

CYBERNETIC ATTENDANCE MANAGEMENT SYSTEM

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Abstract: Automatic attendance maintenance systems is very needy in the real time environments Deep learning methods, especially convolutional neural networks have achieved significant success in the area of computer vision including the difficult face recognition problems. Training of deep models shows unique performance with large datasets, but they are not suitable for learning from few samples. This paper proposes a hardware and software based face recognition based attendance system using deep neural networks. The software is used to recognize the faces using deep learning approach with the help of MATLAB. We need to train the system based on the corresponding person faces, then if the person is recognized the corresponding signal goes to the serial port of the computer, we are connecting arduino with GSM in the serial port of the system .when the person recognized the GSM will activate the message so that he can enroll his attendance to corresponding mobile number, It can be done by the real time environments.

Keywords: Attendance system, face detection, MATLAB, face recognition, neural network.

I. INTRODUCTION

One of the first in rank memories that all of us have of school is the morning attendance, where the teachers would ceremoniously call out to our names, while we replied in affirmation to prove our attendance. A protract and tedious routine, in colleges, many peoples were manipulated the manual attendance system in a number of ways. Nonetheless, the digital revolution has introduced the student's attendance management system that is remodeling the habitual of attendance in schools.

From simple methods like entering in and out timings, the attendance system evolved to time clocks and time cards. For a while the time and time cards served well for the employees, as these were improved methods, better than the manual entering of attendance data. Ultimately, with the development of technology, came into bio metric methods of recording attendance of employees. This method proven highly efficient and accurate method of collecting attendance data.

Using an online attendance management system it is easy for parents to get automatic alerts of days that their students are not in class. This would be impossible in a manual attendance system but using the school management software, that stores all the communication data of the parents, it is easier than for parents updated on their child's daily school attendance. It helps the parents stay abreast of the number of classes missed by their child.

II. LITERATURE SURVEY

Speech recognition

Speech recognition works by using some algorithms via acoustic and language modeling. Among these acoustic represents the relation between linguistic units of speech and audio, language modeling matches the sounds with word sequence.

Steps for performing speech recognition technique,

- Preprocessing of speech signal
- Feature extraction
- Feature Post processing
- Normalization
- Classification

Radio frequency identification

To identify and track tags attached to objects, Radio frequency uses electromagnetic field. The tags contain electronically-stored information. Passive tags are used to collect energy from a nearby RFID reader's interrogating radio waves. Active tags had a local power source like battery and it may operate hundreds of meters from RFID reader. For automatic identification and data capture the RFID is used.

Finger print

By sensing an impression left the friction ridges of the human finger in its narrow sense the person is identified. Overall system performance is based on fingerprint image acquisition. There are varieties of finger print readers on the market.

Iris recognition

It is a cybernetic method of biometric identification uses mathematical pattern recognition techniques on the images irises of person, the complex random patterns are unique hence it can be applicable for particular distance.

Face recognition

Face recognition has been an emerging, challenging and interesting area in real time applications. For automatic recognize and verification a person from a digital image or video frame from video source. It is customarily used in security system. There is eclectic of methods used for face recognition which includes Principle Component Analysis (PCA), Linear Discriminant Analysis (LDA), Independent Component Analysis (ICA), Support Vector Machines (SVM), Artificial Neural Networks (ANN). By extracting landmarks, or features from an image of the subject face, Facial recognition algorithm is used.

- ***Principle Component Analysis***

PCA is a classical feature extraction and data representation technique used in pattern recognition. It is one of the most conquest techniques in face recognition. It is used to safeguard the important information of the pattern and used to remove redundant information. This describes the Eigen face approach. In this face recognition aims to decompose face images into small set of characteristic feature images called Eigen faces. Many existing face recognition researches use PCA.

- ***Linear Discriminant Analysis***

Linear Discriminant analysis is also called fisher face method. Classes of data had been differentiated in this model. LDA is a powerful face recognition technique that overcomes the limitation of Principle Component Analysis technique by applying the discriminant criterion. It is used to increase the ratio of the determinant of the between class scatter matrix to the determinant of with in class scatter matrix of the projected samples. Linear discriminant group the image of the same class and separates images of different classes of the images.

