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Automated School Bus Attendance System

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Abstract: ***In our education world, the most common way to mark the attendance is to sign or by call the student. This traditional way of marking attendance takes longer period of time and is also problematic in several ways this include proxy attendance. To eradicate this problem in this technological world we introduce "Face Detection Attendance System". In this biometric system, Attendance will be taken by using faces of student. This system is faster than our traditional way and also reduces the possibilities for proxy attendance.it is also tasted under various conditions like illumination, head movement, the variation of distance between the student and camera. This system will be installed in the school buses which will then keep the track of every student. While detecting the face of student, System compares the image of the test and the training image. Attendance data is stored in an excel sheet. Attendance data is stored with time date and day for future reference.***
Keywords: School bus, Attendance system, Face detection.

I. INTRODUCTION

In administration field, attendance is very necessary part. The traditional approach of making approach of making roll calls proves itself to be a statue of limitations as it is very difficult to call names and maintain its record especially when the ratio of student is high. However, these requirements are labor-intensive, error-prone and prone to frauds. Some organizations have implemented this digital method such as biometric fingerprinting technique and card swapping technique.

In this paper we will be using face recognition as a system for marking attendance of the student who are present in class. System consists of several steps that are face detection and face recognition. First, we need to database each student face in order to mark their attendance. Then camera device is used to take picture of the classroom in such a way that all faces are captured. This picture then is serves as input for the system. The image is boost by means of a few images processing technique like conversion of an image to greyscale and to perform histogram equalization. We have several face detection algorithms like deep Neural network, support vector machines etc.

Face recognition [6] is done using K-nearest neighbor algorithm, CNN, and SVM algorithm. The system generates the name and identification number of the student who are present and identified in the image, then attendance is marked on front of student name in excel format with respective data (day, date). It also requires few hardware resource hence it is cost-friendly system.

II. LITERATURE SURVEY

The research carried out by the following persons and their published documents has motivate us for our work in field of biometric Smart system. In [14] author had used machine learning and training system of face classifier based on SVM. SVM is one of the legacy classifiers that are still used on datasets. SVM is one of the supervised machine learning algorithms which can be used for both classification problems, SVM algorithm classifies the data points according to the plane.

For face detection, we should use algorithm such as LBPH, Eigen Face, Fisher faces, Principal component analysis (PCA), support vector machine (SVM), Neural network.

Table 1: Comparison of various algorithm for face recognition.

Method	Success Rate
Principal Component Analysis (PCA).	79.65%
PCA + Relevant Component Analysis.	92.34%
Support vector machines	85 – 92.1%
Neural Network	93.7%
Eigen Faces Method	92 – 100%
LBPH Method	98.5%

According to Author [13] LBPH face recognin method has highest rate of success which is of 98.5%. followed by Neural network having 93.7% success rate. LBPH method have advantage over Eigen Face because of ideal lighting circumstance. Next, PCA and relevant component analysis combined has 92.34% of success rate. Whereas, Support vector machines and Eigen face method are having avg 87% and 96% success rate respectively. And the lowest success rate of face detection method is Principal component Analysis having only 79.65%.

In [5] the Author uses Eigen face algorithm for face recognition. In this method face detection, face is cropped and is worked on background subtraction for greyscale images and binary images.

In Convolutional Neural Network (CNN) [3], for face detection author have used the viola and jones algorithm and then used correlation tracker to track face from frame to frame. Author have worked on several parameters like pose estimation, sharpness, resolution and brightness.

III. METHODOLOGY/EXPERIMENTAL

A. Histogram of Oriented gradients

HOG features is short for histogram of oriented gradients. The gradient in an image is mainly lie in boundary region of the local object, the histogram of oriented gradient stands for the edge direction density of detection targets in the image.

The calculation of histogram of oriented gradient the features descriptor can be achieved by the following steps:

1) Pre-Processing.

The hog features descriptor is used on the [320 x 240 pixels] images of the databases. Typically, the image can be of any size. The only constraint is that the sub images should have a fixed aspect ratio even though patches of different sizes are analyzed at different image location.

