



# Attendance Monitoring Through Image Processing Using Face Detection and Recognition Technique

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**ABSTRACT:** Maintenance of attendance is an significant concern for all schools because it is one of the first ways to test a student's regularity. School attendance is done by keeping the attendance sheet, which is a time-consuming procedure. Use of the same time may assist the student in obtaining more information from the teacher or teacher. In addition, the attendance can be easily manipulated because it is recorded manually. It is also difficult to verify each student in the class. The facial detection and facial recognition mechanism is therefore proposed to maintain participation. Not only does this save time, it also protects students from fraudulent attendance. This also sensitizes students to attend classes every day, as the attendance is tracked by an electronic computer. A variety of creative technologies have been developed to take part. Some popular ones are biometrics, thumbprints, fingerprints and access cards.

The system for documenting the attendance using face detection and recognition was proposed. The approach proposed was implemented in four stages, such as facial detection, labeling of the detected faces, training of a labeled data set classification as well as face recognition.

**KEYWORDS:** Face Detection, Face Recognition and Biometrics.

## I. INTRODUCTION

Attendance is of utmost significance for an educational organization's teacher and student alike. So, keeping record of the attendance is very important. The problem arises when we think about the traditional process of classroom attendance. Calling the student's name or roll number for attendance is not just a time consuming issue, it also needs energy. Thus an automated method of attendance will solve all of the above problems. There are some automatic attendances that are currently being used by a lot of institutions. One such system is biometrics. Despite being automatic and a step ahead of traditional method it does not meet the time constraint. The student will have to wait in queue to give attendance, which is time consuming. The project introduces an involuntary attendance marking system, devoid of any kind of interference with the normal teaching procedure. The system may also be implemented during exam sessions or in other teaching activities where attendance is very important. This program removes traditional student recognition, such as calling the student's name, or checking the student's respective identification cards, which may not only interfere with the ongoing teaching process, but may also be exhausting for students during test sessions.

### 1.1 Applications

**1. Prevent Retail Crime:** Face recognition is currently being used to instantly identify known shoplifters, organized retail criminals, or people with a history of fraud entering retail establishments.

**2. Unlock Phones:** A number of phones, including the latest iPhone, are now using face recognition to unlock phones. This technology is a powerful means of protecting personal data and ensuring that sensitive data remain inaccessible to the perpetrator if the phone is stolen.

**3. Smarter Advertising:** Face recognition has the ability to make advertising more targeted by making people's age and gender-based guesses. Organizations like Paddy are now working to install screens at gas stations with face-recognition built in. It's just a matter of time before face-recognition becomes an omnipresent advertising technology.

**4. Find Missing Persons:** Face recognition can be used to locate missing children and victims of sex trafficking. So long so missing persons are added to the database, law enforcement agencies will be alerted as soon as they are identified by face recognition — whether it be an airport, retail store or other public place. In fact, in just four days, 3000 missing children were discovered using facial recognition in India!

**5. Identify People On Social Media Platforms:** Facebook uses face-recognition technology to automatically recognize when Facebook members appear in photos. This makes it easier for people to identify the images they're in, and will recommend which people should be included in the pictures.

**6. Acceptable Diagnostic Diseases:** Face recognition can be used to diagnose diseases that cause detectable changes in appearance. The National Human Genome Institute Research Institute, for example, uses facial recognition to detect a rare disease called DiGeorge Syndrome, in which a portion of the 22nd chromosome is missing. Facial recognition has helped to diagnose the disease in 96 percent of cases. As algorithms become even more sophisticated, face recognition will become an invaluable diagnostic tool for all sorts of conditions.

**7. Track School Attendance:** In addition to making schools safer, facial recognition has the potential to track student attendance. Traditionally, attendance sheets can allow students to sign up for another student who is a ditch class. But China is already using face recognition to ensure that students do not skip class. Tablets are used to scan the faces of students and match their photos against the database to validate their identities.

