Automated Attendance Marking Using Face Recognition

M. Padma Priya
Sri SaiRam Engineering college,
West Tambaram
Chennai

Ananthakrishnan k s
Sri SaiRam Engineering college,
West Tambaram
Chennai

Kallivettu Ganesh
Sri SaiRam Engineering college,
West Tambaram
Chennai

Ramsaireddysomavarapu
Sri SaiRam Engineering college,
West Tambaram
Chennai

Abstract

This paper describes the machine learning approach for face recognition which is capable of processing images efficiently and quickly achieving high detection rates. The project is described in three stage stages of processing. The first is the introduction of new images to the machine which is called the "Integral image", which helps the detection program to detect images quickly and efficiently. The second stage is where the captured images are made learn using the algorithm, based on Ada boost which uses and selects the visual classifiers from the data's and yields efficient classifier. The third stage is where the image classifiers are made effective as "cascade" which helps to remove the background images which are not required .The Eigen face algorithm detects and remove unwanted pixels from the image using the HAAR method of classification. In this domain of facial recognition which provides effective detection and comparison rates than other strategies for attendance marking .The project is implemented using the raspberry-pi and their respective camera module components of raspberry-pi, which has a frame rate of fifteen frames per second.

Introduction:

This paper brings along new algorithms and insights to construct a framework for strong and very fast object detection. This framework is incontestable on, and in part motivated by, the task of face detection. Toward this end we have made a frontal face detection system that achieves detection and false positive rates that area unit equivalent to the simplest printed results [1]. This face detection system is most clearly distinguished from previous approaches in its ability to discover faces very rapidly. Operational on 384 by 288 element pictures, faces are detected at fifteen frames per second on a standard 700 MHz Intel Pentium III. In other face detection systems, auxiliary information, such as image differences in video sequences, or element colorizes color pictures, have been used to achieve high frame rates. Our system achieves high frame rates working solely with the knowledge gift in a very single gray scale image. These alternative sources of information can also be integrated with our system to realize even higher frame rates. There are a unit three main contributions of our object detection framework. We will introduce each of these ideas briefly below then describe them intimately in later sections. The first contribution of this paper could be a new image illustration called associate integral image that permits for in no time feature evaluation. Motivated in part by the work of Papa Georgiou et al. our detection system does not work directly with image intensities [10]. Like these authors we use a set of options that area unit equivalent to HAAR Basis functions additionally use connected filters that are additional complex than HAAR filters. In order to compute these features very chop-chop at several scales we tend to introduce the integral image representation for images. The integral image can be computed from an image using a few operations per pixel. Once computed, any one of these Harr-like features can be computed at any scale or location in constant time. The second contribution of this paper could be a technique for constructing a classifier by choosing a little range of necessary features using AdaBoost [6]. Within any image sub-window the total range of Harr-like options is extremely massive, far larger than the number of pixels. In order to ensure fast classification, the learning process must exclude a large majority of the out there options, and focus on a small set of critical features. Motivated by the work of Tieu and Viola, feature selection is achieved through a simple modification of the AdaBoost procedure: the weak learner is forced so that every weak classifier came back will rely on solely a single feature [2]. As a result each stage of the boosting process, that selects a replacement weak classifier, will be viewed as a feature selection process. AdaBoost provides an effectivelearning algorithm and strong bounds on generalization performance [13, 9, 10].The third major contribution of this paper could be a technique for combining successively more complex classifiers in a cascade structure which dramatically increases the speed of the detector by focusing attention on promising regions of the image. The notion behind focus of attention approaches is that it's usually potential to speedily verify wherever in Associate in nursing image an object might occur [7]. More complex processing is reserved only for these promising regions. The key live of such Associate in Nursing approach is that the "false negative" rate of the attentional process. It must be the case that all, or almost all, object instances area unit elite by the basic cognitive process filter. We will describe a method for coaching a very straightforward and efficient classifier which can be used as a “supervised” focus of attention operator. The term supervised refers to the very fact that the basic cognitive process operator is trained to detect examples of a particular class. In the domain of face detection its potential to realize fewer than 1 Chronicles false negatives and 40% false positives using a classifier constructed from two Harr-like features. The effect of this filter is to reduce by over one 0.5 the quantity of locations wherever the final detector must be evaluated. Those sub-windows that don't seem to be rejected by the initial classifier area unit processed by a sequence of classifiers, each slightly more complex than the last. If any classifier rejects the sub-window, no further processing is performed. The structure of the cascaded detection process is essentially that of a degenerate call tree, and as such is related to the work of Geman and colleagues [1, 4].An extremely quick face detector can have broad sensible applications. These include user interfaces, image databases, and teleconferencing. In applications where rapid frame-rates don't seem to be necessary, our system will allow for significant additional post-processing and analysis. In addition our system will be enforced on a good vary of small low power devices, including hand-held and embedded processors. In our research laboratory we've got enforced this facedetector on the Compaq iPAQ hand-held and have achieved detection at 2 frames per second (this device incorporates a low power two hundred MIPS robust Arm processor that lacks floating point hardware).The remainder of the paper describes our contributions and variety of experimental results, including a detailed description of our experimental methodology. Discussion of closely connected work takes place at the tip of every section.