2) Calculation of image gradient.

After pre-processing the image, the horizontal and the vertical gradients are calculated then the result comes in a form of histogram of gradients.

3) Calculate Histogram of Gradient in 8x8 cells

The image is divided into 8x8 cells. Each cell is accompanied with a histogram of gradients. At each pixel there exist 2 values magnitude and direction. Which gives a total of 128 values for each cell.

4) Calculation of HOG Features vector

The calculation of the feature vector is performed by concatenating the smaller patch vectors to build an overall vector.

Face recognition is a series of steps

a) Find all the faces in a picture.

b) Focus on each face and understand that it is still same face even if it is face in weird direction or in bad lighting.

c) Able to pick out unique features in face.

d) Compare the unique features of the face to all the people.

Face detection went mainstream in the early 2000's when Paul viola and Michael jones invented a way to detect faces that was fast. In this paper we are going to use Histogram of oriented gradients (HOG).

To start our face detection, we will start with making our image black and white. We'll look at every single pixel in our image one at a time.

For every single pixel we are going to look at the pixel which are directly to the surrounding. We wanted to draw an arrow in a direction the image getting darker. If we repeat this process for every single pixel in the image, then pixel will get replaced with arrow all over the image. These arrows are called *gradient*s.

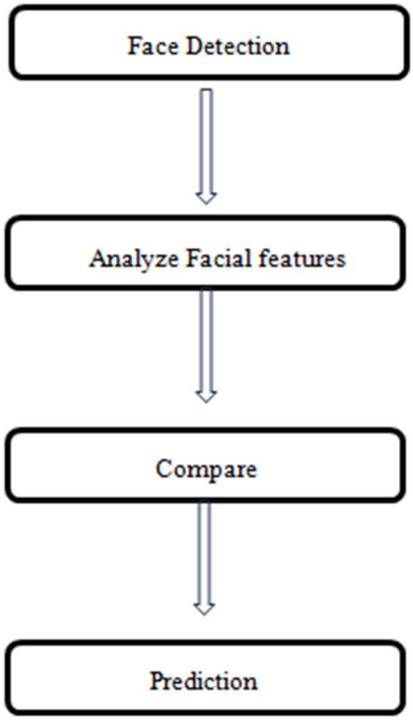


Fig 2: Working of Pipeline in face recognition.

In this HOG image, we have to find the part that look similar image to a known HOG image. That was extracted from bunch of other training image.

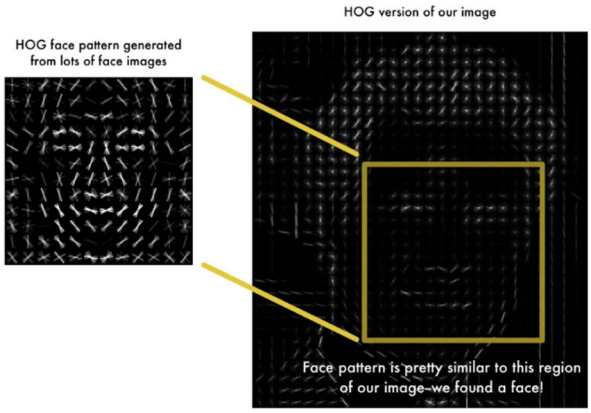


Fig 3: HOG representation of the original image.

Now, we are going to train a Deep Convolutional Neural Network. But instead of training the network to recognize object, we are going to train it to generate 128 measurements for each face. 128 measurements of each face is called as embedded in machine learning.

Finding the person in our database of known people who has the closest measurement of our test image this is the last process of our work. We have use basic machine learning

classification algorithm. Here we have use linear SVM classifier. This classifier takes measurement from our new test image and tells which know person is the closest match. this classifier compares this measurement of test image with image from our database and match with the image which are having similar measurement.

Algorithm: Algorithm shows the step-by-step functioning of a system. In this method, we have followed the below algorithm
Input: images of the classroom.
Output: Updating the attendance in excel sheet.
1: start.
2: Create face database.
3: Take the images captured by the camera as input.
4: image enhancement.

