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Face Recognition Attendance System

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ABSTRACT

Automatic face recognition (AFR) technologies have seen dramatic improvements in performance over the past years, and such systems are now widely used for security and commercial applications. An automated system for human face recognition in a real time background which can be useful for a offices for attendance generation of their employees. So using Real Time Face Recognition is a real world solution which comes with day to day activities of handling various activities. The task is very difficult as the real time background subtraction in an image is still a challenge. To detect real time human face are used and a simple cascade classifier has used to recognize the faces detected with a high accuracy rate. The matched face is used to detect accurate user. Our system maintains the collection of user facial features as datasets and use them for verification.

Key words: Face recognition, Python, CascadeClassifier, Haar Cascades, Features Extraction

Abbreviations:AFR

I.INTRODUCTION

In the project focusing on developing a facial recognition system for employee attendance monitoring, the unique features of the human face are harnessed as a biometric identifier. The facial recognition process involves two critical phases: face detection, for quickly identifying the presence of a face, and recognition, where the system distinguishes and matches the face as an individual. In this specific project, the Haar Cascade algorithm is incorporated. The Haar Cascade method excels in face detection, efficiently pinpointing the location of faces in images. It works by employing a cascade of classifiers, each designed to quickly reject areas of an image that are unlikely to contain a face, thereby focusing computational efforts on potential face regions. The human face's unique characteristics continue to play a pivotal role in this technology. The primary objective remains to boost the efficiency and effectiveness of the current attendance tracking system in organizations, now empowered by the collaborative strengths of Haar Cascade, Eigenface, and Fisher face algorithms.

In modern workplaces, managing employee attendance manually has become outdated and inefficient. Traditional methods, such as paper logs or punch-in systems, are prone to errors, time theft, and human negligence. Face recognition technology, however, offers a precise and automated solution to attendance management. By integrating facial recognition with real-time camera input, this system provides a seamless and secure way to monitor employee attendance. The proposed system captures images from a camera, trains the model with these images, and detects employee faces for logging attendance.The training process involves collecting 60 images for each employee, ensuring accuracy and uniqueness. Using OpenCV's CascadeClassifier, the system is trained to recognize facial features, which are then matched with the live image feed during the detection process. When a match is found, the employee's name and ID are displayed on the screen, and attendance is recorded in an Excel file. This process is efficient, requiring minimal human intervention, and ensures the accuracy of attendance records, improving organizational productivity..

II.RELATED WORK

“Face recognition: A literature survey,” ACM Computing Surveys, W. Zhao, R. Chellappa, P. J. Phillips [1]

As one of the most successful applications of image analysis and understanding, face recognition has recently received significant attention, especially during the past several years. At least two reasons account for this trend: the first is the wide range of commercial and law enforcement applications, and the second is the availability of feasible technologies after 30 years of research. Even though current machine recognition systems have reached a certain level of maturity, their success is limited by the conditions imposed by many real applications. For example, recognition of face images acquired in an outdoor environment with changes in illumination and/or pose remains a largely unsolved problem. In other words, current systems are still far away from the capability of the human perception system.

Speeded up robust features. Computer Vision and Image Understanding, Herbert Bay, Andreas Ess, Tinne Tuytelaars, and Luc Van Gool. Surf [2]

This article presents a novel scale- and rotation-invariant detector and descriptor, coined SURF (Speeded-Up Robust Features). SURF approximates or even outperforms previously proposed schemes with respect to repeatability, distinctiveness, and robustness, yet can be computed and compared much faster. This is achieved by relying on integral images for image convolutions; by building on the strengths of the leading existing detectors and descriptors (specifically, using a Hessian matrix-based measure for the detector, and a distribution-based descriptor); and by simplifying these methods to the essential. This leads to a combination of novel detection, description, and matching steps. The paper encompasses a detailed description of the detector and descriptor and then explores the effects of the most important parameters. We conclude the article with SURF’s application to two 6 challenging, yet converse goals: camera calibration as a special case of image registration, and object recognition. Our experiments underline SURF’s usefulness in a broad range of topics in computer vision.

