A Review: College Attendance System Using Image Tagging

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Abstract

Image tagging is the method of applying labels or keywords to a provided image to the recognized faces or objects. Facial recognition is a category of biometic software which maps a person's facial features mathematically and stores the data as a information related to the face. Facial recognition is the concept, which uses several machine learning algorithms, to compare a given face with the pool of known faces to find the identity of the person. The typical register attendance program requires the participation of teachers as well as students as it takes time to identify and mark every student and it is vulnerable to mistakes because any student attendance may be overlooked by the faculty as well as proxies can also be done. Biometric scanning or manual attendance labelling in log book are the traditional methods to monitor student attendance; however, they are time-consuming , fallible and costly method that does not fully limit the involvement of proxies. In this paper, we introduced the use of face tagging in a real-time attendance system to resolve time wastage in biometric scan and overcoming all the disadvanatges of conventional manual attendance schemes. This system is designed primarily to take a picture of the entire class and identify all students simultaneously. The student's tagged face marks the attendance. Along with the tagging and attendance marking, the system is also able to monitor the total attendance of any student with statistical results. The presence is labelled on the basis of the stored picture, so that a proxy involvement is excluded. The main goal of the project is to make maximum use of lectures time by reducing wastage of time in marking and monitoring of the attendance using traditional schemes, thereby minimizing human interference.

1. INTRODUCTION

Image tagging is a method of marking or keywording images based entirely on figures inside a given image. Face tagging is basically to generate keywords for the recognized face which gets associated to that face. Photo tagging software systematically labels images, while photo taging can be done by users. Images on websites are searched more easily via key expressions concerning this picture. For example, if a photo album is posted to a social networking site, calling a photographic holiday album, a program extracts information required from it. When a picture includes people those who have social networking profiles, it identifies the picture and marks it with the names of the people in it. After finishing the process, the images can be searched using the created tags.

Face recognition is a technological process in which the human face is recognized. It is a biometric technology focused on artificial intelligence that recognizes the individual by analyzing a person's face texture and shape. Biometrics are used to map the face features of an picture or video through a facial recognition system. This compares the data with the database of recognized faces

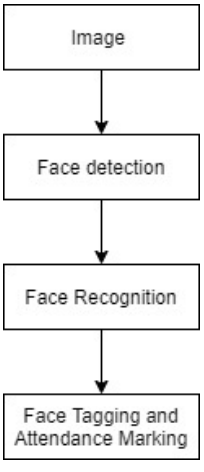

Fig. 1: Face Tagging System

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to find a match. Facial recognition can be useful to test individuals identity. Facial recognition technology has already been deployed in various industries, interactive devices, and security systems for monitoring and granting authenticated individual access.

Since the face is the initial distinct identity of any individual, facial recognition with the tagging of images is an excellent solution, for a time and expense green system without any human interference. It aims to provide the facial populism project with an automated attendance system via a picture campaign, in order to record attendance in lectures and sections and to manage the attendance database. Upon building the college student/candidate database, it takes almost no effort from the user side. Invasive behavior in this method is therefore absent and makes the system work.

A significant variety of methods for attendance labeling are Identification, Fingerprint, Iris, and mainly RFID based systems. These methods are time-demanding and vulnerable to failure. Image tagging is normal, easy to use and no longer needs support from the subject under examination. Facial images can be taken remotely and can be analyzed avoiding any human interference resulting no student can imitate another. Facial recognition will work as a highly profiled indicator of time monitoring and security of attendance.