- ***Independent Component Analysis***

PCA does not support higher order dependencies, it depends on the second order statistics of image set. Independent Component Analysis is the generalization of PCA and it splits the higher order moments. This representation is higher order rank to PCA representation which is used for face recognition under different variations.

- ***Support Vector Machines***

It is a supervised machine learning algorithm which is used for classification or regression. Support vector Machine is a discriminant classifier formally defined by separating hyper plane.

- ***Artificial Neural Network***

Artificial Neural Network is computational algorithm. A neural network is machine learning algorithm based on the model of human neuron. It is an information processing technique. ANN includes large number of connected processing unit that work together to process information. Neural network is not only for data classification it is also apply for regression of continuous target attributes. A neural network contain three layers

Input layer- The activity of input units represents the raw information that can feed into the network.

Hidden layer-To determines the activity of each hidden unit. It is used to determine the activities of the input units and the weights on the connections between the input and the hidden units. There may be one or more hidden layers.

Output layer- The activity of the output unit depends upon the activity of hidden units and the weights between the hidden and output units.

- ***Deep learning algorithm***

It is types of neural networks and related algorithms includes very raw input data. That processes the data through many layers of nonlinear transformation of the input data in order to calculate the target output. This is one of the machine learning methods based on learning data representation. It is constructed by greedy layer-by-layer method.

There are a lot of benefits are there while comparing with other technologies that are why we choosing face technology as our main method in our project.

III. PROPOSED MODULE

The verification persons images are collected and stored in the database and the deep learning technique train the data base images and produce the result based on training ,when the person shows their face on the camera, it detects the face first then the convolutional neural network identify the person so the identified person serial number fed up to the serial port of the PC .In serial port we will be connecting the arduino with GSM, when it identified the person the attendance will provide to the corresponding person otherwise the corresponding SMS will go to the mobile number which we stored In the Arduino micro controller.

IV. BLOCK DIAGRAM



Fig1 Block Diagram of Proposed System

It consist of two modules

1, Software

2, Hardware

SOFTWARE MODULE

MATLAB

MATLAB stands for Matrix Laboratory. It can provide easy access to matrix software developed by the LINPACK (linear system package) and EISPACK (Eigen system package) projects. It is a high-performance language for technical computing. It integrates computation, visualization, and programming environment. It has many advantages compared to conventional computer languages for solving technical problems. Specific applications are collected in packages referred to as There are tool boxes for signal processing, symbolic computation, control theory, simulation, optimization, and several other fields of applied science and engineering.

HARDWARE MODULE

Arduino

It consists of both hardware programmable circuit board and piece of software, or IDE (Integrated Development Environment) that runs on computer. Twitter message and turn it into an output, activating a motor, turning an LED. The Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing are using in the arduino.



Fig 2 Arduino Board

GSM module

For sending message, a GSM Module named with RS232, power supply, buzzer and audio interface are used. This can be connected to PC by using a USB to Serial Adaptor. Terminal programs such as Real term are used to send & receive data. The interface between GSM Module and microcontroller can do directly with the help of wires.

