Automated Real Time Face Recognition Based Attendance System

1. Abstract

In this Project, we propose a system that takes the attendance of students for classroom lecture. Our system takes the attendance automatically using face recognition. However, it is difficult to estimate the attendance precisely using each result of face recognition independently because the face detection rate is not sufficiently high. In this project, we propose a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation. Continuous observation improves the performance for the estimation of the attendance We constructed the lecture attendance system based on face recognition, and applied the system to classroom lecture.

2. Keywords: - Face reception, Image detection, Tensor flow, Keras,Open CV,Python.

3. Introduction: - In traditional face-to-face class setting, student attendance record is one of the important issues dealt with any school, college and university from time to time. To keep the student attendance record valid and correct, the faculty staff should have a proper mechanism for verifying and maintaining or managing that attendance record on regular basis. In general, there are two types of student attendance system, i.e. Manual attendance system) and automated attendance system. By practicing manual recording, faculty staff may experience difficulty in both verifying and maintaining each student's record in classroom environment on regular basis, especially in classes attended by a large number of students. The automated attendance system may offer some benefits to the faculty, at least it may lessen the administrative burden of its staff

4. Methodology

The algorithm goes through the data and identifies patterns in the data. For instance, suppose we wish to identify whose face is present in a given image, there are multiple things we can look at as a pattern:

->Height/width of the face.

->Height and width may not be reliable since the image could be rescaled to a smaller face. However, even after rescaling, what remains unchanged are the ratios – the ratio of height of the face to the width of the face won't change.

->Color of the face.

->Width of other parts of the face like lips, nose, etc

Clearly, there is a pattern here – different faces have different dimensions like the ones above. Similar faces have similar dimensions. The challenging part is to convert a particular face into numbers – Machine Learning algorithms only understand numbers. This numerical

representation of a “face” (or an element in the training set) is termed as a feature vector. A feature vector comprises of various numbers in a specific order.

As a simple example, we can map a “face” into a feature vector which can comprise various features like:
Height of face (cm)
Width of face (cm)
Average color of face (R, G, B)
Width of lips (cm)
Height of nose (cm)

Essentially, given an image, we can map out various features and convert it into a feature vector

Opencv: - OpenCV is the most popular library for computer vision. Originally written in C/C++, it now provides bindings for Python. OpenCV uses machine learning algorithms to search for faces within a picture. Because faces are so complicated, there isn’t one simple test that will tell you if it found a face or not. Instead, there are thousands of small patterns and features that must be matched. The algorithms break the task of identifying the face into thousands of smaller, bite-sized tasks, each of which is easy to solve. These tasks are also called classifiers**.**

Tensor Flow: - TensorFlow is an open source library for fast numerical computing. It was created and is maintained by Google and released under the Apache 2.0 open source license. The API is nominally for the Python programming language, although there is access to the underlying C++ API. Unlike other numerical libraries intended for use in Deep Learning like Theano, TensorFlow was designed for use both in research and development and in production systems.

Keras: - Keras is an Open Source Neural Network library written in Python that runs on top of Theano or Tensorflow. It is designed to be modular, fast and easy to use. It was developed by François Chollet, a Google engineer. Keras doesn't handle low-level computation. Instead, it uses another library to do it, called the "Backend. So Keras is high-level API wrapper for the low-level API, capable of running on top of TensorFlow, CNTK, or Theano. Keras High-Level API handles the way we make models, defining layers, or set up multiple input-output models. In this level, Keras also compiles our model with loss and optimizer functions, training process with fit function. Keras doesn't handle Low-Level API such as making the computational graph, making tensors or other variables because it has been handled by the "backend" engine.

5. Related Work/History

This study describes the comparison of various existing system and provide some more idea for improving the existing system.

Author/Publisher	Title	Feature	Application	Disadvantages
[1] Venkata Kalyan Polamarasetty, Muralidhar Reddy Reddem, Dheeraj Ravi, Mahith Sai Madala4	Attendance System based on Face Recognition	Training data,image capture,face detection,face recognize,	Automatic attendances system based on face recognition, worker attendances, security, safety, police application	Capture one image at a time.
[2] Samuel Lukas, Aditya Rama Mitra, Ririn Ikana Desanti, Dion Krisnadi	Student Attendance System in Classroom Using Face Recognition Technique	For feature extraction discrete wavelet transform,discrete cosine transform,radial basis function network are used	For security, public places	Feature extraction and recoginition process is complex
[3] Yohei KAWAGUCHI Tetsuo SHOJI Weijane LIN Koh KAKUSHO Michihiko MINOH	Face Recognition-based Lecture Attendance System	Estimating students existence Estimating the seat of each student	Offices security, institutes	Continuous observation is required.
[4] K.Senthamil Selvi P.Chitrakala A.Antony Jenitha3	FACE RECOGNITION BASED ATTENDANCE MARKING SYSTEM	efficiency of face recognition algorithm can is increased with the help of fast face detection algorithm	Coaching institutes,security purposes,offices	Cost is high,complex algorithm

[5] Ms. Pooja Humbe, Ms. Shivani Kudale, Ms. Apurva Kamshetty	Automatic Attendance Using Face Recognition	Analog image processing Digital image processing	Institutes, for security	Should be maintained properly
[6] Anusaya Tantak, Archana Sudrik, Archana Kale, Rutuja Mehetre, Prof.Ms.S.S. Pophale	Face Recognition for E-Attendance for Student and Staff	Pre Processing, Feature Extraction, classification ,training set	In Educational institutes, offices	High maintenance and cost
[7] Mathana Gopala Krishnan, Balaji, Shyam Babu	Implementation of Automated Attendance System using Face Recognition..	Find a subspace by doing PCA on training data. Project the training faces onto the PCA subspace. Save the training information such as Eigen values,Eigenvectors , Average training face image, Projected face image	For security purpose,office	Complex algorithm,high requirement,high maitainence.

6. Results and Discussions

In order to reduce the faculty effort and to manage the time effectively the authors proposed automated attendance system base on face recognition in schools/colleges. The system takes attendance for particular amount of time and after the time expires the system automatically closes the attendance. The result of the experiment shows improved performance in the estimation of attendance compared to traditional pen and paper type attendance system.

7. Future Scope Challenges/Issues

The current developed software is installed on the system, i.e. it is a desktop application, and it will be used for some institute. But later it can be updated so that it will be operate as online application. Currently, the system has reached up to some great accuracy level for partial and dense images. It can further be improved to obtain higher accuracy level. It can be automatically updated by the use of the concept of Internet of Things.

8. Conclusions

In order to reduce the faculty effort and to manage the time effectively the authors proposed automated attendance system base on face recognition in schools/colleges. The system takes attendance for particular amount of time and after the time expires the system automatically closes the attendance. The result of the experiment shows improved performance in the estimation of attendance compared to traditional pen and paper type attendance system. The current work is mainly focussed on face detection and extraction

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