

Face Recognition Attendance Monitoring Exemplary System

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Abstract

A computer program that detects, tracks, recognizes and validates human faces in photos or videos captured with a digital camera is known as face recognition. Despite massive progress in the field of face recognition for security, authentication, and participation purposes, there are still obstacles hindering growth toward human-level accuracy. Modifications in human facial appearance, such as varying lighting conditions, noise in facial images, scale, attitude, and on and on, are among the concerns which need to be resolved.

Keywords: Face Recognition, CNN, Haar Cascade Classifier

Introduction

To evaluate a student's performance, all educational institutions require them to keep track of their attendance. Student attendance is manually recorded on attendance sheets issued by department heads in most educational institutions, as mandated by law. Students sign these documents, which are subsequently filled out or manually entered into a computer for further study. This technique is difficult, time-consuming, and inaccurate because some students sign for missing students on a routine basis. In a large classroom, this technique also makes it difficult to identify individual students' attendance. We propose the formulation and construction of face detection and recognition system which would automatically identify students in the classroom attending a lecture and register their attendance by recognizing their faces in this project.

While alternative biometric authentication techniques (including such retinal scans or biometrics) are more accurate, students have usually had to wait in a long queue to enter the classroom. Face recognition has been adopted as it's quasi and well-known, as humans recognize one another mostly solely on their facial characteristics. This (facial) biometric system will provide a registration process that will save a person's unique facial features in a database, as well as identification and recognition techniques. These match a face detected in a camera image to already taken faces at the time of enrollment. The goal of developing an attendance management system is to replace the old method of taking attendance with just an automated system.

Literature Survey

[1] According to Shubhobrata Bhattacharya et al., regular academic attendance of students plays a very important role in performance analysis and quality monitoring. The traditional procedures used in most institutions, like calling names or signing papers, are both time-consuming and insecure. The

computerized attendance management system is described in detail, and it can be utilized for the comfort or completeness of data. The system was designed by combining widely available components to develop a device that manages student attendance via Face Recognition technology.

[2] H. Zhang et al.: Traditional class participation enlisting depends on the roll-calling of teachers, sign-in, and alternate ways with low effectiveness. However, face acknowledgment got broadly utilized as of late at home and abroad, there is no commonsense application framework accessible for this reason on Chinese college grounds. The paper presents programmed class participation enrolling framework CBCA System given face identification and acknowledgment of distributed computing, understudies simply need to remain before the camera for a couple of moments, and sign-in is finished, and sign-in information can be put away in a nearby or focal data set. This framework extraordinarily assists teachers with further developing roll-calling effectiveness in classes. In addition, understudies can be more centered around showing substance as opposed to investing some energy in passing sign-in sheets. Following a couple of months of utilization for various classes, they have observed that the application is adaptable, solid, and accomplishes a 100% acknowledgment rate progressively.

[3] Ngo Tung Son et al.: Face acknowledgment (FR) has gotten significant consideration in the field of safety, particularly in the utilization of shut circuit TV (CCTV) cameras in security checking. Albeit critical advances in the field of PC vision are made, progressed face acknowledgment frameworks give good execution just in controlled conditions. They fall apart fundamentally even with certifiable situations, for example, lighting conditions, movement obscure, camera goal, and so on This article shows how the configuration, execution and lead the observational correlations of AI open libraries in building participation taking (AT) emotionally supportive networks utilizing indoor surveillance cameras called ATSS. Our preliminary framework was sent to keep the appearances of 120 understudies in five classes who review on the third floor of the FPT Polytechnic College building. Our plan considers adaptable framework scaling, and it isn't just used for a school but as a nonexclusive participation framework with CCTV. The estimation results show that the precision is reasonable for a wide range of conditions.

