

Student Information System Based On Face Biometrics with QR Code Using Machine Learning Techniques

Dr. J.Arun,¹ M.E., Ph.D, Head Of The Department, Santhosh Kumar.S,¹ Mohamed Yusuf.S,² Prasanth.A,³ Thamizharasan.S⁴
Dhanalakshmi Srinivasan Engineering College (Autonomous), Perambalur.

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ABSTRACT: Personal identification is considered an important aspect in recognizing the identity of a particular individual. A person's identity can be validated through the traditional or biometric methods. The application of biometric recognition in personal authentication enables the growth of this technology to be employed in various domains. The implementation of biometric recognition systems can be based on physical or behavioral characteristics, such as the Iris, Voice, Fingerprint, and Face. Currently, the attendance tracking system based on biometric recognition for education sectors is still underutilized, thus providing a good opportunity to carry out interesting research in this area. As evidenced in a typical classroom, educators tend to take the attendance of their students by using conventional methods such as by calling out names or signing off an attendance sheet. Yet, these types of methods are proved to be time consuming and tedious, and sometimes, fraud occurs. As a result, significant progress had been made to mark attendance automatically by making use of biometric recognition which uses the face biometric for authentication with Quick Response code. Student details are registered and stored in database as in the form of QR code for security purpose. At the time of attendance tracking, student scans the QR code and then verifies the student with unique Face biometrics. Face recognition can be done with the help of machine learning algorithm. It can be useful to avoid fake attendance and improve automated system in real time college environments and also extend the framework to view the mark details and also view the fees details. Experimental results shows that the real time interface with student details and will implement .NET framework as front and SQL Server as Back end.

Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention. Because of new computing technologies, machine learning today is not like machine learning of the past. It was born from pattern recognition and the theory that computers can learn without being programmed to perform specific tasks; researchers interested in artificial intelligence wanted to see if computers could learn from data. The iterative aspect of machine learning is important because as models are exposed to new data, they are able to independently adapt. They learn from previous computations to produce reliable, repeatable decisions and results. It's a science that's not new – but one that has gained fresh momentum. While artificial intelligence (AI) is the broad science of mimicking human abilities, machine learning is a specific subset of AI that trains a machine how to learn. Watch this video to better understand the relationship between

1.2 APPLICATIONS OF MACHINE LEARNING

Financial services

Banks and other businesses in the financial industry use machine learning technology for two key purposes: to identify important insights in data, and prevent fraud. The insights can identify investment opportunities, or help investors know when to trade. Data mining can also identify clients with high-risk profiles, or use cyber surveillance to pinpoint warning signs of fraud.

I. INTRODUCTION

1.1 MACHINE LEARNING

II. LITERATURE SURVEY

2.1 TITLE: "WEB BASED STUDENT INFORMATION MANAGEMENT SYSTEM"

AUTHOR: MS.MYNAVATHI.R ,
THANGAMANI.T

The design and implementation of a comprehensive student information system and user interface is to replace the current paper records. College Staff are able to directly access all aspects of a student's academic progress through a secure, online interface embedded in the college's website. The system utilizes user authentication, displaying only information necessary for an individual's duties. Additionally, each sub-system has authentication allowing authorized users to create or update information in that subsystem. All data is thoroughly reviewed and validated on the server before actual record alteration occurs. In addition to a staff user interface, the system plans for student user interface, allowing users to access information and submit requests online thus reducing processing time. All data is stored securely on SQL servers managed by the college administrator and ensures highest possible level of security. The system features a complex logging system to track all users' access and ensure conformity to data access guidelines and is expected to increase the efficiency of the college's record management thereby decreasing the work hours needed to access and deliver student records to users. Previously, the college relied heavily on paper records for this initiative. While paper records are a traditional way of managing student data there are several drawbacks to this method. First, to convey information to the students it should be displayed on the notice board and the student has to visit the notice board to check that information. It takes a very long time to convey the information to the student. Paper records are difficult to manage and track. The physical exertion required to retrieve, alter, and re-file the paper records are all non-value added activities.

