmentation is a operation of partitioning an image into separate objects. Image segmentation is to distinguish objects from background. For digital images, four popular approaches are integrated. They are threshold methods, edge-based methods, region-based methods, and connectivity-preserving relaxation methods. Here we segment the whole frame into different parts. So that we can easily separate each student from other students. To perform this, we have different segmentation techniques like thresh holding, adaptive thresh holding. The video analysis is the accurate segmentation and tracking of objects in natural video. Research in this field over the past decade has resulted in reliable analysis on low-level features such as colour, shape and texture. However, aggregating these analyses to reliably detect an object, has difficult task due to objects appearing at different angles when viewed with different cameras, problems with lighting conditions, occlusion, and other many factors that make it difficult to automatically define and segment an “object.” We have tackled this problem in different ways including the detection of students based on using templates and faces for template matching to achieve more accurate object results.

1.3 HEAD AND SHOULDER WITH PC DETECTION USING TEMPLATE CONSTRUCTION TECHNIQUE:-

The figural template construction depend on the height and width of the person. It may vary the ratio according the person figure like tall, stort, thin, fat. The ratio of standard figural template is set when we got many experimental results. The original rectangular figural template is replaced by person’s shape which is shown in figure 1.

1.4 Adjust Template Size:-

The captured size of video frame is fixed in video surveillance system. If we develop same size of template for matching all foreground positions then there will inequality occur between the original persons and person’s standard template shape. Hence curve fitting approach used for suitable fitting size. Standard template replace with fitting size. The fitting size depend upon the distance between the person and the camera.

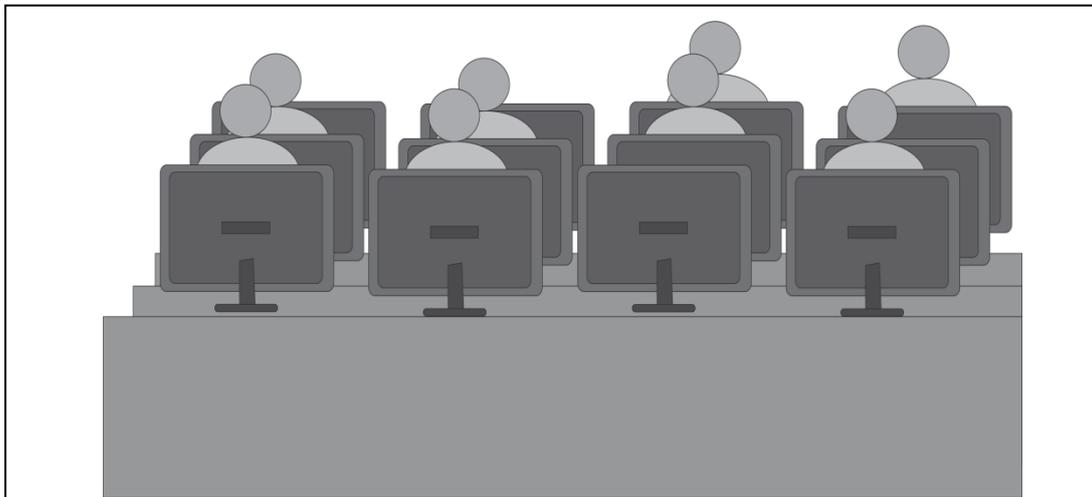


Fig 1: This figure shows the overall Students sitting in a classroom in front of their personal computer, in which some positions are vacant because of some absent students.

The figure 2 is explain as in the case of person 3, the distance between the person and camera is far from each other. In case of person 2, the distance between camera and person 2 is lesser than person 3. However the person 1 is closer than person 2, person 3. According to the distance between the person and camera, the template construction technique will adjust the proper size. The adjusting of person’s standard template by size is calculated by this formula.

$$T = f(P) = b_4P^4 + b_3P^3 + b_2P^2 + b_1P + b_0$$

Where T is Person Standard template size, p is the pixel position of vertical image, B is the coefficient values. This above equation used to derive many different samples.

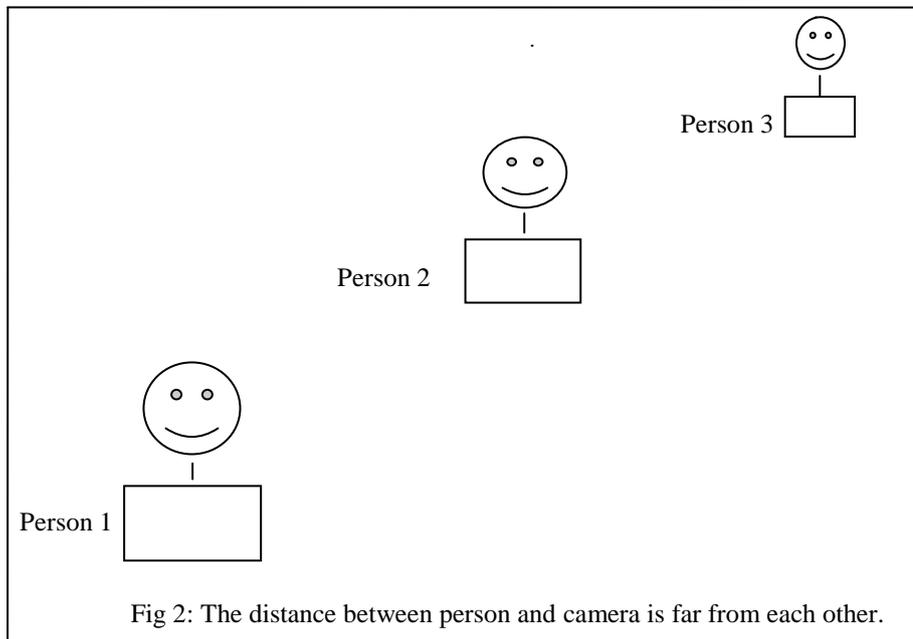
1.5 Template Matching:-

There are different methods for face recognition process like PCA (principle component analysis) or template matching. In PCA method the unknown object features compare with the features locating in database. In template matching it matches the shape and size which was constructed.

There are two case occur. Firstly, the person size is smaller than standard template. Secondly, the person size is larger than standard template. So template size adjust with the person size. Here we set the one margin. If the person is on the margin line which is consider red rectangular box. While if the person is beyond the margin line then it is consider as blue rectangular box. According to this way, we match all the templates. After template is matching for each student in his/her position then return present status to the database. According to this way, it will find the student whosoever sitting in classroom and will mark their attendance online. Each student sitting position is already embedded with his/her roll number. Automatically attendance will be marked. Here we use connectivity of database with MATLAB software. So that all the records should be maintained like timing of classroom, Section, Roll number and Remarks (Present/Absent). All the given information will be stored in the database.

1.6 Count number of students sitting in a classroom:-

The students correctly detected by the template matching technique. Then the counting operation is perform, so that we can calculate the overall strength of the students which are present in a classroom at particular time slot.



III. CONCLUSIONS

Automated video surveillance technique deals with real time observation of student within a particular environment that automatically marks attendance. The student sitting in the order of their roll number in front of personal computer. With the help of video surveillance we counts number of students sitting within a classroom and attendance will be uploaded online in each students account. It is highly accurate Performance than manual and Time saving because it is an automatic procedure of online attendance marked without any effort of manpower. Different kinds of analysis can be made.

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