

SMART ATTENDANCE USING REAL TIME FACE RECOGNITION (SMART - FR)

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ABSTRACT : This paper describes an automated method for human face identification in a real-time backdrop that may be used by a business to track staff attendance. As a result, Smart Attendance with Real-Time Face Recognition is a practical option for dealing with workers on a daily basis. Because real-time background removal in a picture is still a problem, the job is very tough. The Haar cascade is utilized to identify real-time human faces, and a simple quick Principal Component Analysis is employed to recognize the faces identified with great accuracy. Employees' attendance is then recorded using the matching face. In addition, there is a technique for dealing with employee leave requests using Natural Language Processing, which involves approving or denying leaves and providing responses to all requests. Compared to current attendance and leave management systems, our software provides much more options with accurate results in a user-interactive way.

Keywords— RealTime Face Recognition, PCA: Principal Component Analysis, NLP: Natural Language Processing, Face recognition, Haar Cascade Classifie

1. INTRODUCTION

Personal identity is one of the most important building elements for intelligent interactions. Facial recognition is considered to be the most natural among identification techniques, because the facial mode is the mode of identification of persons in daily life. While alternative techniques may offer greater performance, such as fingerprint identification[5], they cannot be used to provide realistic smart interactions because of their invasive nature. Face recognition, on the other hand, offers passive identification which does not need a cooperation or particular action from the recognized person[1]. A business may thus identify its regular staff when entering the company.

This study is essentially focused at creating a system in which workers can identify, record their attendance and process their requests for leave. Face recognition is thus utilized to indicate the participation of workers. Smart attendance with Real Time Face Recognition (SMART-FR) offers flexibility in recognizing multiple staff simultaneously, not one by one. Algorithms are required to improve the accuracy, efficiency and reliability of recognition. In order to handle these objectives, Principle Component Analysis (PCA) and hair cascade are employed. The PCA is one of the most effective methods used to detect and compress images.

Another practical application of this technology is the automatic management of workers' leave requests.

In terms of today's companies' leave procedure, the majority of them use a manual method to manage workers' leave requests. If an employee want to apply for a leave, he or she must come to a job. It is thus time consuming, inefficient and unreliable. This method enables workers to request a leave with a simple text message. The Natural Language Processing (NLP) technology is utilized inside the system to handle these requests[7]. NLP is an area of computer science, artificial

intelligence and linguistics related to computer interaction with human (natural) languages. As such, NLP is linked to the field of interaction between human and machine. "Many NLP problems include the comprehension of natural languages that allow computers to get meaning from human or natural language input." Practices have shown that this method is simple to use and effective.

2. RESEARCH METHODOLOGY

The system features an independent application and a web-based application. Stand-alone application deals with the process of face recognition and attendance marking. The NLP process is primarily addressed in the web-based application. Both apps have a central database connection.

2.1. Detailed System Design of Face Recognition

Face recognition is the most important part of this project.

2.2. Haar Cascade Method

Detection of the human face requires the initial training of the hair classifier cascades. This PCA technique and hair feature algorithms must be built to train the classifiers.

The full system architecture of the face recognition process is shown in Figure 1. It describes the two major processes involved in the system, the detection of faces or the process of training and recognition.

2.3. Face Recognition Implementation Methodology

PCA is an excellent technique for statistical pattern recognition in data. In this method, the fundamental idea of face recognition using PCA is utilized. PCA is a helpful statistical method used in areas such as facial recognition and compression of images, and often used to identify patterns in high dimension data..

This section will take you through the steps you needed to perform a PCA on a set of data.

- Stage 1: Subtract the Mean of the data from each variable
- Stage 2: Calculate and form a covariance Matrix
- Stage 3: Calculate Eigenvectors and Eigen values

the intensity values of a pixel, use the change in contrast values between adjacent rectangular groups of pixels.

Haarcascade_frontalface_default.xml file is used in this research. It produced the best results from testing. However it may prefer one of the alternatives as many of these only detect faces in certain conditions i.e. facing the camera directly. This can help improve the accuracy of the recognizer and require less training data.