DISADVANTAGES

- Less security to maintain all details

2.2 TITLE: "A Student Information Management System Based on Fingerprint Identification and Data Security Transmission"

AUTHOR: Pengtao Yang,

At present, there are a large number of college students, so the identification and verification of student identity information occur at all times in the campus, as well as the corresponding services given by the students' identification. Therefore, safe and efficient student

information management, convenient identification to obtain the required service, and safe and reliable information transmission have become an important task for the student information management. The system is mainly composed of two parts: terminal and host computer. The terminal is composed of fingerprint identification module and micro controller. The host computer can use personal computers or large servers according to the number of users, and the management of student information database uses SQL Server. A new type of student information management system is designed to implement student information identification and management based on fingerprint identification. In order to ensure the security of data transmission, this paper proposes a data encryption method based on an improved AES algorithm. A new S-box is cleverly designed, which can significantly reduce the encryption time by improving ByteSub, ShiftRow, and MixColumn in the round transformation of the traditional AES algorithm with the process of look-up table. Experimental results show that the proposed algorithm can significantly improve the encryption time compared with the traditional AES algorithm. In order to achieve the campus student consumption, identity registration, and other functions, the student information identification management system based on fingerprint identification and data security transmission needs to transmit student fingerprint information, identity information, and bank card information among the terminal.

DISADVANTAGES

- Need sensors to capture fingerprint, so cost is high

III. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

The term multi-view face recognition, in a strict sense, only refers to situations where multiple cameras acquire the subject (or scene) simultaneously and an algorithm collaboratively utilizes the acquired images/videos. But the term has frequently been used to recognize faces across pose variations. This ambiguity does not cause any problem for recognition with (still) images; a group of images simultaneously taken with multiple cameras and those taken with a single camera but at different view angles are equivalent as far as pose variations are concerned. However, in the case of video data, the two cases diverge. While a multi-camera system guarantees the acquisition of multi-view data at any moment, the chance of obtaining the equivalent data by using a single camera is unpredictable. Nonetheless, most existing multi-

view video face recognition algorithms exploit single-view videos. Given a pair of face images to verify, they look up in the collection to “align” the face part’s appearance in one image to the same pose and illumination of the other image. This method will also require the poses and illumination conditions to be estimated for both face images. This “generic reference set” idea has also been used to develop the holistic matching algorithm, where the ranking of look-up results forms the basis of matching measure. Student attendance system is needed to measure student participation in a classroom. In many institutions and organization the attendance is important. The previous approach in which manually taking attendance and maintain its records was very inconvenient task. Another Approach is Biometric device, using biometric device like fingerprint scanner

3.1.1 DISADVANTAGES

- Manual approach can be implemented
- Security is less
- Time complexity is high
- Difficult to maintain all records

3.2 PROPOSED SYSTEM

Nowadays Attendance is considered as an important factor for both the student as well as the teacher of an educational organization. With the advancement of the machine learning technology the machine automatically detects the attendance performance of the students and maintains a record of those collected data. In the video scenes, human faces can have unlimited orientations and positions, so its detection is of a variety of challenges to researchers. The proposed feature is developed using the spherical harmonic representation of the face, texture mapped onto a sphere. The texture map for the whole face is constructed by back-projecting the image intensity values from each of the views onto the surface of the spherical model. A promising approach to handle pose variations and its inherent challenges is the use of multi-view data. In video based face recognition, great success has been made by representing videos as linear subspaces, which typically lie in a special type of non-Euclidean space known as HAAR cascade algorithm manifold. From the perspective of manifold learning, our method can be regarded as performing a geometry-aware dimensionality reduction from the original HAAR cascade algorithm manifold to a lower-dimensional, more discriminative manifold where more favorable classification can be achieved. And also provide neural network algorithm to classify faces with

improved accuracy in attendance system. Finally provide SMS and Email based alert system with real time implementation. The task of the proposed system is to capture the QR code with face of each student and to store it in the database for their attendance. Finally student the view fees details and generate the overall report about the student details.