[4] The work by E. Varadharajan et al. is on biometric participation in the board. The board's programmable involvement will fill the role of the traditional approach, which is time-consuming and hard to maintain. There are several numbers of biometrics technologies but face recognition has been the most efficient. They will exhibit participation without human obstacles in this paper. In this approach, a camera is positioned in the classroom and will take a picture, whereupon the characteristics will be recognized, the information base will be examined, and ultimately the attendance will be checked. If indeed the participant is tagged as missing, the message about the understudy's absence will be sent to their family. There are different techniques for looking at the countenances. The Eigen's face is one of the techniques. Eigenfaces is a set of Eigenvectors that are utilized in the PC vision issue of face acknowledgment.

[5] Sakina et al.: Machine Learning pulled in enormous consideration because of its commendable extraordinary presentation and taking care of various complex issues. This innovation acquired enormous consideration because of its preparation procedures. This paper examines the effective

execution of face acknowledgment utilizing HOG and AI. It will investigate the participation of understudies utilizing AI to facilitate the day-to-day daily schedule for instructors and staff. Also, the Histogram of Oriented Gradients (HOG) is utilized to extricate the highlights from the face utilizing our dataset to arrange the understudies. Finally, the distinguished face will be coordinated with the face in the dataset and remembered as needs be.

[6] Nikki Stevens et al.: Facial Recognition Technology has been intensively investigated as well as admonished because of its demonizing implications and influence within the over-policing of minority organizations. Furthermore, this dataset of faces being used for training and testing is a crucial component of facial recognition advancements. They show FRT as a massive infrastructure gathering in this article, choosing to focus on the chronology of four face recognition sets of data: its first set of data, introduced by Mr. Bledsoe as well as his colleagues in PRI Institute in the year 1963, The Facial Recognition Technology set of data, compiled by the Army Research Lab in 1995, MEDS-I (2009) and MEDS-II (2011), these data sets that included the dead arrestees, organized in Miter Corporation and the Pluralism in Face data set, which was made by IBM in 2019. They claim that the governmental difficulties of race in facial recognition are about undeniably more than fundamentally portrayal, bringing up issues regarding the likely accidental consequences and barriers of efforts to just de-information, predispositions using these four great datasets.

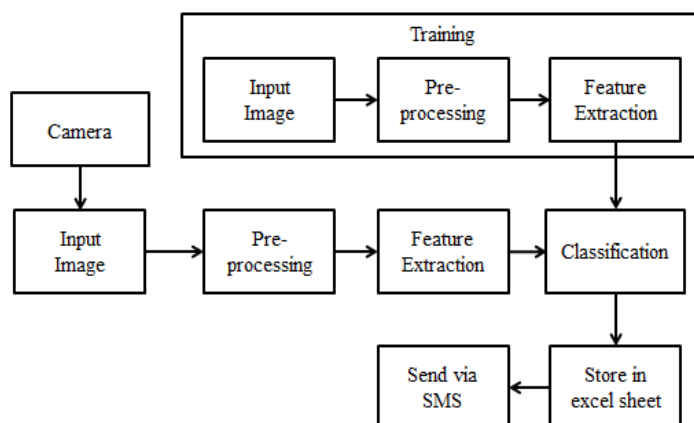
[7] Vishal Chudasama et al.: Because of the wider imaging point or greater physical distance toward the camera, practical frameworks, like those used in surveillance applications, catch low resolution facial images. Face recognition techniques, on either side, require a high-resolution facial image for viable feature extraction and analysis. Various efforts have been presented to determine the low resolution facial images in terms of meeting the need for a facial recognition framework considering the low goal face recorded. By expanding on our prior methodology, they proposed a simplified and computationally intensive Convolutional Neural Network to expand the spatial objects of a low resolution face photo to get a high resolution picture with an up-scaling element of up to 8x. The newly proposed method, termed E-ComSupResNet, is indeed an upgraded version of our starter approach ComSupResNet which includes numerous improvements. Despite prior work, the proposed design with revised high effectiveness in dividing low-recurrence and high-recurrence highlights, as well as a reconstructing module. With all of the Residual Block overview, a novel up-scaling network is given, to determine the element's layouts for such element of two, a Global Residual Learning as well as two recently modified unfortunate encounter abilities forcing comparisons in the new organizational engineering, they get improved SR pictures than our previous organization and competing condition of workmanship methods. In addition, the recently proposed design comprises approximately 1.5 million boundaries, compared to almost 57 million boundaries in previous studies. They also try to make the methodology more generalizable by learning the structure in a cross-data set environment and preparing it for the CASIA Web Face dataset while evaluating it on the CelebA and LFW datasets. They demonstrate the accuracy of their assessments with precise assessments. Researchers show an increase in high consistency remaking with the Structural Similarity Index Metric and Peak-Signal-to-Noise Ratio through precise analyses.