Analysis Of Local Appearance-Based Face Recognition: Effects Of Feature Selection And Feature Normalization, H.K.EKENEL AND R.STIEFELHAGEN [3]

In This Paper, The Effects Of Feature Selection And Feature Normalization ToThe Performance Of A Local Appearance Based Face Recognition Scheme Are Presented. From The Local Features That Are Extracted Using Block-Based Discrete Cosine Transform, Three Feature Sets Are Derived. These Local Feature Vectors Are Normalized In Two Different Ways; By Making Them Unit Norm AndBy Dividing Each Coefficient To Its Standard Deviation That Is Learned FromThe Training Set. The Input Test Face Images Are Then Classified Using Four Different Distance Measures: L1 Norm, L2 Norm, Cosine Angle And Covariance Between Feature Vectors. Extensive Experiments Have Been Conducted OnTheArAndCmu

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Pie Face Databases. The Experimental Results Show The Importance Of Using Appropriate Feature Sets And Doing Normalization OnThe Feature Vector.

“Face recognition in unconstrained environments: A comparative study. In ECCV Workshop on Faces in RealLife Images: Detection, Alignment, and Recognition”, Javier Ruiz Del Solar, Rodrigo Verschae, and Mauricio Correa[4]

In their study "Face Recognition in Unconstrained Environments: A Comparative Study", Javier Ruiz Del Solar, Rodrigo Verschae, and Mauricio Correa justify their literature survey by emphasizing the growing need for robust face recognition systems capable of operating in real world conditions. Unlike controlled environments, unconstrained settings involve challenges such as varying lighting, pose, occlusion, and image quality, which significantly affect recognition performance. The authors point out that traditional datasets and evaluations fail to capture these complexities, making it essential to assess and compare existing methods using realistic data. Their survey aims to highlight the strengths and limitations of current approaches, thereby supporting the development of more effective solutions for real-life applications.

III.METHODOLOGY

Algorithms

Face detection a widely popular subject with a huge range of applications. Modern day Smartphones and Laptops come with in-built face detection softwares, which can authenticate the identity of the user. There are numerous apps that can capture, detect and process a face in real 25 time, can identify the age and the gender of the user, and also can apply some really cool filters. The list is not limited to these mobile apps, as Face Detection also has a wide range of applications in Surveillance, Security and Biometrics as well. But the origin of its Success stories dates back to 2001, when Viola and Jones proposed the first ever Object Detection Framework for Real Time Face Detection in Video Footage.

This article is about taking a gentle look on the Viola-Jones Face Detection Technique, popularly known as Haar Cascades, and exploring some of the interesting concepts proposed by them. This piece of work was done long before the Deep Learning Era had even started. But it’s an excellent work in comparison to the powerful models that can be built with the modern day Deep Learning Techniques. The algorithm is still found to be used almost everywhere. It has fully trained models available on GitHub. It’s fast. It’s pretty accurate (at least when I try it).

According to Wikipedia… Woody Bledshoe, Helen Chan Wolf, and Charles Bisson were the first ones to do the first ever Face Detection on a Computer back in the 1960s. A person had to manually pinpoint the coordinates of facial features such as the pupil centers, the inside and outside corner of eyes, and the widows peak in the hairline. The coordinates were used to calculate 20 distances, including the width of the mouth and of the eyes. A human could process about 40 pictures an hour in this manner and so build a database of the computed distances. A computer would then automatically compare the distances for each photograph, calculate the difference between the distances and return the closed records as a possible match.

So what is Haar Cascade? It is an Object Detection Algorithm used to identify faces in an image or a real time video. The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper “Rapid Object Detection using a Boosted Cascade of Simple Features” published in 2001.

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The algorithm is given a lot of positive images consisting of faces, 26 and a lot of negative images not consisting of any face to train on them. The model created from this training is available at the OpenCV GitHub repository try has the models stored in XML files, and can be read with the OpenCV methods. These include models for face detection, eye detection, upper body and lower body detection, license plate detection etc. Below we see some of the concepts proposed by Viola and Jones in their research.

The first contribution to the research was the introduction of the haar features shown above. These features on the image makes it easy to find out the edges or the lines in the image, or to pick areas where there is a sudden change in the intensities of the pixels.

A sample calculation of Haar value from a rectangular image section has been shown here. The darker areas in the haar feature are pixels with values 1, and the lighter areas are pixels with values 0. Each of these is responsible for finding out one particular feature in the image. Such as an edge, a line or any structure in the image where there is a sudden change of intensities. For ex. in the image above, the haar feature can detect a vertical edge with darker pixels at its right and lighter pixels at its left.