2.Features :

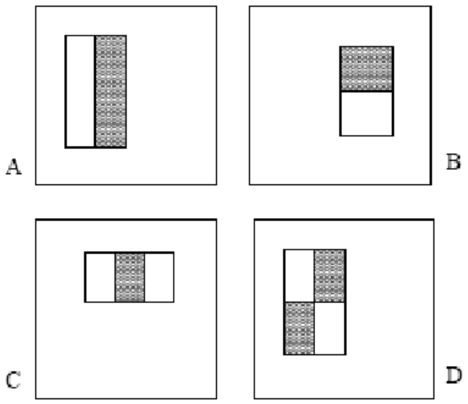

Figure 1: Example rectangle features shown relative to the enclosing detection window. The sum of the pixels whichlie within the white rectangles are subtracted from the sum of pixels in the grey rectangles. Two-rectangle features are shown in (A) and (B). Figure (C) shows a three-rectanglefeature, and (D) a four-rectangle feature.

Our object detection procedure classifies images based on the value of simple features .There are many motivations for using features rather than the pixels directly.The most common reason is that options will act to code adhoc domain data that's tough to be told employing a finite quantity of training data. For this system there is also a second critical motivation for features: the feature based system operates much faster than a pixel-based system.The simple options used square measure cherish Haar basis functions that are employed by Papageorgiou et al. [10].More specifically, we use three kinds of features. The value of a two-rectangle feature is that the distinction between the add of the pixels within two rectangular regions. The regions have identical size and form and square measure horizontally or vertically adjacent (see Figure 1). A three-rectangle feature computes the sum within two outside rectangles subtracted from the sum in a center rectangle. Finally a four-rectangle feature computes the difference between diagonal pairs of rectangles.Given that the bottom resolution of the detector is 24x24,the thorough set of parallelogram options is kind of giant, over 180,000 .Note that in contrast to the Haar basis, the set of parallelogram features is overcomplete.

2.1. Integral Image:

Rectangle features can be computed very rapidly using an intermediary representation for the images which we call the integral images .The integral images at the location x,y contains the sum of the pixels higher than and to the left of x,y.

$$(x, y) = \sum(x', y')$$

$x' \leq y, y' \leq y$

1.A complete basis has no linear dependence between basis components and has constant range of components because the image area, during this case 576. The full set of a hundred and eighty thousand options is again and again over-complete.

2.There could be a shut respect to “summed space tables” as utilized in graphics [3]. We decide a special name here so as to emphasize its use for the analysis of images, rather than for texture mapping.

