Chapter 4
Performing Facial Recognition Using Ensemble Learning

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ABSTRACT

Investment in facial recognition technologies has increased recently with the amount of venture capital invested in facial recognition startups dramatically increasing in 2021. Facial recognition uses AI and ML techniques to find human faces in the surrounding area. Facial recognition technology is used by the web application Automated Attendance System (AAS) which was developed by a group of students from the University of Wollongong in Dubai to automate attendance management in educational institutions. AAS is simple to use, quick to implement, and can be incorporated into current educational institutions. Deep convolutional neural networks, notably the VGG19 and EfficientNetB0 models, are the foundation of the system. These models were trained for high accuracy utilizing transfer learning and ensemble learning. The automation of attendance tracking reduces human error; increases efficiency, accuracy, and integrity; and does away with the need for manual methods of collecting attendance.

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INTRODUCTION

The most important factor to recognize a person is their face. Facial recognition can be used to distinguish between people's faces using the technologies of the modern day with applications such as an unlock system for a phone and airport boarding and checks. The automated attendance system allows a student's attendance to be recorded on a particular day. The student needs to go through facial recognition to mark the attendance. Once facial recognition is done, the details of ID number, date and in-time are saved in the database. The information will be stored in a cloud that forms a connection with the system and server through the internet. The system will consist of a GUI where additional information about the student will be present.

The automated attendance system is made for students at universities and can be applied to students at schools to record their attendance and in-time to be stored in a database. The system involves two AI models, namely, VGG19 and EfficientNet to gather information and differentiate between students by utilizing transfer learning and ensemble learning and a GUI to verify the attendance of those students. The GUI will present information such as the details of the student, the date and how many absences they have.

Pre-Requisites

Before starting the project, research about facial recognition, how it is done, and how to increase its accuracy in different environments is necessary. Since the project involves artificial intelligence, choosing which language to use is important and understanding the libraries which can be used for image processing and machine learning itself. Determining what hardware is needed for the project is also something which is considered.

BACKGROUND

Facial recognition is a cutting-edge topic with enormous implications for security, surveillance, and human-computer interaction. It allows machines to recognize and authenticate people based on their distinctive facial traits. Researchers, technologists, and society at large have all become fascinated by the capacity to automatically detect and distinguish faces. This technology has a lot of potential because it provides accurate and dependable identification solutions across a wide range of industries. AI and ML algorithms are used in facial recognition to identify human faces in the environment. Usually, the algorithm looks for human eyes first, then for eyebrows, nose, mouth, nostrils, and iris (Suneratech, 2021). Intelligent software powered by

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