2.4. Detailed System Design of NLP

NLP is the other research application developed in SMRT-FR and it is used to process and handle leave requests of employees. NLP process running throughout the system is illustrated in Figure 2.

Employees can request leaves easily by sending a SMS or using web interface and those leave requests are processed using NLP application, and accept or reject result is generated by considering several conditions and rules.

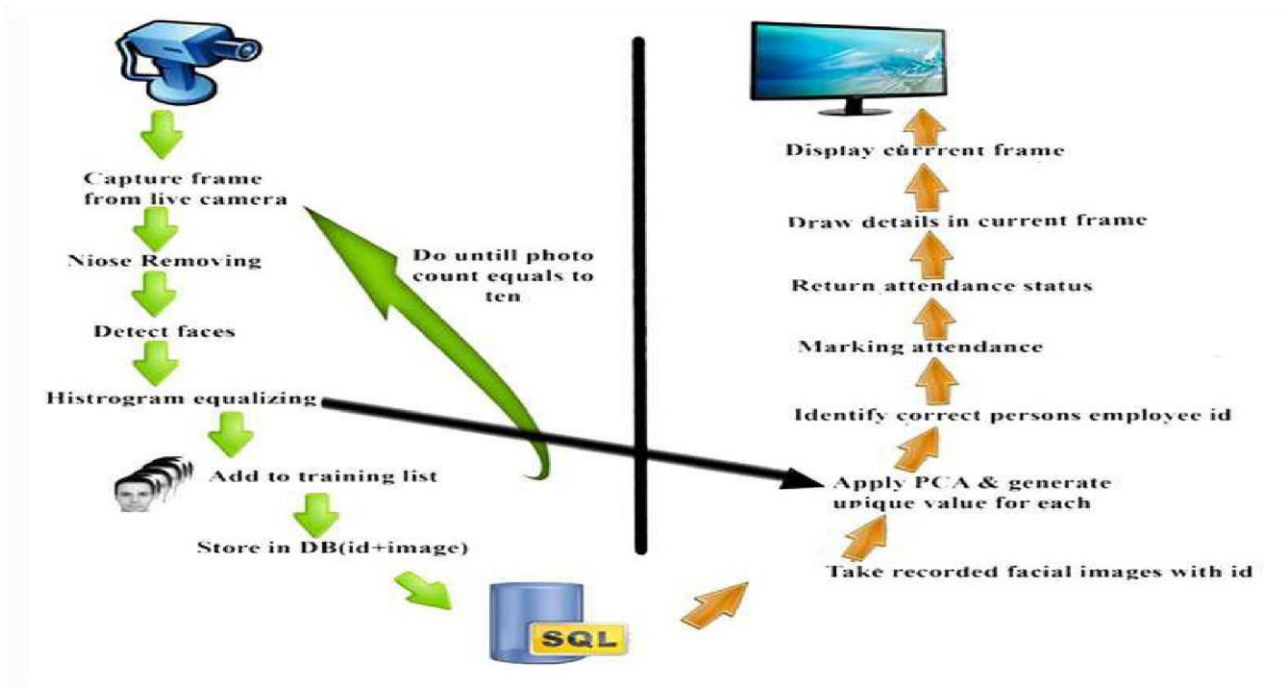


Figure 1: Detailed system design of face recognition

from the covariance Matrix

- Stage 4: Chose a Feature Vector (a fancy name for a matrix of vectors)
- Stage 5: Multiply the transposed Feature

Vectors by the transposed adjusted data

The core basis for Haar classifier object detection is the Haar-like features [4]. These features, rather than using

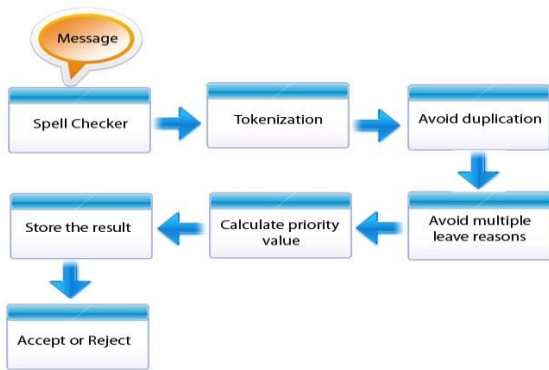


Figure 2: Detailed system design of NLP



Figure 4: Face recognition attendance marking

Figure 3 represents the main processes of NLP and how it is used for handling leave requests.