3.2.1 ADVANTAGES

- Automated computerized system
- Provide biometric based security system
- Computational complexity is less
- Easy to maintain the student details

IV. SYSTEM IMPLEMENTATION

1. FRAMEWORK CONSTRUCTION:

Personal identification has seen a number of advances in the last two decades. The term biometrics is used to encompass all methods which identify an individual based on physical attributes that can be both perceived and measured based on actions. Traditional biometric methods such as fingerprints and handwriting signatures have been shown as not reliable when operated on large data sets. In this module, admin and student interfaces are created. Admin can be store all details about students for future verification

2. QR CODE GENERATION:

A QR code (abbreviated from Quick Response code) is a type of matrix barcode (or two-dimensional barcode). QR codes often contain data for a locator, identifier, or tracker that points to a website or application. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary) to store data efficiently; extensions may also be used. In this module, student register their details such name, mobile number, mail id, class information and so on. These details are stored as QR code for security purpose

3. FACIAL FEATURES EXTRACTION:

Student faces are captured as real time for registration and also enable the camera to subtract the face pixels from background. In this module, implement preprocessing steps to identify the foreground pixels. Subtract foreground pixels from whole image. Implement HAAR cascade algorithm to extract facial features such as face skin tone, eye and other features. These features are constructed as feature vectors

4. LABEL THE DETAILS:

In this module feature vectors are created for individual students. A feature vector is a vector containing multiple elements about an

object. Putting feature vectors for objects together can make up a feature space. The features may represent, as a whole, one mere pixel or an entire image. The granularity depends on what someone is trying to learn or represent about the object of student

5. CLASSIFICATION

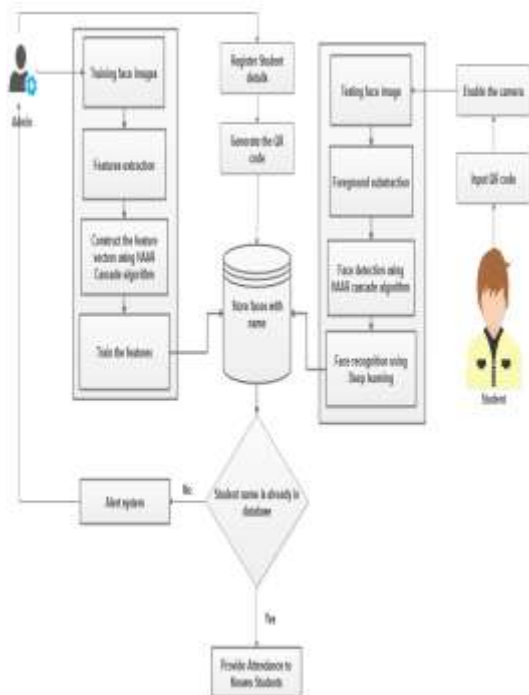
Deep learning is one of the most novel ways to improve face recognition technology. The idea is to extract face embedding's from images with faces. Such facial embedding's will be unique for different faces. And training of a deep neural network is the most optimal way to perform this task. In this module, implement deep learning algorithm to classify the feature vectors. It includes neural network to classify the multiple features simultaneously. Convolutional Neural Networks allow us to extract a wide range of features from images. Classify the student at the time of attendance and also authorized students view the fees information

6. ALERT SYSTEM

In this module, we can identify the known person. Based on known person, provide attendance to students. And also provide alert about unknown faces. Finally overall report about attendance details

V. SYSTEMDESIGN

5.1 SYSTEM ARCHITECTURE



VI. SOFTWARE DESCRIPTION

FRONT END: .NET FRAMEWORK

The .NET Framework (pronounced dot net) is a software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large library and provides language interoperability (each language can use code written in other languages) across several programming languages. Programs written for the .NET Framework execute in a software environment (as contrasted to hardware environment), known as the Common Language Runtime (CLR), an application virtual machine that provides services such as security, memory management, and exception handling. The class library and the CLR together constitute the .NET Framework. The .NET Framework's Base Class Library provides user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network communications. Programmers produce software by combining their own source code with the .NET Framework and other libraries. The .NET Framework is intended to be used by most new applications created for the Windows platform. Microsoft also produces an integrated development environment largely for .NET software called Visual Studio

Design Features

Interoperability

Because computer systems commonly require interaction between newer and older applications, the .NET Framework provides means to access functionality implemented in newer and older programs that execute outside the .NET environment. Access to COM components is provided in the System.Runtime.InteropServices namespaces of the framework; access to other functionality is achieved using the P/Invoke feature.