2. LITERATURE SURVEY

This is a first step before starting on any project to gather required project-related information. This helps us in planning the project by studying papers which are published in this domain and researching on topics which will help us achieve the desired results

The paper on the IT company attendance method focused on deep convolution networks (CNN) was published by Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic. CNN has been used to track the position of the model made up of new technologies: CNN face cascade and CNN facial cascade embedding as the model has a satisfactory impact on big datasets.CNN was used for attendance monitoring the place the mannequin composed of new technologies: CNN face detection cascade and CNN face embedding cascade as CNN achieve satisfactory effects for large datasets. The cards used to mark the attendance of the employee had previously been the radio Frequency Identification (RFID). Global Positioning System(GPS) have been used to track the staffs location. The attendance of the employee was marked based on the calculated distance between the employee and company's location. Yet this system's vulnerability, such as the use of the region (GPS) by some individuals other than the card holder to mark presence or damage or the loss of RFID card by the card holder. Usage of DNN for the attendance marking used at the entry to the organization through the use of the attributes such as eye, nose, lip, or mouth, etc that are not affected by the use of add-ons such as glasses or some kind of temporary facial elements such as barbed, beard, hair growth, etc. In a limited data sample of original face images of staff in a real-time environment, DNN achieves an incredibly high accuracy of about 95.02%[1].

Also Shubhobrata Bhattacharya, Gowtham Sandeep Nainala, Prosenjit Das and Aurobinda Routray once published a paper on the attendance program for the study room which referred to discourage the use of traditional attendance management. In the traditional attendance scheme, it took time to attend the students manually and the proxy is a major downside. Smart Attendance Monitoring System analyzes a video series in which faces are remembered and labels the faces with the concept of Viola & Jones. The facial recognition parameters taken into consideration :

- Posing estimate: this is the measurement of nose tip co-ordinates and various facial elements with facial detection.
- The picture sharpness was also taken into account. c) The scale of the image has also been taken into account, as the distance between the camera and the faces may be small or bigger. Based on the final facial score of this measure, the formulation was determined and CNN was applied for facial identification[2].

A new automated attendance system was implemented in the paper published by Pooja G.R., Poornima M, Palakshi S, M. Bhanu Prakash Varma, Krishna AN, which records the status of a student, if the subject is present in the classroom. This program, built on face recognition algorithms, identifies the student automatically on webcam when he enters the classroom and marks his presence. The proposed solution has a basic architecture, with the detection of the human face by means of a high-definition camera where the images are processed using a known Viola Jones algorithm. The image faces are identified using a Haar Cascade Classifier that is designed using AdaBoost algorithm to select a few important features from a wide range of possible features. Extracting features is a way of collecting image visual information for indexing. This paper discusses the use of the Gray Co-occurrence Level (GLCM) matrix to obtain statistical texture for image estimation. This automated web camera attendance program consists of image acquisition, face recognition, the creation of the database, preprocessing, feature removal and post-processing steps. Threats like spoofing are also avoided using various techniques. This sytem saves time in contrast with conventional attendance marks and helps to track students and can be transported in any academic environment[3].

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There are various algorithms designed to recognize the face. Nevertheless, major issues such as blurring conditions, illumination, resolution and illumination impede accurate identification of the face. Aftab Ahmed, Fayaz Ali, Jiandong Guo, and Farha Deeba proposed a paper that used a binary pattern histogram (LBPH) algorithm to identify faces even in low resolution images. The key benefit of this algorithm is that it does not make any monotonous gray scale transformations of the image and is not influenced by an illumination change.It is proposed that it can operate even at a low resolution of 35px to recognize the human face in many directions, lateral positions and to track the face during movement. Rather of looking at the entire image the algorithm takes a 3* 3 -fenster into account and compares the values of the 8 neighboring pixels by using the median pixel value. If the neighbouring pixel value is higher or equivalent to the middle pixel value, then the pixel value is marked as 1 else it is marked as 0. We will convert this to a decimal value after you have obtained a binary sequence for a 3* 3 slot. After getting a binary sequence for a 3*3 window we convert it to a decimal value. After all the decimal values are collected, the histogram for the entire picture is formed. The faces are identified by an examination of the image histograms. Thus using LBPH recognition can be done irrespective of the illumination.[4].