Problem Statement

Develop algorithms/systems for a dependable and accurate automatic attendance management system based on facial recognition that uses machine learning, which could be especially useful in the substantiation area.

Proposed System

Figure 1: Architecture of the Proposed System



While various biometric identification techniques (like iris scans or fingerprints) are more efficient, students usually wait in line for a lengthy time to enter their classroom. Face recognition was adopted as a non-intrusive and friendly technology since people are recognized mainly by their facial characteristics. This (facial) biometric system will include an enrollment process that stores a person's unique facial features in a database, along with identification and verification mechanisms. These compare a camera image's recognized face to previously saved faces acquired at the time of enrollment. The following is a block diagram of the proposed system: A photograph of your face is captured by the camera, which is then sent to Python for further processing.

Reducing low-frequency background noise, equalizing the intensity of particles images, removing reflections, and masking portions of pictures all are applications of image pre-processing. The method of enhancing data images before they can be analyzed by the computer is known as image pre-processing.

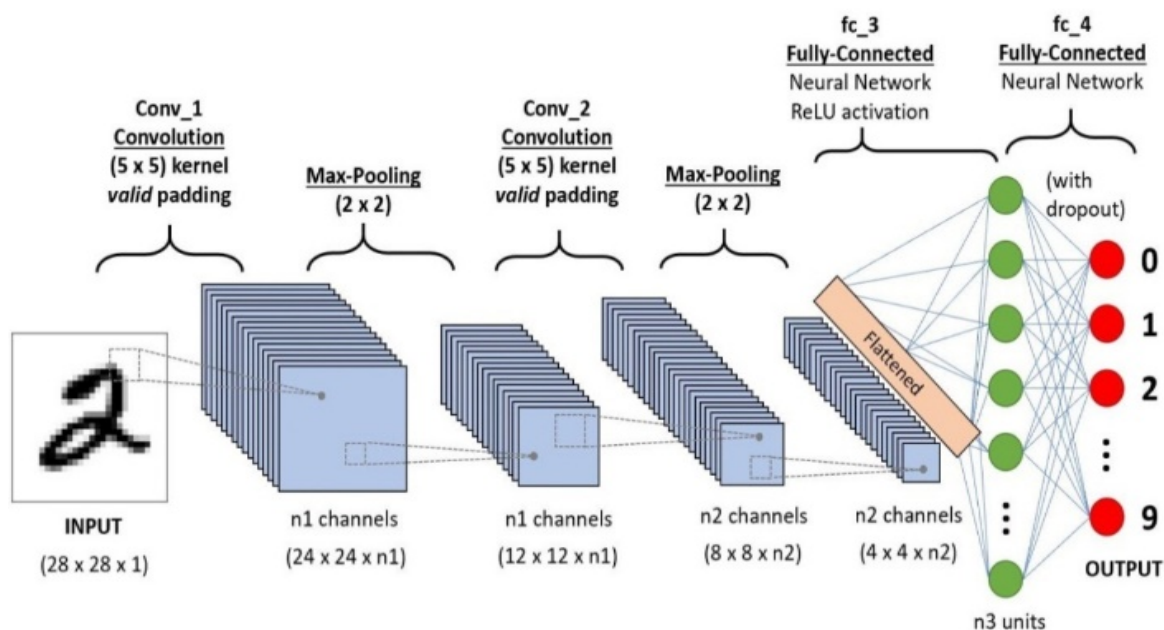
Feature Extraction is the method of lowering the number of resources required to explain huge volumes of data. Amongst the most difficult aspects of performing extensive data analysis is the number of variables involved.