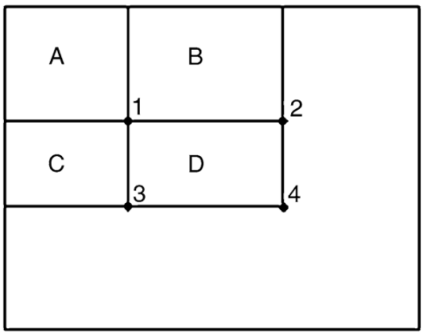

Figure 2: The sum of the pixels within rectangle D can becomputed with four array references. The value of the integral image at location one is that the add of the pixels in parallelogram A.The value at location two is A+B , at location three is A+C ,and at location 4 is A+B+C+D .The sum within D can be computed as 4(2+3).

Where ii(x,y) is the integral image and i(x,y) is the original image. Using the following pair of recurrences:

$$S(x,y) = s(x,y-1) + i(x,y) \quad (1)$$

$$ii(x,y) = ii(x-1,y) + s(x,y) \quad (2)$$

Where, s(x,y) is the cumulative row sum,s(x,-1) = 0, and ii(-1,y) = 0 the integral image can be compared in one pass over the original image .

Using the integral image any rectangular sum can be the difference between two rectangular sums can be computed in eight references .Since the two-rectangle sums they'll be computed in six array references .eight within the case of three-rectangle options, and nine for four-rectangle options.

3. BlockDiagram:

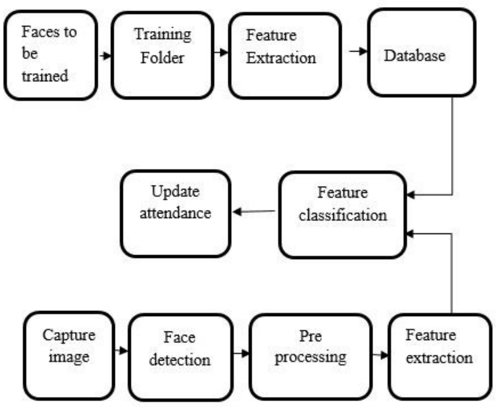

Fig 3:BLOCK DIAGRAM OF AUTOMATIC ATTENDANCE SYSTEM

4. VIOLA-JONES ALGORITHM:

We are using Viola-Jones algorithm for face detection. There is a built-in operate n MATLAB named as "detector=vision.CascadeObjectDetector".The cascade object observer uses the Viola-Jones formula to detect people's faces. Detector=vision. Cascade Object Detector creates a system object, detector that detects objects using Viola-Jones algorithm. The classification Model property controls the kind of object to observe.

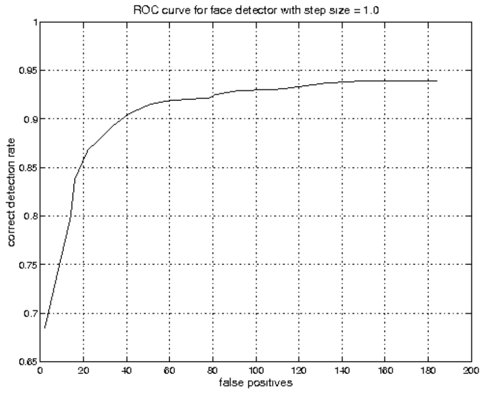

Fig 4 :ROC face detector for face detection program

5. Conclusion:

In this Real time Face recognition system for time and attendance applications they proposed the use of automated face recognition system for time application and attendance applications using Open CV library. The proposed system used the viola jones algorithm for the face detection which comprises of the haar's cascades and the detected face is resized for the favorable size and this is further processed. The processing is done using the linear stretch enhancement and recognition is done using PCA. When the recognition of the student is completed the attendance is automatically updated to the database with both the name, data and time. A web application is used for viewing the status of the same which shows the attendance report of the attendance on a particular date. This model conjointly considers potential threats like spoofing for the system and this is often avoided by victimization the attention blink detector algorithmic rule to acknowledge the viewer avoiding security threats. This way the model used period face recognition system for the time and group action.