Image tagging is the mechanism by which images are branded or keyworded based on figures inside a certain photo. Tags are larger to represent the content of the picture and are exactly relevant to the specific content material of the picture. The generated tags may be man-made or system-produced. This paper introduces different image tagging approaches based on deep learning algorithms. The detailed image tagging work can essentially be divided into model-based and model-free approaches. For the model-based approaches, pre-trained classifiers with machine learning algorithms are essential, while model-free methods propagate tags by tagging the visual neighbours' behaviours. So they used model based approach for a sytem as they had to train it with faces. The picture tagging of the known faces operates on a process in which the program trains people's images. The finishing stage of the training allows the program to learn the participants. The training phase will then be followed by the recognition of faces in a picture wherein all the faces of a picture will be detected and the faces detected are given as an input in a deep convolutionary neural network where tags are generated The tag list shall only consist of the person's name as the faces identified are supplied as CNN data[5].

For algorithms of face detection and recognition a paper was made wherein algorithms were compared and study on pros and cons of each algorithm is made. There are various face recognition algorithms like Local Binary Pattern Histogram(LBPH), Eigenfaces, Fisherfaces etc. For certain algorithms such as Eigenfaces and Fisherfaces, the key component analysis of an individual's face was used to determine the features of the face; the variations in lighting influence these algorithms. Local Binary Pattern Histogram is the face consciousness that doesn't remove PCA. It does also seek to locate the local type in order to compare each pixel to the next pixel. Studying the different algorithms, the system used LBPH algorithm using Opencv to recognize faces for a attendance system. After detection and recognition of faces the attendance was marked in SQLite database automatically. It also ensures that the attendance results are obtained by the Interface application of the attendance program to an authenticated user[6].

This article builds an automated attendance program by combining two Faster R-CNN face detection and SeetaFace face recognition software deep learning algorithms. The results of various experiments show: The system that record five classroom violations, i.e. absence, later arrival, early departure, free access and attendance carefreeness, and include an attendance table to represent the learning condition of all students after school. Attendance plays an significant part in teachings evaluation. It's normally reviewed by the instructor at the beginning and end of the lesson, but it might be like the instructor can miss someone or some students answer several times. Firstly, Faster R-CNN was used to detect facial numbers of students, followed by an algorithm SeetaFace for the recognition of students automatically in order to cover absence, later arrivals, leave early, free access to these four attendance functions. The system included five modules 1) Capturing a video in which each student appears in the video. (2) Isolate the frame of each participant per minute, (3) Faster R-CNN detection module which detect the face and output co-ordinatesof each student. (4)SeetaFace face recognition module for face recognition. (5)Automatic attendance analysis module. The sytem was implemented and tested in the classroom, using 720P, 1080P camera, 4K HD camcorder[7].

N.Sudhakar Reddy, M.V.Sumanth, S.Suresh Babu published a paper on a system wherein attendance was marked using biometric finger print, as finger print is a distinct identity of a a individual. The system's methodology involved steps such as data preprocessing, data analysis, data enrichment and prediction. The training data is preprocessed removing all the moise and improving the quality of the image. The machine is trained with the data. The certificate for conduct is one of the essential qualifications that any student needs for higher education The conduct of the student is calculated by its attendance and is estimated in this process, depending on the number of days the student attends the school. The student's conduct

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is reflected in the days that the student participates and seen for every week. This system is design to determine the overall conduct of the student. Such technology helps the student to realize the value of attendance at school and at college level to achieve his grades in order to change his or her conduct[8].

Authentication is one of the big problems in the information technology era. One of the well-known techniques for user authentication is human face recognition (HFR). HFR has been used extensively in many applications, such as the video monitoring / monitoring system, interaction between human computers, the door access control and network security, as a main branch for biometric authentication. This paper provides a method for student attendance at class with the use of the face-recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to obtain the characteristics of the face of student followed by the use of the Radial Basic Function (RBF) for classification of face objects.The authentication of the student is done in a classroom where the student are seated on their respective seats .The tests carried out involving 16 students in classrooms led to a positive recognition of 121 out of 148 faces. The system's success rate in identifying facial expressions of classroom students is approximately 82% [9].

