Original Research Article

DETECTION OF FACE AND RECOGNITION OF INTERVIEWEE USING TRANSFORM TECHNIQUE AND MACHINLE LEARNING ALGORITHM

Abstract

A crucial task in any firm is the hiring of new personnel. Virtual interviews have replaced face-to-face interviews as the norm since the Pandemic. Knowing the sincerity of the interviewee while applying to the company becomes a significant task in such a situation. The practice of manually comparing a candidate's face from many interview rounds to the actual candidate joining the organization is being used by interviewers. I want to automate this human process, using machine learning techniques to aid the interviewee's sincerity be established. Machine learning techniques will be used in this procedure to find and identify faces in pictures taken during the first round of interviews. Then compare it later to the real face that was photographed at the time of joining. If all of the visuals line up, it establishes the interviewee's sincerity. And if they don't match, management can take the necessary steps offline. This project will be conceived up and explored from the standpoint of how and whether Python may be used to implement.

Keywords: Face recognition, Dimensionality reduction, Gabor Wavelet, Eigen faces, PCA.

1. INTRODUCTION

People are surrounded by highly intelligent modern technology in today's environment. Artificial intelligence (AI) applications make it possible to access all available information by simply utilizing a little device like a palm. AI software greatly eases lives in many ways. Thanks to self-learning algorithms and readily accessible web data that incurs no computational expense. This has enabled machine learning to advance significantly.The well-known field of face detection and recognition in computer vision and image processing focuses on finding human faces in digital pictures and videos. One face or a number of faces in an image can be used for face detection. the face recognition basic idea supporting the tracking and identification of faces. The primary objective of this project is to identify images and faces in images utilizing a range of technologies, artificial intelligence, and machine learning. In this project, the OpenCV computer

vision library and the Python programming language are both utilized. Typically, the project starts with the identification of a single face, and the algorithm will identify the person who has a facial picture using that facial image.

For a human, recognizing faces is a simple task. The human brain has nerve cells that are trained to recognize particular local elements of a scene, such as edges, lines, angles, or movement, whether they are internal or external features. It employs an algorithm for computers to recognize distinguishing features of a person's face, such as skin tone, location, shape, and distance between the eyes.A library for computer vision programmers is known as open-source computer vision (Open CV). It is a free library created to support real-time computer vision and image processing applications. While being written in C++, it is compatible with the Java, Python, Ruby, and Android SDK programming languages. Because to its simplicity of use and readability, Open CV is among the most widely used libraries for image and video processing. The vast majority of operating systems are compatible with OpenCV.

Face recognition and recognition are two different concepts; however face recognition requires face detection in order to identify a face. To find a face in an image, face detection techniques are used. The Har cascade method, a machine learning object detection system, was utilised for this research. Its cascade function is trained using tens of thousands of positive and negative photos to increase accuracy. Depending on the trained picture, OpenCV offers per-trained Har Cascade algorithms that are categorized into several groups, such as faces, eyes, smiles, and bodies. Thus, for the purpose of detection, pre-trained Har Cascade algorithms were employed.
The myriad of tiny lines and features that make up a face must match. Face recognition software written in Python divides the process of recognizing faces into a large number of manageable, smaller tasks. Recognition The most recent development in machine learning techniques is Python. For the purpose of finding faces in images, OpenCV employs machine learning methods. There is a set pattern for face recognition using Python and OpenCV. A person's face, eyes, nose, mouth, color, and general features are the first things you notice when you meet them for the first time in your life. In order to recognize that person's face, your mind is learning or training for it by compiling face data.

2. LITERATURE WORK

Picture analysis and comprehension, especially in recent years. This tendency can be attributed to at least two factors, the first of which is the broad range of commercial and Face recognition has recently attracted a lot of attention as one of the best uses of law enforcement uses, and the second of which is the availability of workable technology after 30 years of study. in spite of the limitations imposed by several real applications have brought today's machine recognition systems to a certain level of maturity, but they are still constrained in their ability to succeed. One issue that hasn't been fully resolved, for instance, is the recognition of face photographs captured in an outside setting with changing lighting conditions and/or poses. In other words, the capability of the human vision system is still well beyond what is now possible with systems.