Common Language Runtime engine

The Common Language Runtime (CLR) serves as the execution engine of the .NET Framework. All .NET programs execute under the supervision of the CLR, guaranteeing certain properties and behaviors in the areas of memory management, security, and exception handling.

Language independence

The .NET Framework introduces a Common Type System, or CTS. The CTS specification defines all possible data types and programming constructs supported by the CLR and how they may or may not interact with each other

conforming to the Common Language Infrastructure (CLI) specification. Because of this feature, the .NET Framework supports the exchange of types and object instances between libraries and applications written using any conforming .NET language.

Base Class Library

The Base Class Library (BCL), part of the Framework Class Library (FCL), is a library of functionality available to all languages using the .NET Framework. The BCL provides classes that encapsulate a number of common functions, including file reading and writing, graphic rendering, database interaction, XML document manipulation, and so on. It consists of classes, interfaces of reusable types that integrate with CLR (Common Language Runtime).

Simplified deployment

The .NET Framework includes design features and tools which help manage the installation of computer software to ensure it does not interfere with previously installed software, and it conforms to security requirements.

Security

The design addresses some of the vulnerabilities, such as buffer overflows, which have been exploited by malicious software. Additionally, .NET provides a common security model for all applications.

VII. SYSTEM TESTING

Software testing is a method of assessing the functionality of a software program. There are many different types of software testing but the two main categories are dynamic testing and static testing. Dynamic testing is an assessment that is conducted while the program is executed; static testing, on the other hand, is an examination of the program's code and associated documentation. Dynamic and static methods are often used together. Testing is a set activity that can be planned and conducted systematically. Testing begins at the module level and work towards the integration of entire computers based system. Nothing is complete without testing, as it is vital success of the system.

Testing Objectives:

There are several rules that can serve as testing objectives, they are

1. Testing is a process of executing a program with the intent of finding an error
2. A good test case is one that has high probability of finding an undiscovered error.

3. A successful test is one that uncovers an undiscovered error.

If testing is conducted successfully according to the objectives as stated above, it would uncover errors in the software. Also testing demonstrates that software functions appear to be working according to the specification, that performance requirements appear to have been met.

There are three ways to test a program

1. For Correctness
2. For Implementation efficiency
3. For Computational Complexity.

Tests for correctness are supposed to verify that a program does exactly what it was designed to do. This is much more difficult than it may at first appear, especially for large programs.

Tests used for implementation efficiency attempt to find ways to make a correct program faster or use less storage. It is a code-refining process, which reexamines the implementation phase of algorithm development. Tests for computational complexity amount to an experimental analysis of the complexity of an algorithm or an experimental comparison of two or more algorithms, which solve the same problem. The data is entered in all forms separately and whenever an error occurred, it is corrected immediately. A quality team deputed by the management verified all the necessary documents and tested the Software while entering the data at all levels. The development process involves various types of testing. Each test type addresses a specific testing requirement. The most common types of testing involved in the development process are:

- Unit Test.
- Functional Test
- Integration Test

VIII. CONCLUSION AND FUTURE ENHANCEMENT

8.1 CONCLUSION

In this project, we reviewed face recognition technique for still images and video sequences. Most of these existing approaches need well-aligned face images and only perform either still image face recognition or video-to video match. They are not suitable for face recognition under surveillance scenarios because of the following reasons: limitation in the number (around ten) of face images extracted from each video due to the large variation in pose and lighting change; no guarantee of the face image alignment resulted from the poor video quality, constraints in the resource for calculation influenced by the real time processing. So we can propose a local facial

feature-based framework for still image and video-based face recognition under surveillance conditions. This framework is generic to be capable of video to face matching in real-time. While the training process uses static images, the recognition task is performed over video sequences. Our results show that higher recognition rates are obtained when we use video sequences rather than statics based on HAAR cascade algorithm and Convolutional Neural network algorithm. And also provide QR code based authentication system with fees information system. Evaluation of this approach is done for still image and video based face recognition on real time image datasets with SMS alert system

8.2 FUTURE ENHANCEMENTS

In future work, we can extend the framework to implement various algorithms to provide still to video face matching with improved accuracy rate. Videos provide an automatic and efficient way for feature extraction to reduce the features based on dimensionality reduction.

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