- Conversion of RGB to greyscale image.
- Generation of histogram for the grayscale image.
- Equalizing the image.
- Create histogram of the equalized image.

5: Face detection.
6: Face Recognition.
Use the hog method.
7: Mark the attendance of present student in Excel sheet.

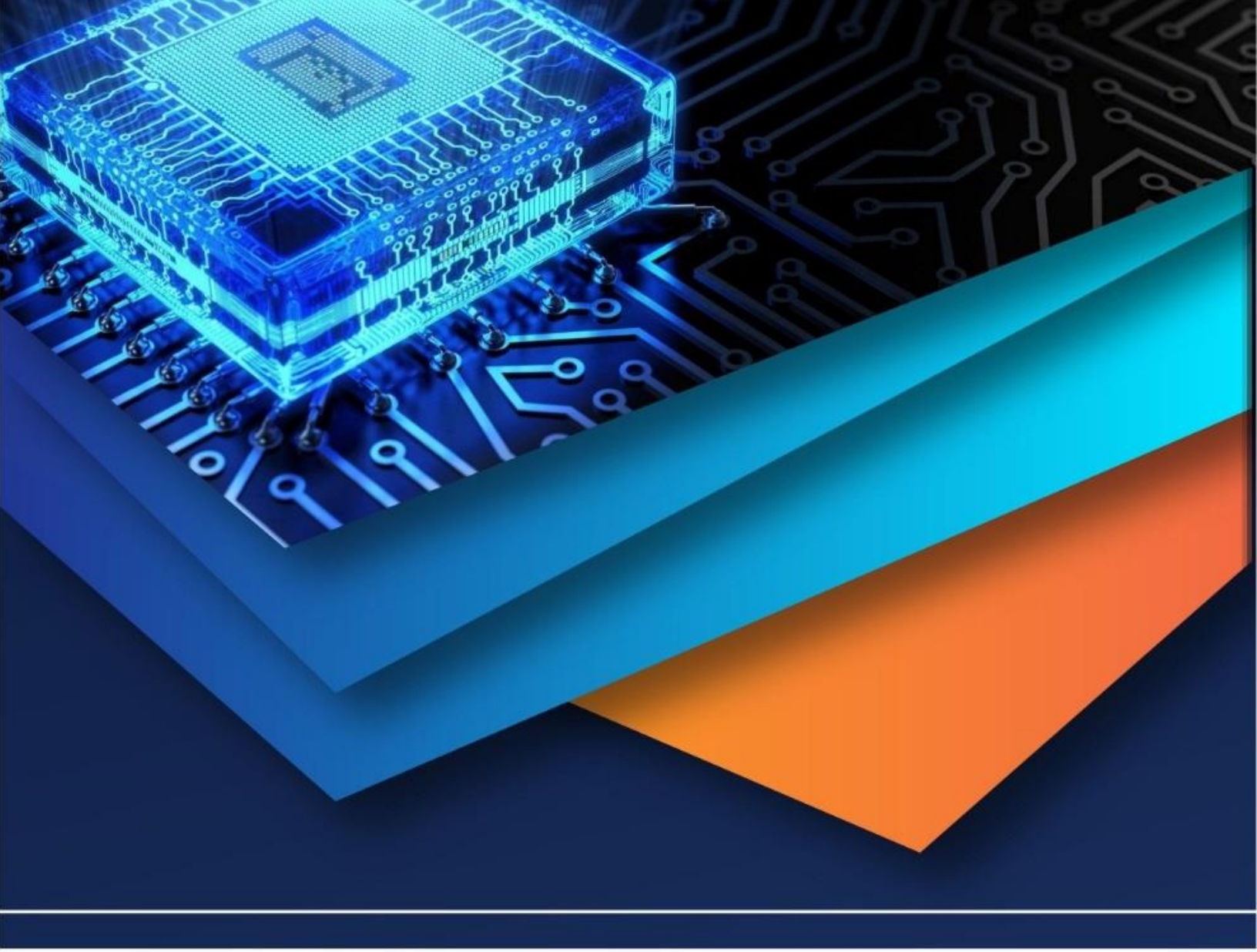
IV. CONCLUSION

In conclusion, The Histogram of Focused Gradients (HOG) method combined with the ESP32-CAM module for face control provides a powerful and versatile solution for attendance tracking. The integration of image processing technology and hardware improves accuracy, performance and physical performance, making it suitable for many applications.
Face detection using the HOG method provides protection against different environments, including lighting changes and obstructions. By extracting HOG features from face images and using machine learning models, the system provides accurate attendance information by obtaining reliable and recognizable faces.
In addition, the integration of the ESP32-CAM module supports system operation by increasing image capture and processing time. The ESP32-CAM's compact size, low power consumption and Wi-Fi connectivity make it ideal for installation in a variety of locations such as classrooms, offices and events.
Eliminates the need for manual attendance tracking, reduces human error, and saves time for managers and people. The contactless nature of the system promotes hygiene and provides convenience and efficiency to the participants. In addition, the accuracy and reliability of the system ensures the integrity of the attendance data and prevents fraud.
Methods suggested in this research paper include data collection, preprocessing, HOG object extraction, machine learning model training, face detection using the ESP32-CAM module, face recognition, engagement, evaluation, integration, and continuous improvement.
This approach provides researchers and developers with a framework to develop efficient and effective attendance management systems for face detection.
Looking ahead, there is still opportunity for future R&D. Discover the best facial recognition techniques that can improve the accuracy and stability of the system, such as deep learning models. In addition, the integration of the system with the cloud-based storage and analytics platform can increase efficiency and facilitate data management. Additionally, addressing privacy concerns and ensuring data security should be a top priority in building trust and complying with privacy laws.