The primary human face recognition methods, which primarily apply to frontal faces, are described in this section along with each method's advantages and disadvantages. The methods taken into account are geometrical feature matching, neural networks, dynamic link architecture, hidden Markov model, and template matching. In terms of the face representations they used, the approaches are assessed. As an illustration, eigenfaces Eigen face is one of the techniques for facial recognition that has attracted the most research. It is also known as the principal component, eigenvector, eigenpicture, and the Karhunen-Loève expansion.Principal component analysis was employed in references [26, 27] to effectively depict images of faces. They claimed that with a simple set of weights for each face and a common face image, any face images could be roughly recreated.

Recent years have seen a rise in the use of face recognition and detection. In this paper, we create a novel method for face detection and recognition. To identify the student's face, we're developing a face detection and recognition system. This device's function is to let pupils entry and exit. To begin with, when a student needs to leave their university, a digital image of them is taken by the camera, and their face features are recovered and compared to the image in the database.

This article presents the findings of a research project that is currently underway and aims to systematically identify, analyze, and test existing open-source and commercial face recognition

systems—those that might significantly assist the main stakeholders of highly technology-smart institutions, including college students with disabilities. [1] By superimposing the face image onto the eigenpicture, the aces are obtained. Reference For face detection and recognition, [28] employed eigenfaces, a method inspired by Kirby and Sirovich's. In mathematics, eigenfaces are the eigenvectors of the covariance matrix of the collection of face pictures or the main components of the distribution of faces. The eigenvectors are arranged in such a way as to each indicate a different level of variance between the faces.

By using a linear combination of the eigenfaces, one may precisely represent each face. The "best" eigenvectors—those with the highest eigenvalues—can also be used to make an estimate. An M-dimensional space, or "face space," is created by the best M eigenfaces. Averaging over changes in size, orientation, and lighting, the authors reported 96, 85, and 64 percent correct classifications. 2,500 pictures of 16 people were in their database. Because there is a lot of backdrop in the photographs, it has an impact on the results that are presented above. Through a strong correlation between images and changes in illumination, the authors were able to explain the system's robust performance in a variety of lighting circumstances.

The correlation between photographs of the entire faces, however, was shown by [29] to be ineffective for achieving good recognition performance. The eigenfaces technique typically requires illumination normalization [27]. In order to account for arbitrary illumination effects, Reference [30] presented a new approach to compute the covariance matrix using three photos, each obtained in a different lighting condition. If the object is Lambertian, this method can be used. Reference [31] expanded their earlier work on eigenface to include eigenfeatures that correlate to facial features including the lips, nose, and eyes. They employed an eigenspace that was modular and made up of the aforementioned eigenfeatures (i.e., eigeneyes, eigennose, and eigenmouth). Compared to the traditional eigenface technique, this one would be less susceptible to changes in appearance. For the 7,562 photos of roughly 3,000 people in the FERET database, the algorithm had a 95% recognition rate. In conclusion, eigenface appears to be a quick, easy, and useful technique. It does not, however, typically offer invariance’s.

3. GENERAL PROBLEM WITH FACE RECOGNITION

The performance of most face recognition algorithms deteriorate quickly if none of these elements are present, despite the fact that most face recognition techniques work well under limited conditions. Regulated [12].The fact that the human face is not a singular, rigid thing makes this technology challenging. There are in fact many different sources of variation, which can be divided into two groups and account for the two main changes in facial appearance: Internal and external forces are also present [13]. Extrinsic factors, which are caused by the interaction of light with the face and the observer, cause the alternation of the face while intrinsic factors, which are independent of the observer, include the physical characteristics of the face. Subgroups are further classed as intrinsic factors.I Intrapersonal factors define variance in facial appearance between different people, and [ii] Interpersonal factors define variation in facial appearance of the same person. In addition, the Illumination, position (expression), and age changes are the three main serious issues impacting the existing face recognition systems, according to a performance analysis of the FERET, FRVT2002 [15], and FAT 2004 databases.