The most accurate and exact biometric identification method available is iris recognition. The majority of commercial iris recognition systems use proprietary Daugman algorithms which are capable of providing perfect levels of recognition. Published tests, however, were typically obtained under favorable conditions and independent testing of the technology was not carried out. The system of iris recognition consists of a Hough-Based Automated Segmentation sytem that can locate the circulatory iris and the student location, eyelids, eyelashes and reflections. The iris area extracted was transformed to a rectangular block of constant dimensions to compensate for the differences in the imagery. Eventually, the data for step 1D Log-Gabor filters were extracted and quantified at four rates in order to encode a bit-wise biometric prototype into a special iris pattern[10].

In recent years, automatic face recognition technology (AFR) has seen significant performance changes, and are now commonly used for security and commercial applications. An automated method for identifying human faces in real time for a college to mark their employees' presence. Smart attendance with real-time face recognition is a real-world approach to treating workers on a day-to-day basis. The function is really hard because the picture is always challenging in real-time context subtraction. Manual entry into logbooks is a daunting task and time lost as well. We have therefore developed an effective module, which includes face reconnaissance to manage employee attendance records. Our module inscribes the face of the personnel (3). This inscription is a mechanism once and its image is deposited in the database. We need a system when registering the face as it is a process once. As an employee identification, you can have your own roll number which is unique for each employee. Each employee's presence in a database is updated. The findings showed better performance over the management system for manual attendance. The findings showed better performance over the program for manual attendance. Attendance after identification of employees is identified. Instead of current attendance and leave management programs, this product replaced far more approaches with realistic user experiences tests. No need for special hardware for installing the system in the office. It can be constructed using a camera and computer[11].

In a paper published by Shireesha Chintalapati, M.V. Raghunadh an system used to mark attendance using Support Vector Machine (SVM) classifiers and Principal Component Analysis (PCA). Automated attendance systems based on the techniques of face recognition have proved to save time and be safe, and an unknown individual can also be recognized by this device. LBPH beats other algorithms for real-time situations with a higher detection rate and a small false positive rate. In contrast to distance classifiers, SVM and Bayesian are both more powerful classifiers. The future work is to improve the recognition rate of algorithms when there are unintentional changes in a person like tonsuring head, using scarf, beard. Only up to 30 degrees angle change can be defined in the established method, which must be further enhanced. Gait recognition is be combined with face recognition systems in order to achieve better performance results. [12].

Fingerprint attendance program aims to automate an institution's biometric attendance process. A system was proposed by B. K. Mohamed and C. Raghu wherein a fingerprint identification device was made for the classroom as fingerprint is a distinct feature of each individual. This saves time wasted when names are called and offers a guaranteed way of marking attendance. The attendance is recorded by a handheld device without teacher interference. The device can be moved and students can mark there presence in the lecture. Students will place their finger over the sensor in order to identify their class presence. The entire device consist of the fingerprint module, Real Time Clock and the Graphic Fluid Crystal Display (GLCD) buttons and is operated by the microcontroller. You can pick different options with buttons. The battery time and status are also shown. RTC tracks the time and can be synced with the host network, and saves the date with each participating session. You may use the USB interface to connect to a host device.

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The machine operates from a battery rechargeable. Host computer GUI program allows the instructor to control the facilities and attendance[13].

In every field of human life, digitisation is growing, be it banking or education. Today, it is assumed that a person is automating everything, while books have become eBooks. Different systems like biometric fingerprint and facial scanners are used in the same education sector, but every school / college is unable to provide such systems because of corporatisation. A framework which uses Android Platform that is open source and generic for routine attendance calculation with face recognition is proposed in this paper. Each high school, college and organization can easily find it free of charge. The architecture of the system has 3 modules in which a mobile device is used to capture a image and send it for further fro face detection. A administrator module is also introduced which has authority for modification, updation and deletion of students details. The suggested method automatically produces Google Sheets and the company can be easily accessed. This system is based on face recognition algorithms which recognize the face and attendance of the student automatically[14].