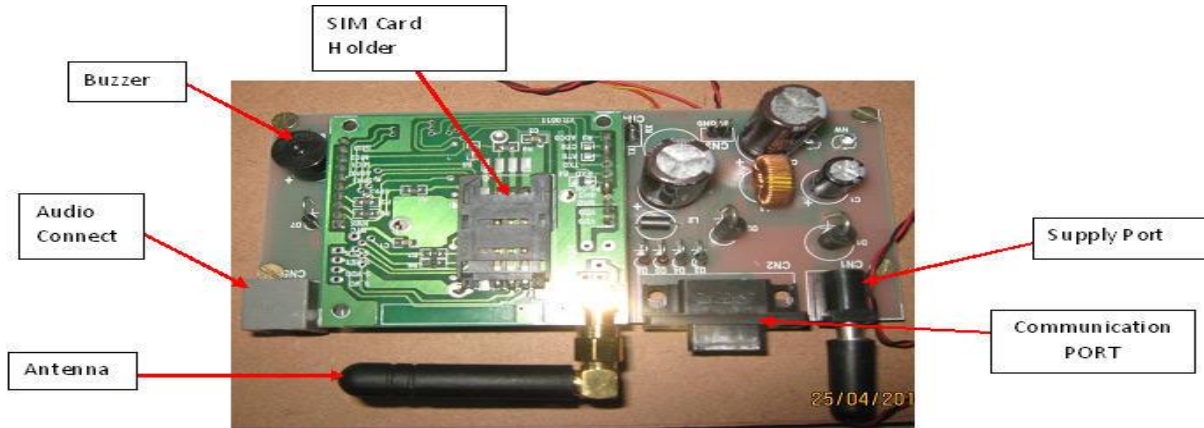


Fig 3 GSM module

V. METHODOLOGY

Convolutional Neural Network

Convolutional Neural Networks (CNN) is everywhere. It is the most popular deep learning architecture. The recent surge of interest in deep learning is due to the immense popularity and effectiveness of convnets. CNN has grown exponentially ever since. In just three years, researchers progressed from 8 layer AlexNet to 152 layers ResNet.

CNN is also computationally efficient. It uses unique convolution and pooling operations and performs parameter sharing. This activates CNN models to run on any device and making them universally attractive. All in all this sounds like pure magic. It is dealing with a very powerful and efficient model which performs automatic feature extraction to achieve superhuman accuracy.

Here an input image is given. It performs a series convolution & pooling operations, followed by a number of fully connected layers. If someone performing multiclass classification the output is softmax. Now they dive into each component.

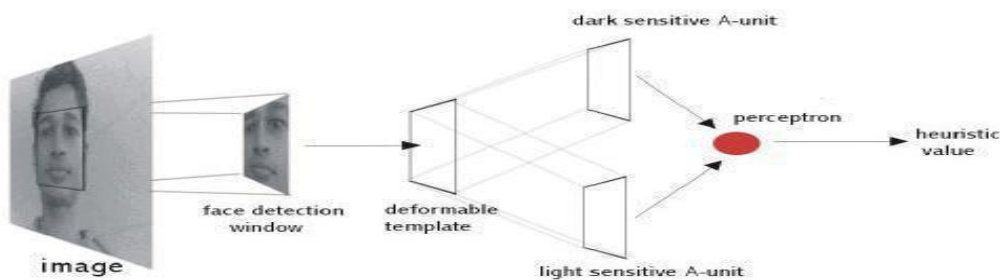


Fig 4 Implemented fully automated frontal view face detection model

Pose invariant face recognition

Extending the frontal view face recognition system to a pose-invariant recognition system is quite simple if one of the proposed specifications of the face recognition system is relaxed. Successful pose-invariant recognition will be possible if many images of a known individual are in the face database. Nine images from individual can be taken. Then if an image of the same individual is submitted within a 30° angle from the frontal view he or she can be identified.



Nine images in face database from a single known individual



Unknown image from same individual to be identified

Fig: 6.8 Pose invariant face recognition.

VI. CONCLUSION

The computational models, which were implemented in this project, the successful testing results confirm that the choices made by the researcher were reliable. The system with manual face detection and automatic face recognition did not have recognition accuracy over 90%, due to the limited number of Eigen faces that were used for the PCA transform. This system was tested under very robust conditions and it is envisaged that real-world performance will be far more accurate. The fully cybernetic frontal view face detection system displayed virtually perfect accuracy and in the researcher's opinion further work need not be conducted in this area.

The fully cybernetic face detection and recognition system was not robust enough to achieve high recognition accuracy. The only reason for this the face recognition subsystem may not display a slight degree of invariance to scale rotation or shift errors of the segmented face image. Implementing an eye detection technique would be a minor extension to the implemented system and would not require a great deal of research. The most suitable real-world applications of face detection and recognition systems are for mug shot matching and surveillance. There are better techniques such as iris or retina recognition and face recognition using the thermal spectrum for user access and user verification applications since these needs a very high degree of accuracy.

The implemented fully cybernetic face detection and recognition system (with an eye detection system) could be used for simple surveillance applications such as ATM user security, while the implemented manual face detection and automated recognition system is ideal of mug shot matching. Since controlled conditions are present when mug shots are gathered, the frontal view face recognition scheme should display recognition accuracy far better than the results, which were obtained in this study, which was conducted under adverse conditions.

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