The technique of obtaining information classes from two or more types of photos is known as image classification. The face is identified and recognized in this phase. A checkmark is placed next to a student's name when his or her face is recognized. Data is kept in an excel sheet at the end of the month, and student attendance is sent to parents through SMS.

CNN (Convolutional Neural Network)

Neural networks are a set of methods developed according to the human brain that recognize patterns. They comprehend sensory information by utilizing a device belief to classify or cluster original data. All real-world information should be converted into a format that they can comprehend, which is numerical and stored in vectors, whether they are images, sounds, text, or time series. Neural networks are a useful resource within the category and clustering of statistics. You can think of seeing them as a layer of grouping and classification on top of the statistics you keep track of. They assist in the classification of unmarked statistics based on the similarities between the examples, and they classify statistics when they have a classified dataset to learn on.

Figure 2: CNN Architecture

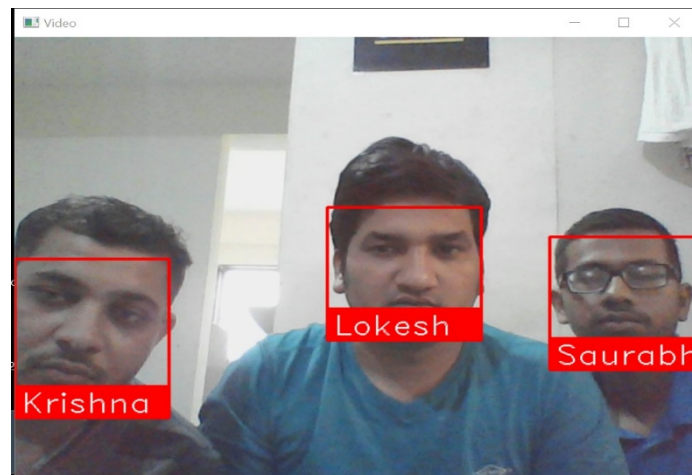


The Convolutional Neural Network is a Deep Learning mechanism that can take an image as an input and attach relevance to distinct aspects/gadgets within it, as well as differences between them. The level of pre-processing required by a Convolutional Neural Network is far less than that required by other types of learning algorithms. The simple technique includes hand-engineering of filters, but Convolutional Neural Network can analyze those filters/traits with adequate training. The Visual Cortex company promotes the structure of a Convolutional Neural Network, which is comparable to the connectivity samples of Neurons inside the Human Brain. The brain's neurons react better to stimuli in the Receptive Field, a narrow portion of the field of vision. Several such fields can be used to cover the complete visual perspective.

Results

As a result, we observed that the faces of several students have been detected and recognized. The attendance of the students has been marked as present/absent in the excel sheet directly, i.e out of four students taken as samples only three were present in front of the camera, therefore the attendance of those students are marked as present (P), and the remaining student's attendance, who was absent, is

marked as absent (A). So that the teacher can save the attendance sheet for grading and evaluation processes.



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Conclusion

It can be concluded that, in replacement of a manual and unreliable approach, a reliable, secured, efficient, and economical class attendance management system has been developed. This facial detection and identification system would save a lot of time for administration, minimize the amount of work required, and replace current stationery with existing electronic devices. The system may be set up without using specialized equipment because it only requires a computer/laptop and a camera. The camera's picture quality and real-time efficiency must be examined because it is so essential to the system's operation, specifically if a device is powered by a live camera feed. For network access, the technology can be utilized to benefit approval systems and access control authentication (limited services).

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