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Automated Class Student Counting Through Image Processing

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Abstract

Teachers used to keep student records manually by calling names or distributing an attendance sheet around the classroom. These procedures take time, are prone to errors, and require proxy attendance. Furthermore, digital record assimilation is time-consuming since teachers must manually put in the entries in the database to generate reports. It's also important to keep manual and digital records consistent. Standard biometrics such as fingerprint and iris recognition have been used in automated systems in recent years. These systems are obtrusive by nature and necessitate high-tech equipment. Our proposed solution eliminates redundancy in human records and makes maintaining attendance a simple chore.

Keywords: Attendance, Pedagogy, Image processing.

1 | Introduction

The Automated attendance tracking with image processing is a new technique that is already being utilised in factories to track employee attendance. The system used in these factories, however, is costly. This project proposes a prototype for keeping track of student attendance in Coaching Classes. In comparison to existing systems in similar classes, such as RFID tags and readers, it offers a cost-effective alternative. Anisotropic diffusion, Hidden Markov models, Image editing, Image restoration, independent component analysis, and Linear filtering are some of the image processing techniques that are now in use. We can utilise our product as an independent component application in the classroom to identify pupils separately. The image processing technology uses MATLAB software to reconstruct the image; this software is used for synthesis.

Pixelation can be a difficulty in the world of real-time 3D computer graphics. Bitmaps are used as textures on polygons in this scene. Simple closest neighbour texture filtering would simply zoom in on the bitmap when the camera approached a textured polygon, resulting in severe pixelation. At high zoom levels, the most common solution is pixel interpolation, which smoothly blends or interpolates the colour of one pixel into the colour of the next adjacent pixel. This results in a more

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natural-looking image, but it's also a lot blurrier. There are several methods for doing this; see texture filtering for more information. Maintaining attendance is highly crucial and required in all institutes for evaluating student performance. In this sense, each institute has its unique technique. Some people take attendance manually using outdated paper or file-based systems, while others use biometric technology to take attendance automatically. Many automatic approaches, such as biometric attendance, are available for this purpose. All these systems waste time since students must form a line to place their thumb on the scanning gadget. Attendance systems are used by businesses of all kinds to track when students or employees start and stop working, as well as the department where the work is done. When it comes to schools and universities, an attendance monitoring system can be quite beneficial to both parents and professors. If the institution uses an attendance monitoring system, parents are always informed about their children's reliability in class.

In credit card transactions, fraud is defined as the unlawful and unwelcome use of an account by someone other than the account owner. To stop this misuse, necessary preventative steps should be adopted, and the behaviour of such fraudulent operations can be studied to reduce it and guard against its similar occurrences in the future. People have been concerned with credit card fraud detection models based on data mining in recent years. Classic data mining algorithms aren't directly applicable to our topic because it's handled as a classification challenge. As a result, a different technique is employed, which involves the employment of general-purpose meta heuristics like genetic algorithms. The enhancement of science and technology leads to make the life more comfortable than older days. The emerging technologies like software engineering [1] and [2], energy management [3], [4] and [5], wireless sensor network [6]-[13], face recognition [14], neural network [14], routing [15] and [16], cloud computing [17], distributive environment [18], mixed environment [19], bellman algorithm [20], programming language [21], neutrosophic shortest path [22], [23] and [24], optimal path [25], multi-objective optimal path [26], transportation problem [27], [28] and [29], uncertainty problem [30]-[35], fuzzy shortest path [36] and [37], answer note [38], making the products more intelligent and self-healing based. The smart city [39] and [40] applications like smart water [40] and [41], smart agriculture [42] smart grid [42] and [43], smart parking [44], smart resource management, etc. are based on IoT [44] and [45] and IoE technologies. The purpose of this study is to create a credit card fraud detection system based on genetic algorithms. Genetic algorithms are a form of evolutionary algorithm that tries to continuously improve solutions. When a card is duplicated, stolen, or lost by fraudsters, it is usually utilized until the available limit is exhausted. As a result, rather than focusing on the quantity of correctly classified transactions, a strategy that reduces the overall allowed limit on fraud-prone cards takes precedence. Its goal is to reduce false alerts by utilizing a genetic algorithm to optimize a set of interval-valued parameters.

2 | Literature Review

Authors have provided a basic understanding of how facial detection and identification algorithms work. The most efficient and reliable face identification and face recognition algorithms are Viola Jones and PCA (Principal Component Analysis). PCA does not work directly on the images; instead, it works on the matrices that are formed from them. It compresses the original image face database into a smaller one. Because this database has fewer dimensions, it takes less time to compute matrices. The extraction of the typical feature or dominating feature images known as Eigenfaces allows for this reduction. Face detection is achievable because to the Viola Jones technique, which employs the divergence between the pixels of rectangular boxes rather than the pixel intensity. The Haar object classifier, which can be found in the Haarcascade.xml file, is used. Image processing is a field that is constantly changing. Image morphology, neural networks, full-color image processing, image data compression, image recognition, and knowledge-based image analysis systems have all seen a considerable surge in interest over the last five years. The improvement of visual information for human interpretation and the processing of scene data for autonomous machine perception are two major application areas for image processing systems. For our human beings to perceive, images are superior to any other sort of information. Human vision allows us to perceive and comprehend the world around us. The goal of image understanding, picture analysis, and

computer vision is to electronically replicate the effect of human vision. Essentially, image enhancement refers to the improvement of an image's attractiveness.

