International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 3 | ISSN : 2456-3307

Automatic Attendance Marking System Using Face Recognition

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ABSTRACT

Face Recognition as it is often referred to as, analyses characteristics of a person's face image input through a camera. Facial recognition or face recognition as it is often referred to as, analyses characteristics of a person's face image input through a camera. Verification or identification can be accomplished from two feet away or more, without requiring the user to wait for long periods of time or do anything more than look at the camera. Traditionally staff attendance is taken manually by using attendance sheet, given by the college member in class. The Current attendance marking methods are monotonous & time consuming. Manually recorded attendance can be easily manipulated. Hence the project is proposed to tackle all these issues. The proposed system consists of a high resolution digital camera put on gate to monitor the office room. The data or images obtained by the camera are sent to a computer programmed system for further Analysis. The obtained images are then compared with a set of reference images of each of the staff & salary the corresponding attendance. The camera module can be a wireless or wired system.

Keywords: Image processing, Face recognition, , Microcontroller, and Camera

I. INTRODUCTION

Nowadays, taking attendance in any field is very important task so as to maintained the record of student, employee etc. Traditionally, student attendance is taken manually by using attendance sheet given by faculty member in class which is very time consuming. Observed that the technique used was very time consuming and even many demerits has been observed by us such as wastage of paper, interruption in classroom etc. previously a system has been proposed by continues observation which improves the performance for the estimation of the attendance. Implementation of the system has to be carried out on accordance of some techniques named as face detection and face recognition. The Face detection and face recognition are very advanced in terms of computer authentication technology. The technology of student attendance system is used to support the teacher for checking student attendance in modern way. The system is going to work by some techniques such as the image is captured by web camera of laptop is then processed towards the detection as the detected face image is obtained face recognition has to be done which is divided into further parts namely face alignment, preprocessing, feature extraction, face matching where the image is converted into gray scale image and the result has to be seen. This has been done by using algorithm. This technique is considered to be one of the most successful for image processing or analysis.

II. COMPONENTS OF FACE

BIOMETRICS

A. Face Detection:

AdaBoost [6] classifier is used with Haar [7] and Local Binary Pattern (LBP) [8] features whereas

Support Vector Machine (SVM) [12] classifier is used with Histogram of Oriented Gradients (HOG) [13] features for face detection evaluation.

Haar-like [7] features are evaluated through the use of a new image representation that generates a large set of features and uses the boosting algorithm AdaBoost [6] to reduce degenerative tree of the boosted classifiers for robust and fast interferences only simple rectangular Haarlike [7] features are used that provides a number of benefits like sort of ad-hoc domain knowledge is implied as well as a speed increase over pixel based systems, suggestive to Haar [7] basis functions equivalent to intensity difference readings are quite easy to compute. Implementation of a system that used such features would provide a feature set that was far too large, hence the feature set must be only restricted to a small number of critical features which is achieved by boosting algorithm, Adaboost [6]. The original LBP [8] operator labels the pixels of an image by thresholding the 3-by-3 neighbourhood of each pixel with the centre pixel value and considering the result as a binary number. Each face image can be considered as a composition of micro-patterns which can be effectively detected by the LBP [8] operator. To consider the shape information of faces, they divided face images into N small non-overlapping regions T0, T1, ..., TN. The LBP [8] histograms extracted from each sub-region are then concatenated into a single,

Spatially enhanced feature histogram defined as:

Hi, j= _x ,yI(fl(x,y)=i)I((x,y)_Tj)

Where i = 0, L-1; j = 0, N-1. The extracted feature histogram describes the local texture and global shape of face images.

180	176	168
179	175	170
169	174	170

Example

➔

1	1	0
1		0
0	0	0

Threshold

$(10000011)^2=131$

Pattern

SVM [12] classifier is been used with HOG [13] features for face detection. HOG [13] greatly outperforms wavelets and degree of smoothing before calculating gradients damages, results emphasizes much of the available information is from sudden edges at fine scales that blurring this for reducing the sensitivity to spatial position is a mistake. Gradients should be calculated at the finest available scale in the current pyramid layer and strong local contrast normalization is essential for good results. Whereas SVM [12] are formulated to solve a classical two class problem which returns a binary value, the class of the object. To train our SVM [12] algorithm, we formulate the problem in a difference space that explicitly captures the dissimilarity between two facial images. The results summery of above methods are stated below.

Table 1. Face detection results summery

Dataset	Detection		
	Adaboost		SVM
	Haar	LBP	HOG
[1]	99.31%	95.22%	92.68%
[2]	98.33%	98.96%	94.10%
[3]	98.31%	69.83%	87.89%
[4]	96.94%	94.16%	90.58%
[5]	90.65%	88.31%	89.19%
Mean	**96.70%**	**89.30%**	**90.88%**

B. Face Recognition

Eigen faces [9] considered as 2-D face recognition problem, faces will be mostly upright and frontal. That's why 3-Dinformation about the face is not required that reduces complexity by a significant bit. It convert the face images into a set of basic functions which essentially are the principal components of

The face images seeks directions in which it is more efficient to represent the data. This is mainly useful for decrease the computational effort. Linear discriminant analysis is primarily used here to reduce the number of features to a more manageable number before recognition because face is represented by a large number of pixel values. Each

of the new dimensions is a linear combination of pixel values, which form a template. The linear combinations obtained using Fisher's linear discriminant are called Fisher faces [10]. LBP [8] is an order set of binary comparisons of pixel intensities between the center pixel and its eight surrounding pixels.

Figure 1

*LBP (xa,ya) = 7_*
n=0 s(im - ia) 2n

Where ia corresponds to the value of the center pixel (xa,ya), im to the value of eight surrounding pixels, function f(x) is defined as:

f(x) =1 if x>=0
f(x) =0 if x< 0

III. DESIGN METHODOLOGY AND ALGORITHM

A. Background subtraction:

The background is assumed to be the frame at time *t*. This difference image would only show some intensity for the pixel locations which have changed in the two frames. Though we have seemingly removed the background, this approach will only work for cases where all foreground pixels are moving and all background pixels are static. The next part is face detection which determines the location and sizes of human faces in the captured image. The faces are detected from the captured image using algorithm.

B. Face detection using HAAR cascades:

Integral images can be defined as two-dimensional lookup tables in the form of a matrix with the same size of the original image. Each element of the integral image contains the sum of all pixels located on the up-left region of the original image (in relation to the element's position).This allows to compute sum of rectangular areas in the image, at any position or scale, using only four lookups:

$$Sum = I(C) + I(A) - I(B) - I(D)$$

Where points A, B, C, D belong to the integral image

IV. CONCLUSION

In current work we developed the system to evaluate the face detection and recognition methods which are considered to be a bench mark. Some methods performed consistently over different datasets whereas other methods behave very randomly however based on average experimental results performance is evaluated, five datasets been used for this purpose. Face detection and recognition method's result summery is provided in table 1 and table 2 respectively whereas datasets summery is provided in table 3. In current system Haar-like [7] features reported relatively well but it has much false detection than LBP [8] which could be consider being a future work in surveillance to reduce false detection in Haar-like [7] features and for the recognition part gabor [11] is reported well as it's qualities overcomes datasets complexity.

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