4. STRUCTURE PROCESS OF FACE RECOGNITION SYSTEM

Face recognition systems are becoming particularly crucial due to the desire for improved security and the public's interest in them. Both of the following two operating modes are possible for it:Face verification (or authentication) involves a one-to-one match that checks a query face image against a template face image whose identity is being claimed.Face identification (or recognition) using one-to-many matches compares a query face image to every template image in the database to identify the query face. Kanade 1973 produced the first automatic face recognition system. Facial recognition systems can be roughly categorized as consisting of two basic phases, namely, the training phase and the testing phase, with at least four modules as follows:

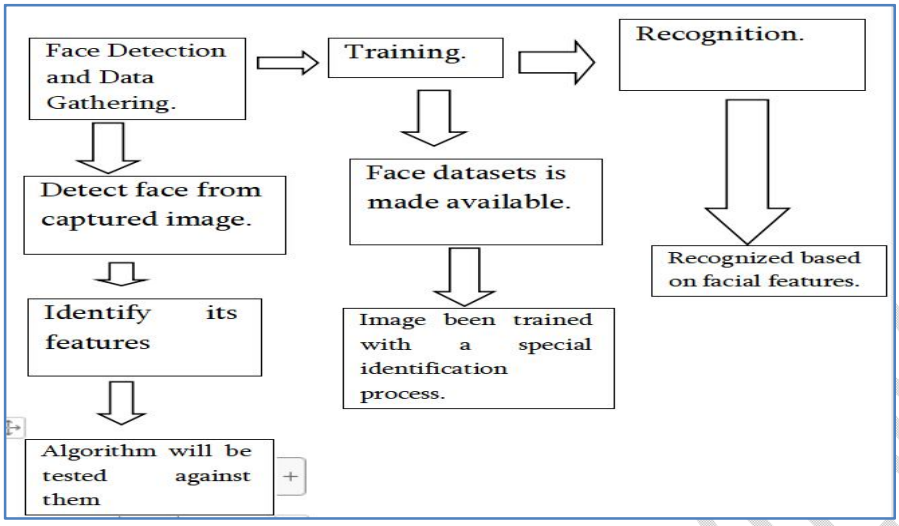

Figure 1: Process of Face Recognition

5. PROPOSED METHODOLOGY

i. Haar cascade: Algorithm to detect face

ii. LBPH: Local Binary Pattern Histogram algorithm (LBPH) for recognition

Face detection and identification is the most used computer vision approach in the artificial intelligence environment because of its many uses. Face recognition is the application of several approaches to map face characteristics to identify a person. Face is crucial for interpreting facial expressions of emotion, conversing, and discovering personal information about people. Because of the individual's face's individuality and other elements, we can recognise them. A few applications that require face detection and recognition include security systems, virtual reality, face tracking, video surveillance, and face recognition.Face recognition, including internal and exterior traits, comes naturally to humans. A scene's local details, such as edges, lines, angles, and movement, can be detected by the brain's specialised nerve cells. Computers use algorithms to recognise distinguishing traits on a person's face, such as skin tone, position, eye-gap width, and shape. The goal of this research was to quickly and accurately recognise a person's face among the available photos. On a range of platforms, machine vision applications have been created.