The term "image restoration" refers to the process of returning a picture to its original state after it has been subjected to various procedures. Image compression is the process of reducing the size of an image's data.

3 | Proposed Model

The suggested system's scope is confined to a user-friendly institutional level application with role-based access that exists in a three-layered hierarchical structure. Admin level - The admin has access to all student records in the database, including read, write, manipulation, and delete permissions. The establishment of a professor's profile is solely the responsibility of the administrator. Faculty/Staff level: The Teacher has the same access for the students' database as the Faculty/Staff level, but he or she cannot create any new profiles. At the student level, the system will generate a monthly attendance record for them, which will be given to them through email. If they are on the defaulters list, their parents will be notified. When you run the application, you'll see a pop-up box asking for your login credentials. We must choose if the user is an administrator or a professor. Admin, unlike a faculty user, can form a new faculty. The login and password should be entered in the appropriate places. The right username and password must be given for authentication when logging in as an administrator. The login form is validated by the system. A query is also run to ensure that the username and password are entered by the proper user.

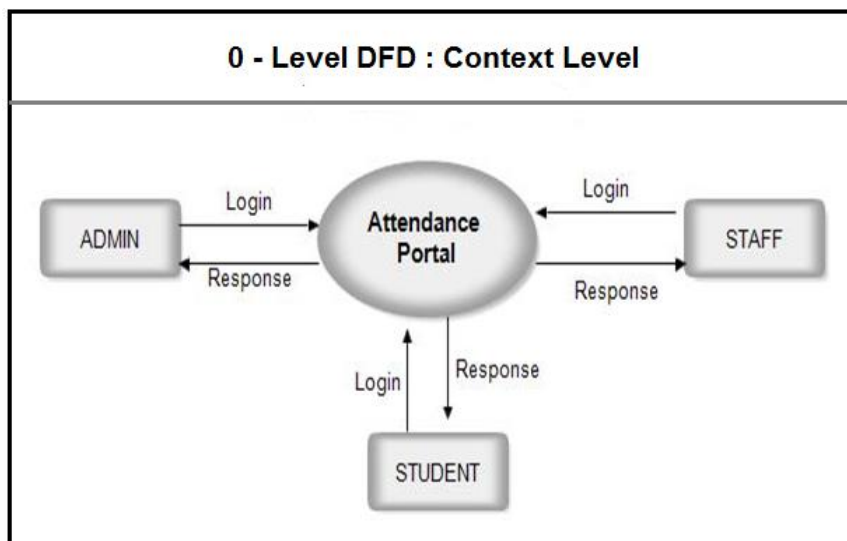


Fig. 1. Level DFD for proposed model.

The admin has been verified. New faculty users can be created by the administrator. As a result, a popup appears after verification, as illustrated. Three options are displayed in the menu bar. They are Add Faculty, which is used to create a new user, and Remove Faculty, which is used to remove an existing user. Access faculty is used to view the database table that contains all the users' usernames and passwords. The logout command is used to log out of the system. Only the administrator has access to these three privileges. By pressing the "Add Faculty" option on the menu bar, the admin can establish a new faculty user. A popup box displays, asking for the newly established user's Username and Password. In the pop-up box, the username and password are input. By clicking the "Save" button after filling out the appropriate fields, the data is securely checked and stored in the database. A message box appears after saving the login and password into the database, indicating that the transaction was successful. The admin uses the Access Faculty option on the menu bar to view the Table that contains all the users' usernames and passwords. Only the Admin has access to this feature. This database table will be inaccessible to any other user. A new window pops up, displaying the database table.

Faculty is the user type that will be logging in. The user must select the appropriate user type from the drop-down menu; otherwise, even if the username and password are correct, the user will not be authorised. After the new user has been validated and authenticated. On the screen, the "Face Detection and Recognition" form displays. To open the camera programme, the user must first click the "Detect and recognise" button.

If the student is not already enrolled in the system, the system can be trained to enrol him or her. In front of the camera, the pupil must sit. The system will extract their facial image, and the user will need to fill in the required information in the form. The "Add face" button has been pressed. It saves all the student information in a database. If the student is currently enrolled in a course. The system will then detect and extract a new image of the student after selecting the "Detect and recognise" button. The algorithm and image database used during enrolment will be used to recognise the user.

4 | Results



Fig. 2. Result through proposed system.

The project started with the aim of creating a web application utilising Bootstrap framework, but owing to the use of CSS, the application required a lengthy time to load, defeating the objective of easy attendance management. It was also time-consuming to post the image to the internet. As a result, a desktop application was chosen. Initially, static images were used, but due to the importance of facial dynamics in the face recognition process, a switch to dynamic live image capture was made. Facial dynamics are even more important under degraded viewing conditions such as poor illumination, low resolution, and recognition at a distance.

5 | Conclusion

The goal of our proposed project, "An Automated Attendance System," is to reduce the number of errors that occur in the existing (manual) attendance system. The goal is to automate and create a system that will benefit an organisation like an institute. Because the camera is so important to the system's operation, the image quality and performance of the camera in a real-time environment must be thoroughly verified before installation. This method is secure, dependable, and readily available. Installing the system in the classroom does not require any specialised hardware. It can be made with a camera and a computer.

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