The objective here is to find out the sum of all the image pixels lying in the darker area of the haar feature and the sum of all the image pixels lying in the lighter area of the haar feature. And then find out their difference. Now if the image has an edge separating dark pixels on the right and light pixels on the left, then the haar value will be closer to 1. That means, we say that there is an edge detected if the haar value is closer to 1. In the example above, there is no edge as the haar value is far from 1.

This is just one representation of a particular haar feature separating a vertical edge. Now there are other haar features as well, which will detect edges in other directions and any other image structures. To detect an edge anywhere in the image, the haar feature needs to traverse the whole image.

The haar feature continuously traverses from the top left of the image to the bottom right to search for the particular feature. This is just a representation of the whole concept of the haar feature traversal. In its actual work, the haar feature would traverse pixel by pixel in the image. Also all possible sizes of the haar features will be applied.

Depending on the feature each one is looking for, these are broadly classified into three categories. The first set of two rectangle features are responsible for finding out the edges in a horizontal or in a vertical direction (as shown above). The second set of three rectangle features are responsible for finding out if there is a lighter region surrounded by darker regions on either side or vice-versa. The third set of four rectangle features are responsible for finding out change of pixel intensities across diagonals.

Now, the haar features traversal on an image would involve a lot of mathematical calculations. As we can see for a single rectangle on either side, it involves 18 pixel value additions (for a rectangle enclosing 18 pixels). Imagine doing this for the whole image with all sizes of the haar features. This would be a hectic operation even for a high performance machine.

To tackle this, they introduced another concept known as The Integral Image to perform the same operation. An Integral Image is calculated from the Original Image in such a way that each pixel in this is the sum of all the pixels lying in its left and above in the Original Image. The calculation of a pixel in the Integral Image can be seen in the above GIF. The last pixel at the bottom right corner of the Integral Image will be the sum of all the pixels in the Original Image.

With the Integral Image, only 4 constant value additions are needed each time for any feature size (with respect to the 18 additions earlier). This reduces the time complexity of each addition gradually, as the number of additions does not depend on the number of pixels enclosed anymore. In the above image, there is no edge in the vertical direction as the haar value is -0.02, which is very far from 1. Let's see one more example, where there might be an edge present in the image.

System Implementation

To conduct studies and analyses of an operational and technological nature, and To promote the exchange and development of methods and tools for operational analysis as applied to defense problems**.**

1. Logical Design : The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system. This is often conducted via modeling, using an over-abstract (and sometimes graphical) model of the actual system. In the context of systems design are included. Logical design includes ER Diagrams i.e. Entity Relationship Diagrams

2. Physical Design: The physical design relates to the actual input and output processes of the system. This is laid down in terms of how data is input into a system, how it is verified / authenticated, how it is processed, and how it is displayed as output. In Physical design, following requirements about the system are decided.

1. Input requirement,
2. Output requirements,
3. Storage requirements,
4. Processing Requirements,
5. System control and backup or recovery.

Put another way, the physical portion of systems design can generally be broken down into three sub-tasks:

1. User Interface Design
2. Data Design
3. Process Design

User Interface Design is concerned with how users add information to the system and with how the system presents information back to them. Data Design is concerned with how the data is represented and stored within the system. Finally, Process Design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system. At the end of the systems design phase, documentation describing the three sub-tasks is produced and made available for use in the next phase.

Physical design, in this context, does not refer to the tangible physical design of an information system. To use an analogy, a personal computer's physical design involves input via a keyboard, processing within the CPU, and output via a monitor, printer, etc. It would not concern the actual layout of the tangible hardware, which for a PC would be a monitor, CPU, motherboard, hard drive, modems, video/graphics cards, USB slots, etc. It involves a detailed design of a user and a product database structure processor and a control processor. The H/S personal specification is developed for the proposed system.