## II. RELATED WORK

In Deepan, man. P[1] et.al., a new hybrid classifier with a modified Viola-Jones PCA and LBP algorithm, is being developed for more accurate facial detection performance. When the student has been marked and registered, the program must update the entries in the college / school attendance entry software or the data server. The facial detection method proposed by the Modified Viola-Jones[1] algorithm is used because it produces high accuracy and low false detection. The basic principle of the modified Viola Jones algorithm is to scan a subwindow capable of detecting faces across a given input image. The typical approach to image processing will be to rescale the input image to a different size and then run the fixed size detector through these images. This method is time consuming due to the estimation of images of various sizes. The modified Viola Jones[1] algorithm uses both the integral image representation and the modified AdaBoost algorithm to produce better performance under different lighting conditions. The specifics of the modified Viola Jones algorithm are as follows[1]: four steps taken during the implementation of the modified Viola-Jones face detection algorithm.

In Samuel Lukas[2] et.al, the student attendance record is one of the most important issues dealt with by any school, college or university from time to time. In order to keep the student attendance record accurate and correct, faculty staff should have a clear system for checking and preserving or handling the attendance record on a regular basis. There are generally two types of student attendance system, i.e. a manual attendance system (MAS) and an automated attendance system (AAS). This paper discusses the combined use of DWT and DCT in HFR. The Discrete Wavelet Transform (DWT) has been introduced as a highly efficient and flexible method for dealing with subband signal decomposition. 2D-DWT is now established as a key operation in image processing. It is also known as a multi-resolution analysis which decomposes any image into its wavelet coefficients and scaling function. In fact, the Discrete Cosine Transform (DCT) is derived from the Discrete Fourier Transform (DFT). Because artifacts are in the form of images, 2D-DCT can therefore be implemented. DCT properties are de-correlation, energy compaction, domain scaling, separability, and symmetry. De-correlation implies that there is no correlation in the estimation of all DCT coefficients. Thus, all DCT coefficients can be calculated independently. DCT has excellent energy compaction for strongly correlated images.

In K.H.Pun[3] et.al., a computer program that determines if an image is a positive picture (face image) or a negative image (non-face image) is referred to as a classifier. A classifier is trained on hundreds of thousands of face and non-face images to learn how to correctly classify a new image. OpenCV provides us with two pre-trained and ready-to-use facial detection classifiers: first, to run a classifier, knowledge files need to be loaded as if they had no knowledge, just like a newborn baby. Each file begins with the name of the classifier to which it belongs. For example, the Haar cascade classifier begins as haarcascade\_frontalface\_alt.xml. The Haar Cascade Classifier is a machine-based approach to learning, an algorithm created by Paul Viola and Michael Jones, which is trained in many positive (faceless) and negative (faceless) images.



In Leonardo A. Camenta[4] et.al., Gabor features in face recognition were presented in order to improve performance. Here the gabor-based approach is used, which modifies the grid from which the gabor features are extracted using mesh to model face deformations generated by varying poses, and also the statistical model of scores is computed using gabor features to improve recognition efficiency. A cloud-based ubiquitous face-recognition monitoring system is proposed. This research reduces the complexity of the gabor filter by maintaining local features. This work defines a novel method for center symmetric local binary pattern extraction algorithm.

In Chen Li[5] et.al., biometric recognition automatically verifies the identity of a person based on his or her anatomical and behavioral characteristics. Faces have many distinct advantages compared to other biometric characteristics such as fingerprints, palms, irises, voice, gait, and ears. Even at a long distance, face features can be extracted from camera images that provide a convenient and non-intrusive way to monitor remotely. In addition, the face also has a richer structure and a larger area than other parts of the body, so that the face region is not easily occluded. Face recognition has now become an essential form of biological authentication and has received a great deal of attention in different contexts over the last decade. Gabor wavelets have been widely studied in pattern recognition for the extraction of local spatial characteristics of different directions and scales, because they represent the characteristics of spatial orientation, localization, and frequency selectivity. The LBP features proposed by Heikkila have been shown to be successful in the definition of the texture function. Nevertheless, the texture features derived from LBP are often too complex to be robust in flat areas of images.

### III. METHODOLOGY

In Implementation Detail of different algorithms or the techniques that are applicable while executing the process for the Automatic attendance monitoring system. And also, a snapshot gives an idea on how exactly the process gets started followed by classifier used.