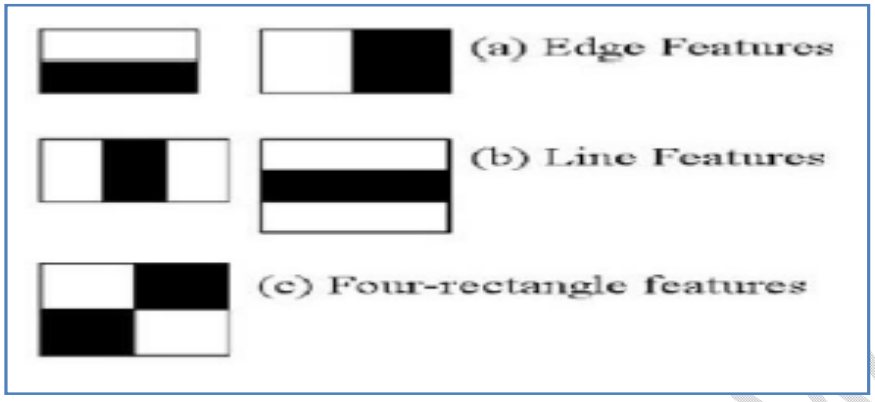

Figure 2:Haar Cascade features

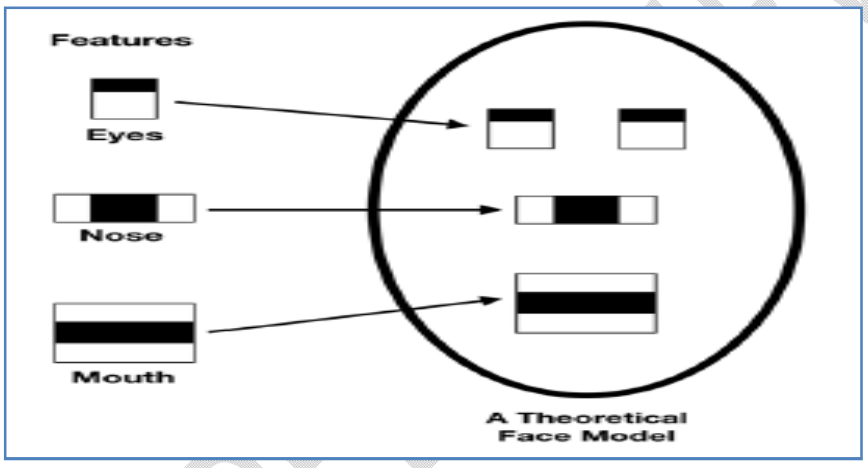

Figure 3: Face features extraction

The pre-trained dataset had been used to recognition. All facial images have been recovered, cropped, resized, and converted to greyscale in the areas where the system recognised the attributes in the image. The identification and recognition of people had been taught to a new classifier. This was the purpose of a brand-new Python file. Also, the Local Binary Pattern Histogram method from the OpenCV library was used, which is used for recognition. The algorithm was trained using the dataset of facial images. For every image used for recognition, the ID is the same. The face image dataset contains both an image ID and a person ID.

6. RESULTS AND ANALYSIS

The LBPH Recognition method and the previously mentioned Haar Cascade Detection technique will form the basis of our Python code Prototype, as was previously stated. Following the execution of this code, a few histograms were generated.