Usually, the process of successful image tagging requires 2 steps, including the first image tagging and the subsequent tag refining. Photo tagging is a method of labelling the frame with a photo with one or more textual principles that represents the image's visual content. Picture tags seek to tag pictures with one or more human-friendly textual definitions to represent the picture's visual content. The resulting tags are the image tag list. The purpose of the image tagging is to eliminate imprecise tags and replace incomplete Tags manually or automatically via an algorithm. The image tag refinement can be achieved, as the tags in the tag list might not be specific for that image, and there may been a lack of some appropriate tags in the tag list. Firstly, a data set is created and trained the software for tagging on auto-tagging pictures and then the software can automatically tag the pictures based on the features found in the image when a user posts or gives a url to an image. It also include the image classification which classifies the images uploaded by the users on the basis of their features and/or their content. Classification algorithms, which are based on neural networks and the clustering algorithms, are also used to classify images according to pixels and types and sized sizes as well as on the basis of texture and content. This allows users and organizations to automatically identify their photos, which took a lot of time manually instead[15].

3. NEED AND BENEFITS

The typical attendance system of taking roll calls is been practiced by teachers all over the world from past many years. Roll call is not a constructive use of time, but it has became a habit. Apart from this, several systems have been developed with new emerging technologies. Some of these are fingerprint scanner, iris scanners and computer based face scanning. As every lecture is been conducted for a specified time, it is necessary to fully utilize the lecture time. Roll calls or manual register attendance marking schemes needs both students and teachers participation. It consumes a good amount of time to mark presence of each student of the class. So there is a lot of time wasted in it which can be avoided and can utilize the lectures time. In addition to this, there is a possibility that teacher can overlook a student and mark him absent. So there is a strong chance of human error. False attendance can also be marked where student can do misconduct of marking their classmates presence. The newer systems of attendance overcome some of the disadvantages but are time consuming. The long queues for scanning biometrics or faces by a scanning device results into more wastages time. In wider society, it's now estimated each of us spends three working weeks of the year simply authenticating ourselves to computers and other people. Face is the primary distinct feature of every individual. The system of marking attendance using a camera and face recognition wherein the whole class is marked at one time from the place where they have been seated. This would result in nearly no wastage of students and teachers time as this a automatic process and student attendance will be marked at the same time they do no have to distract themselves from the lecture. As face attribute is used for system, the chances of proxies will be completely eliminated and no fallibility in the system as it fully automated and has no human intervention. This will overcome all the problems and make the lecture more productive. This can also further be extened to monitor the conduct of the student in the class and also the attentiveness of the student.

4. COMPARISON AND STUDY OF FACE RECOGNITION ALGORITHMS

Table 1: Results

Performance Evaluation Conditions	*False Positive Rate*	*Training time*	*Recognition Rate (Images)*
PCA + Distance Classifier (Eigenfaces)	55%	1081 ms	93%
LDA + Distance Classifier (Fisherfaces)	53%	1234 ms	91%
PCA + SVM	51%	24570 ms	95%
PCA + Bayes	52%	29798 ms	94%
LBPH + Distance Classifier	25%	563 ms	95%

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5. CONCLUSION

The attendance marking can be improved with the help of various technologies and tests which are developed over the time. Some of the technologies and concept which we studied are Support Vector Machine , Local Binary Search Patterns, Principal Component Analysis and studied various systems which are implemented in order to enhance attendance monitoring. Based on this study we planned to use face-conciousness and image tagging to introduce a system that senses and recognizes the presence of a certain individual. The system will be using the Local Binary Pattern Histogram (LBPH) algorithm as it fits well for facial expressions, lighting and poses of different people. This algorithm is selected as it has a very low level of noise disturbance and confidence, as its range provides the most environmentally friendly effects and is not influenced by changing the lighting. Thus can be successfully implemented in a classroom and can eliminate proxies and time consumption. When a particular lecture consists of a large range of students, this system preserves time and effort. In addition, this proposed device could be constructed to self-aware and used to detect fraud in crowded environments, such as airports, bus stops and theaters.

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