

A study on AI-based face recognition

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Abstract

A Study on AI-based face recognition is discussed briefly in this paper. Facial recognition technology is a biometric system that identifies a person by analyzing their facial features. The process involves capturing facial images, which are then automatically processed by recognition equipment. This paper provides an overview of face recognition research from various perspectives. It outlines the development stages and technologies of facial recognition and discusses research into real-life conditions. Additionally, it introduces the general evaluation standards and databases used for facial recognition. Finally, the paper provides a forward-looking view of the technology, which is expected to be a key direction of future development and has potential applications in various fields. This paper presents a comprehensive overview of AI-based face recognition technology, which is a biometric technology based on the identification of facial features of a person. The study covers the development stages, related technologies, research for real-world conditions, evaluation standards, and databases of face recognition. The paper also provides a forward-looking view of the potential application prospects of face recognition. Through this study, we aim to enhance the understanding of AI-based face recognition technology and its potential impact on various industries. The work done & presented in this paper is the result of the mini-project work that has been done by the first sem engineering students of the college and as such there is little novelty in it and the references are being taken from various sources from the internet, the paper is being written by the students to test their writing skills in the starting of their engineering career and also to test the presentation skills during their mini-project presentation. The work done & presented in this paper is the report of the assignment / alternate assessment tool as a part and parcel of the academic assignment of the first year subject on nanotechnology & IoT.

Keywords: AI, IoT, Face, Recognize, Result

1. Introduction

To verify the student attendance record, the personnel staff ought to have an appropriate system for approving and maintaining the attendance record consistently [1]. By and large, there are two kinds of student attendance framework, i.e. Manual Attendance System (MAS) and Automated Attendance System (AAS). Practically in MAS, the staff may experience difficulty in both approving and keeping up every student's record in a classroom all the time [2]. In a classroom with a high teacher-to-student ratio, it turns into an extremely dreary and tedious process to mark the attendance physically and cumulative attendance of each student.

Consequently, we can execute a viable framework which will mark the attendance of students automatically via face recognition. AAS may decrease the managerial work of its staff. Especially,

for an attendance system which embraces Human Face Recognition (HFR), it normally includes the students' facial images captured at the time he/she is entering the classroom, or when everyone is seated in the classroom to mark the attendance. Generally, there are two known methodologies to deal with HFR, one is the feature-based methodology and the other is the brightness-based methodology [3].

The feature based methodology utilizes key point features present on the face, called landmarks, of the face, for example, eyes, nose, mouth, edges or some other unique attributes, as shown in fig.1. In this way, out of the picture that has been extricated beforehand, just some part is covered during the calculation process. Then again, the brightness-based methodology consolidates and computes all parts of the given picture. It is also called holistic-based or image based methodology. Since the overall picture must be considered, the brightness based methodology takes longer handling time and is likewise more complicated [4].

2. Overview

There are different advances that are done during the process of this face recognition framework, yet the essential steps of these are face detection and face recognition. Firstly, to mark the attendance, the images of students' faces will be required. This image can be captured from the camera, which will be installed in the classroom at a position from where the entire classroom is visible. This image will be considered as an input to the system. For efficient face identification, the picture should be upgraded by utilizing some image processing methods like grayscale conversion and histogram equalization [5].

After image quality upgrade, the image will be passed to perform face detection. The face identification process is trailed by face recognition process. With the assistance of the element extractor, different face highlights are extracted. Utilizing these faces as Eigen features, the student is recognized and by coordinating with the face database, their attendance is marked. Developing the face database is required with the end goal of comparison [6].

3. Scope and objectives

In order to prevent the frauds of ATM in India, it is recommended to prepare the database of all ATM customers with the banks in India & deployment of high resolution camera and face recognition software at all ATMs. So, whenever user will enter in ATM his photograph will be taken to permit the access after it is being matched with stored photo from the database. Duplicate voter are being reported in India. To prevent this, a database of all voters, of course, of all constituencies, is recommended to be prepared. Then at the time of voting the resolution camera and face recognition equipped of voting site will accept a subject face 100% and generates the recognition for voting if match is found [7].

Passport and visa verification can also be done using face recognition technology as explained above. Driving license verification can also be exercised face recognition technology as mentioned earlier. To identify and verify terrorists at airports, railway stations and malls the face recognition technology will be the best choice in India as compared with other biometric technologies since other technologies cannot be helpful in crowded places. It's main objective is to keep a track on number of people in the input picture. Python language is used in this AI based face recognition face recognition technology uses face recognition software package which consists of dlib, numpy, opencv -python and cmake, etc.....which belongs to family of machine learning programs/codes etc... The flow-chart for the face recognition algorithm is shown in the Fig. 1 [8].