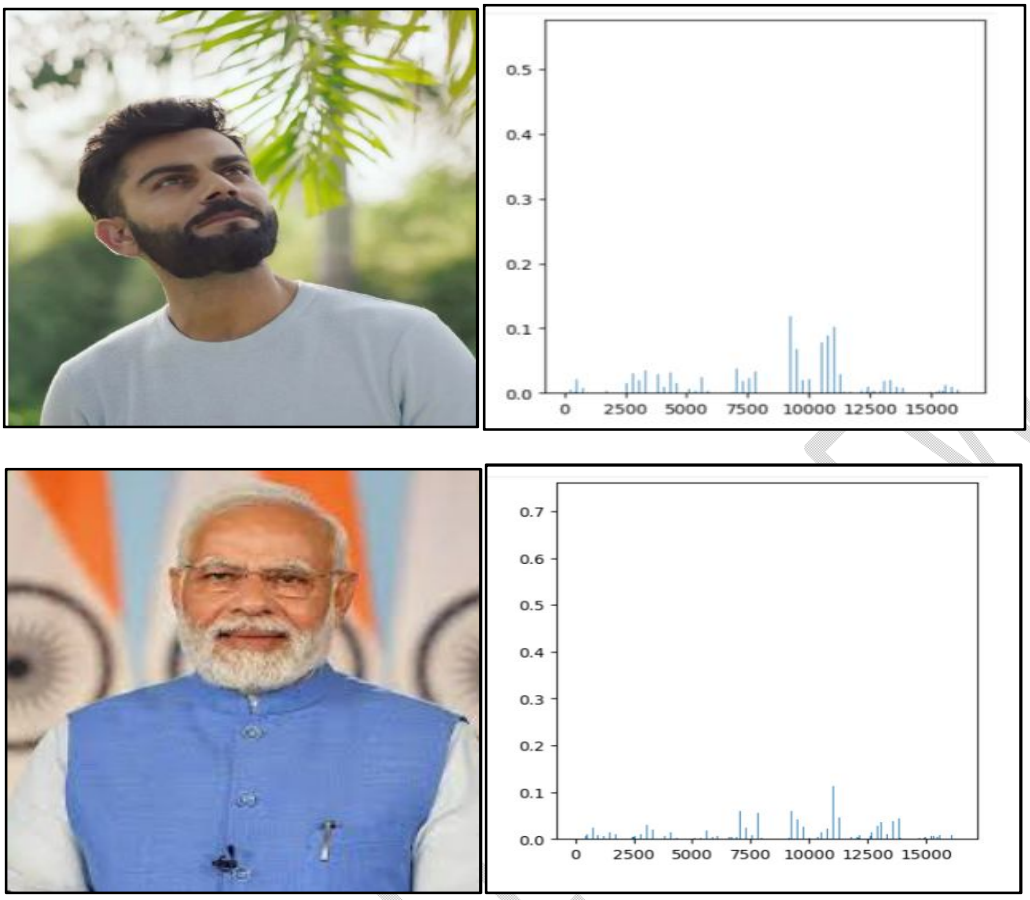

Figure 4: comparison of both diagrams with Haar Cascade

After running such code, the results of a few image matches are presented below with their Confidence scores. (Note: An increased confidence value indicates that the histograms are widely separated, which affects the recognition's accuracy. Nonetheless, a lower confidence rating suggests that the histograms are closely packed together and therefore likely accurate.)

Figure 5: Confidence score of pictures

Confidence score of picture (left) is 76.9 percentages and picture (Right) is 63.7. Find the difference of both pictures with and without of transform technique.

7. CONCLUSION

The development of artificial intelligence technologies appears to be advancing society. Every aspect of civilization has transformed as a result of the current generation's artificial intelligence and machine learning technology. Furthermore, modern technology, such as artificial intelligence and Machine learning can help people solve many problems that seem intractable. Technology has advanced significantly over the past few decades, revolutionizing much different industries.In contrast, machine learning is a subfield of artificial intelligence that gives computers the ability to continuously learn and advance by using data. Several companies, including those in the robotics, health care, social media, computer vision, gaming, and mobile phone sectors, have coordinated extensively with these technologies.Due to the impact of technology advancement on the global economic system, significant changes are being made in the way that new products are organised, traded, invested in, and developed. Long-term trends in As a result of modern industrial technology, productivity and employment have also altered. The rapid expansion of innovation and the dynamics of technology flows have major positive effects on livelihood. As a result, a lot of rich and developing countries may now combine technology more successfully with the increased expectation of rising living standards.Artificial intelligence (AI) refers to computer software that simulates human intelligence. When this programme has been created utilizing a variety of algorithms and machine learning modules, it can interpret photos, text, videos, and sounds. Moreover, a technique using artificial intelligence to develop intelligent computer systems, a technique known as machine learning is used. Self-driving automobiles today use artificial intelligence and machine learning technology. In addition, unrelated occupations like forensics, healthcare, and others are also applicable.In this study, the interviewee's face and eyes were found in an image using real-time face detection and recognition. Using the Haar cascade machine learning object detection system, the items in an image were recognised. Using a local binary pattern histogram approach, the detected face was recognised in a manner similar to this, and then the image was recognised.

Disclaimer

The eyes of persons were covered as per the International standard Protocol

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