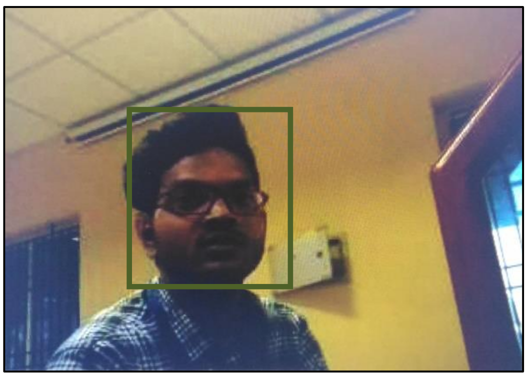

Fig 4: screenshot of image being captured

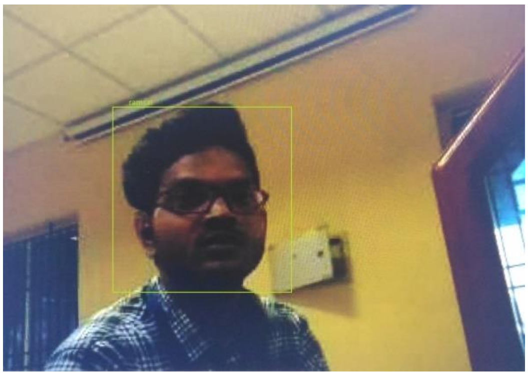

Fig 5 : screenshot of the detection phase of the program

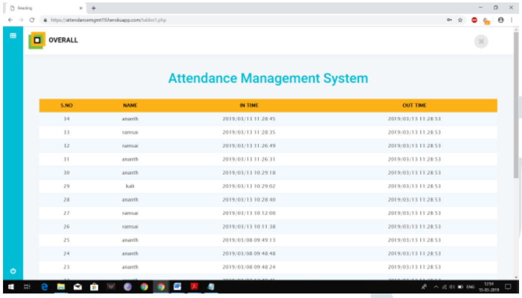

Fig 6: screenshot of the webpage where the in-time and the out-time are marked

Webpage url: https://attendancemgmt19.herokuapp.com

6.Future Enhancement:

Currently the model of Automatic Attendance can be improvised to increase transparency among the people working or studying in their respective organizations .Server can be modified to send the statistic report of individual's on monthly basis .This method can help in solving discrepancies in attendance marking system. A system modelled message can be sent to their respective registered mail ids. Further,This model also considers possible threats like spoofing for the system and this is avoided by using the eye blink detector algorithm to recognize the viewer avoiding security threats.

7. References:

1. Viola, P., & Jones, M. (2001). Rapid object detection using a boosted cascade of simple features. In Computer Vision and Pattern Recognition, 2001. CVPR 2001. Proceedings of the 2001 IEEE Computer Society Conference on (Vol. 1, pp. I-511). IEEE.

2. Rohit, C., Baburao, P., Vinayak, F., &Sankalp, S. (2015). attendance management system using face recognition. International Journal for Innovative Research in Science and Technology, 1(11), 55-58.

3. NirmalyaKar, MrinalKantiDebbarma, AshimSaha, and DwijenRudra Pal, "Implementation of Automated Attendance System using Face Recognition", International Journal of Computer and Communication Engineering, Vol. 1, No. 2, July 2012.

4. BenfanoSoewito, Ford Lumban Gaol," Attendance System on Android Smartphone", 2015 International Conference on Control, Electronics, Renewable Energy and Communications (ICCEREC).

5. AparnaBehara, M.V.Raghunadh, "Real Time Face Recognition System for time and attendance applications", International Journal of Electrical, Electronic and Data Communication, ISSN 2320-2084, Volume-1, Issue-4.

6. KAWAGUCHI, Y., SHOJI, T., Weijane, L. I. N., KAKUSHO, K., & MINOH, M. (2005). Face recognition-based lecture attendance system. In the 3rd AEARU Workshop on Network Education (pp. 70-75).

7. SoundrapandiyanRajkumar, J. Prakash, "Automated attendance using Raspberry pi", International Journal of Pharmacy and Technology, Sep 2016.