REFERENCES

[1] Marko Arsenovic, Srdjan Sladojevic, Andras Anderla Darko Stefanovic. Face Time – Deep Learning based recognition attendance system
[2] Li, S. Z., & Zhang, Z. (2009). Face recognition based on discriminant analysis. Handbof ook of face recognition.
[3] Kou, H., & Li, L. (2020). Design and implementation of a face recognition-based attendance system. International Journal of Pattern Recognition and Artificial Intelligence.
[4] Samridhi Dev, Tushar Patnaik – student Attendance system using face recognition.
[5] Youssef hbali, Mohammed Sadgalm Abdelaziz El Fazziki – object detection based on hog features: faces and dual eyes augmented reality.
[6] Rahman, M. A., Akter, S., Hasan, M. K., & Islam, M. M. (2020). IoT-based smart attendance system using facial recognition. 2020 International Conference on Electrical, Computer and Communication Engineering (ECCE).
[7] Biswas, P., Ray, S., Majumder, S., & Chatterjee, S. (2021). ESP32 CAM-based face recognition attendance management system. 2021 4th International Conference on Computer, Communication, and Signal Processing (ICCCSP).
[8] Tiemeng li, Wenjun Hou, Fei Lyu, Yu lei, Chen xiao – face detection based on depth information using HOG-LBP

[9] Kaur, H., & Singh, G. (2020). Real-time face detection and recognition-based smart attendance system. 2020 6th International Conference on Signal Processing, Communication and Networking (ICSCN).
[10] Cherifi Dalila, Kaddari Redouane, Zair hamza, Nait Ali amine – infrared face recognition using neural network and HOG-SVM.
[11] Mahalakshmi, P., & Sujatha, T. (2021). Attendance management using face recognition in an IoT environment. 2021 8th International Conference on Advanced Computing and Communication Systems (ICACCS).
[12] Pachori, R. B., Verma, M., & Rani, A. (2021). Face recognition using Histogram of Oriented Gradients (HOG) feature extraction and SVM classifier. 2021 7th International Conference on Computing, Communication and Security (ICCCS).
[13] Arjun Raj A, Mahammed shoheb, Arvind k chethan k s– face recognition based smart Attendance system.
[14] Pal, D., Biswas, K., & Dey, S. (2019). Face detection and recognition using HOG and SVM for automated attendance system. 2019 4th International Conference on Communication System, Computing and Information Technology (CSCIT).



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