4. Methodology

It includes the following steps [9]:

- First, you need to find the correct setup file for your operating system.
- we run this code using python language in the command prompt

- using python image library which is a free and open source additional library for the python programming language that adds file formats support for opening , manipulating and saving many different image
- consists of dlib , numpy, opencv face recognition technology uses face recognition software package which -python , and cmake,etc.....which belongs to family of machine learning programs/ codes etc
- Recognizes and manipulates faces from python or from the command line from the world's simplest library.....
- It is built using dlib's state-of – the art face recognition built with deep learning.
- The model has an accuracy of 99.38% on the labelled faces in the wild bench mark
- This also provides a simple face recognition command line tool that lets you do face recognition on a folder of images from the command line.

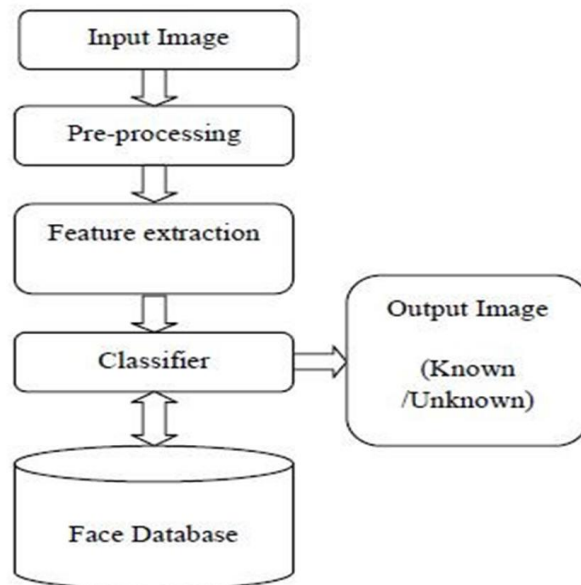


Fig. 1 : Flow-chart for the face recognition system developed

5. Conclusions

AI-based face recognition is a powerful technology that is becoming increasingly important in a variety of applications. It is more accurate and secure than traditional face recognition techniques, and it is becoming more affordable, making it accessible to a wider range of businesses and organizations. In the future, AI-based face recognition is likely to become even more accurate and secure, as well as more widely used in a variety of applications. This could lead to a future in which facial recognition is used for everything from unlocking smartphones to verifying identity for online transactions [10].

References

- [1]Dr. Pavithra, Indian Filed & Published Patent Application No. : 202041043354, Title of the invention : Computer implemented method for segmentation and identification of medical images using machine learning, Docket No 87311, C.B.R. No. 33416, The Patent Office Journal No. 42/2020, Dated 16/10/2020, page no. 53544, Date of Publication : 16/10/2020
- [2]Dr. Pavithra, Indian Patent Application No. : 202021043962, Title of the invention : Facial recognition triple security entryway system using ai & deep neural system, The Patent Office Journal No. 44/2020, Dated 30/10/2020, page no. 55271, Publication Date : 30/10/2020.
- [3]Dr. Pavithra, Indian Patent Application No. : 202041046698, Title of invention : Design and Development of RFID and Finger Print based Centralized Voting System, Publication Date : 6/11/20.



- [4]Dr. Pavithra, Indian Patent Application No. : 202041046698, Title of invention : Design & development of RFID & finger print based centralized voting system, Date of filing : 26/10/2020.
- [5]Dr. Pavithra, Indian Patent Appn. No. : 202041046850, Title of invention : Microstrip patch antennas with double wide slots for wireless communication using direct contact probe feed excitation with broadsided radiation, Docket No 93934, C.B.R. No. 36158, Date of filing : 27/10/2020.
- [6]Dr. T.C.Manjunath, Dr. K.N. Vijaykumar, Pavithra G., “Separation of foreground & background objects in image processing”, Nat. Jour. of App. Engg. & Technologies (JAET), Vol. 1, Issue 1, pp. 60 - 65, April 2012, India.
- [7]Dr. T.C.Manjunath, Pavithra G., Suhasini V.K., “Lossless compression in artificial images”, Nat. Jour. of App. Engg. & Technologies (JAET), ISSN-2278-1722, Paper id AET-0015, Vol. 1, Issue 1, pp. 66 - 71, April 2012, India.
- [8]Dr. T.C.Manjunath, Dr. Vaibhav Meshram, Pavithra G., “Dynamic modelling of a robot arm”, Nat. Jour. of App. Engg. & Technologies (JAET), ISSN-2278-1722, Paper id AET-012, Vol. 2, Issue 1, pp. 47 - 53, April 2013, India.
- [9]Dr. T.C.Manjunath, Arunkumar G., Pavithra G., “Development of swarm intelligence in mobile robotic systems”, Nat. Jour. of App. Engg. & Technologies (AET-2014), Vol. 3, Issue 1, Apr. 2014, pp. 109-112, Vidyalkar Inst. of Tech., Mumbai, Maharashtra, India.
- [10] Pavithra G., Dr. T.C. Manjunath, Dr. H.V. Manjunath, “Design and Implementation of PLC Based Industrial Application Prototypes”, Indian Journal of Science & Technology (IJST)-UGC Web of Science, IF : 5.02, Vol. 10, Issue 35, Sept. 2017.