Figure 5.1 represents the home page of the Attendance monitoring system. Upload button is used to upload the crowd video and the detect button is used to for detecting features of frames from the video.



Figure 5.1 Home Page

#### Steps for Estimation of Crowd Count in Crowd Video

Input: Image of the Registered student.

Output: Identify the student name and register number.

- Step 1: - Capture the image of the student with name and register id.
- Step 2: - Extract features using Haar Cascade classifier.
- Step 3: - Train the image of the student.
- Step 4: - Take the image of the registered student through web camera.
- Step 5: - Identify Face of the student.
- Step 6: - Display the student name with register number.
- Step 7: - Store the data in database along with the name , register number, date and time.

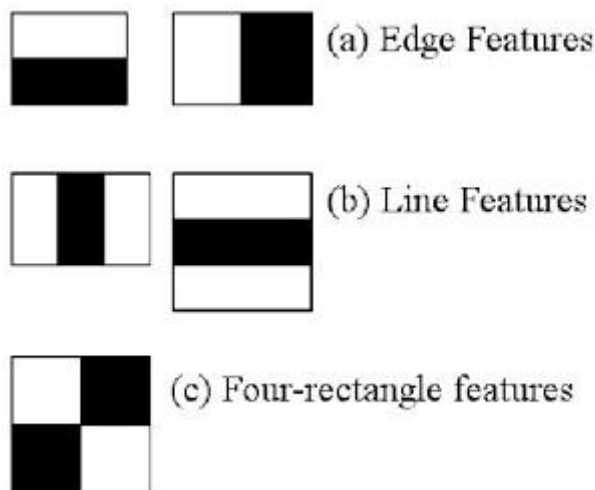
**Education for a haar-like classifier**

- Positive and negative picture collection of training
- Marking meaningful images with ImageClipper software or objectmarker.exe
- Creates samples.exe to create a.vec (vector) file based on positive images.
- Instruction of the haartraining classifier.

**Haar Cascade Classifier**

Object detection using Haar cascade classifiers is an effective object detection method proposed in its paper "Rapid Object detection using a Boosted Cascade of Simple Function," in 2001, by Paul Viola and Michael Jones. It's a machine-based learning approach, with both positive and negative images forming a cascade function. It is then used in other images to detect objects.

The algorithm initially needs a lot of positive images (face pictures) and negative images (faceless pictures) to train the classifier. Then have to extract from it features. Haar features shown in the picture below are used for this purpose. It's just like our convolutionary heart. A single value is obtained by subtracting the number of pixels from the number of the pixels under black rectangle from the number of the pixels under white rectangle.



**Figure 5.1 Haar cascade classifier**

A system of facial recognition is a technology that can distinguish a person from a digital image or a video image from a video source. The Haar Cascade classification is based on the Haar Wavelet technology to analyze pixels in the picture by function in squares. This uses "integral picture" concepts to calculate the detected "features." Haar Cascades uses the Ada-boost learning algorithm which selects a small number of important features from a large set to give an effective classifiers' results. The haar cascade classification is based on the Viola-Jones algorithm, which is trained to classify a face with certain input faces and non faces and to train a facial classifier.

**Haar features**

Haar features are identical to those kernels used to detect the presence of the feature in the provided image.

**Detect edges using kernels of convolution:**

Given the image input and the kernel, place the kernel in one corner and multiply the kernels by converting the kernel. The method is used to detect various edge types using different kernels. A Haar-Feature is like a CNN kernel, except that the kernel values are calculated by training in a CNN, whereas a Haar-Feature is manually calculated.