IV.RESULTS

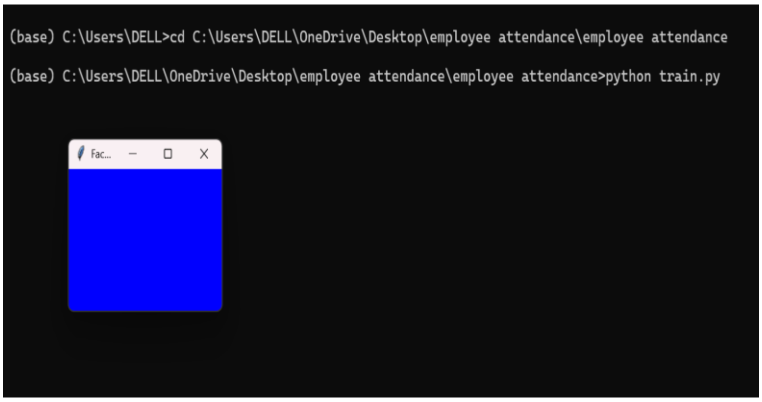

Figure 1: Shows App window pop- up

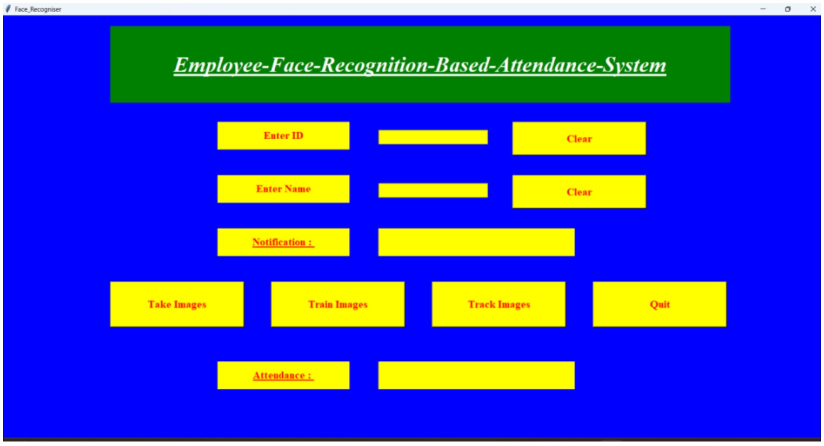

Figure 2 : Shows user interface

. **Figure 3: Shows** Attendance screen

V.CONCLUSIONS

The Employee Face Recognition-Based Attendance System revolutionizes how organizations manage employee attendance. By implementing an automated, secure, and efficient facial recognition model, the system significantly improves workforce management. This technology eliminates manual errors, reduces time theft, and offers a more reliable and scalable solution than traditional attendance systems..

VI.DISCUSSIONS

- Automatic Face Recognition (AFR) systems have significantly advanced in recent years, leading to widespread use in both security and commercial sectors.
- These systems are now being implemented in office environments to automate employee attendance tracking.
- Real-time face recognition provides a practical solution for managing everyday operations where human identification is necessary.
- One of the major technical challenges in real-time recognition is accurate background subtraction from images or video feeds.
- The system relies on detecting human faces in live video using techniques such as a simple cascade classifier.
- Once faces are detected, recognition is performed with high accuracy by comparing them against stored datasets.

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REFERENCES:

[1]. W. Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld, “Face recognition: A literature survey,” ACM Computing Surveys, 2003, vol. 35, no. 4, pp. 399-458.

[2]. Herbert Bay, Andreas Ess, Tinne Tuytelaars, and Luc Van Gool. Surf: Speeded up robust features. Computer Vision and Image Understanding (CVIU), 110(3):346–359.

[3]. H.K.Ekenel and R.Stiefelhagen,Analysis of local appearance based face recognition: Effects of feature selection and feature normalization. In CVPR Biometrics Workshop, New York, USA, 2006

[4]. Javier Ruiz Del Solar, Rodrigo Verschae, and Mauricio Correa. Face recognition in unconstrained environments: A comparative study. In ECCV Workshop on Faces in RealLife Images: Detection, Alignment, and Recognition, Marseille, France, October 2008.

[5]. Kyungnam Kim “Face Recognition using Principle Component Analysis”, Department of Computer Science, University of Maryland, College Park, MD 20742, USA.

[6]. Osuna, E., Freund, R. and Girosit, F. (1997). "Training support vector machines: an application to face detection." 130-136

[7]. IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012 ISSN (Online): 1694-0814