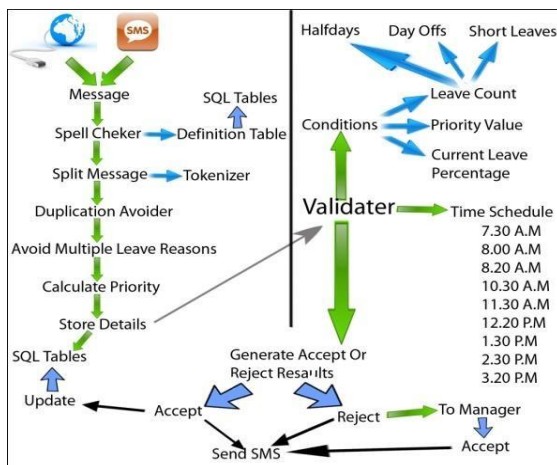


Figure 3: General steps of NLP process

The system is created in order to guide the employee to the camera. You should look the same as your pictures stored in the system. If the employee doesn't carry glasses in the pictures, for example, he should delete the glass attendees. And if the face changes substantially, as a bearded, it is also advisable to update the stored pictures of him in the system. The individual employee may then verify whether or not their attendance is noted.

The technology has so far been able to identify faces with 68 percent precision. Precision relies on the clarity of the image. The camera should be set up in a location without obstructions and with excellent light in the backdrop. The system comprises of a component where the employee may mark attendance manually by inputting the number of the employee if the detection system delay or malfunction. This is done to prevent any inconvenience created by the company's everyday operations.

There is a feature in SMART-FR that enables staff to seek leave through an SMS message. It is thus a big job to translate the communications into a language that computers can comprehend. This technique is used for NLP and Tokenization[8].

When the system first receives a leave request, a spell check is done to fix the keywords of the messages. The message is then divided into words (tokens), and superfluous words are removed. Then, by matching distinct words with token words previously recorded in a database, the leave type, reason and request date were found. Each tokens is given an integer value and the final result is determined by the sum of the values of each word. This total (integer value) is the result for future procedures.

3. RESULTS AND DISCUSSIONS

The PCA method has been selected for facial recognition algorithms because it is the most effective data compression approach. This makes the high-dimensional data, pictures, represented by lower-dimensional data so that the difficulty of grouping images is reduced. And PCA has also provided improved outcomes for other procedures.

The suggested system is a real-time system. It continually captures the picture via a web camera. At the entrance of the organization, the primary camera and attendance identification display may be positioned to improve results. When workers enter the main camera, their attendance is immediately noted. This is shown in Figure 4.

Figure 4 shows red, green and white frames. And certain important phrases are also shown in the colored frames. It is a method to detect various attendance situations.

NLP is utilized primarily in decision-making and is used to mimic the brain and take choices inside this system. If this decision-making method produces the right system outcome, it is occasionally incompatible with real-world solutions since computers cannot think precisely like the human brain.

The NLP system has been evaluated in several test scenarios. These instances include different kinds of leave request messages. 71 instances were successfully handled out of 100. The precision of this NLP system is thus 71 percent as a percentage.

4. CONCLUSIONS

From the preceding discussion it can be stated that a reliable, safe, quick and effective system has been created to replace a manual and unreliable method. This method may be used to improve the outcomes of attendance and leaves management. This method will save time, decrease the amount of work the administration needs to perform and replace the paperwork with electronic equipment. Therefore, a system has been created with anticipated outcomes but there is still space for improvement.

It should be able to identify all faces under any light circumstances in the future advancement of face recognition.

This method can presently only recognize a limited number of words in the NLP process. This system should thus be able to handle and detect many key phrases in future.

5. REFERENCES

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