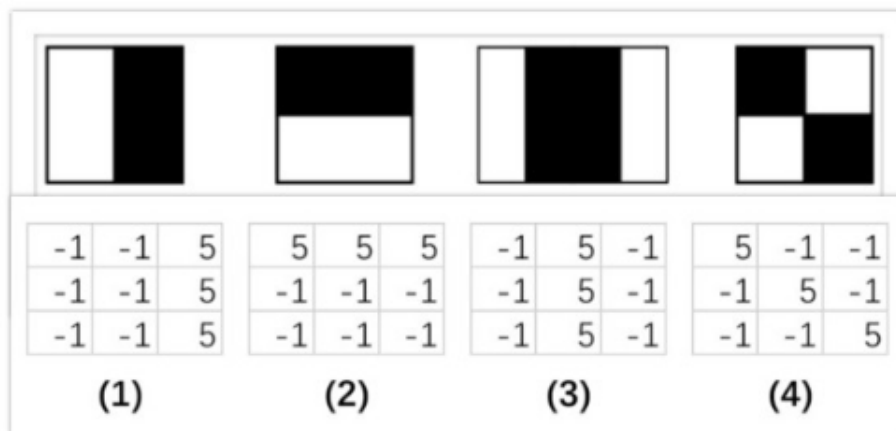


Figure 5.2 Detect edges using kernels of convolution

Here's some haar-features. The first two are edge features to detect edges. The third is a "line feature," while the fourth is a "four rectangle feature" that is most likely used to identify a slanted line. Apply haar features to a girl's image. Each function results in a single value, determined by subtracting the pixel sum under a white rectangle from the pixel sum under the black rectangle.

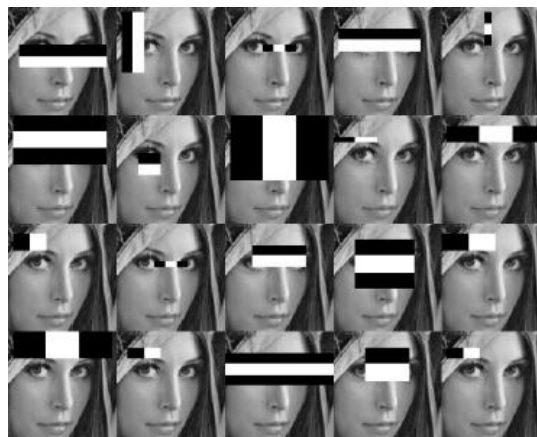


Figure 5.4 Haar features to a girl's image.

Each haar feature has some resemblance to identify part of the face. Viola-Jones uses 24 \* 24 as the base window size and divides the above features by 1 PX. Consider all possible haar parameters such as size, scale and type end up measuring around 160,000 + features. Evaluate a huge set of features for every 24 \* 24 PX.

#### IV. EXPERIMENTAL RESULTS

The outcome after implementation is evaluated with several test cases. The best situations the model performs effectively are evaluated. Analyzed the worst cases for the model built. Model obtained by combining both results. Software testing helps to detect bugs or defects that are checked with specific software components. Combined components form a complete system during testing. At this particular point, tests will show that the function fulfills functional goals and is not inaccurate. Test cases are selected to ensure user behaviors are tested for all combinations. Therefore, the expected device behavior is given in various combinations. Therefore, test cases with inputs and outputs on planned lines are chosen. Research findings identify some best case models, the worst case models made.

#### V. CONCLUSION

This was effectively introduced to hold the attendance record. The key reason behind this program is to remove all the disadvantages associated with manual attendance system. The drawbacks ranged from wasting time and paper to removing proxy problems in a class. The face detection and recognition method was reliable enough to achieve good

recognition accuracy as the LBPH algorithm is insulated from monotonic greyscale transformations and performs best in a controlled environment. Facial recognition is part of computer vision, and this decade's computer vision is rising. Computer vision's outreach is immense and endless possibilities. The most suitable real-world applications for face detection and recognition systems are for matching and monitoring mug-shot. There may be various lighting conditions, seating arrangements, and climates in different classrooms. Most of these conditions were tested on the system, and the system showed 100 % accuracy in most cases. There might also be students displaying various facial expressions, hair styles, mustache, spectacles, etc. All these cases are considered and tested for high accuracy and efficiency. It can be inferred from the above discussion that a reliable, stable, fast and efficient system was built to replace a manual and inefficient system. This program can be applied to help control attendance and leaves results. The program would save time, reduce the amount of work the administration needs to do, and replace the stationery content with electronic devices, and reduce the amount of human resources required for the purpose. A system with expected results was built, but there is room for improvement.

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