

FACE RECOGNITION EMPLOYEES ATTENDANCE SYSTEM

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To my beloved parents, thank you for support and motivation.

For my inspiring supervisor, Ts.Sharifah Saon. And respectful Co-supervisor. Ap. Ir.

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ABSTRACT

Face recognition uses a variety of technologies and locations to carry out the attendance system. In order to recognise a face in real-time settings utilising a specific purpose device, attendance systems require accurate results. Video architecture is also achieved in our design by piercing the camera via a stoner-friendly interface. The Overeater (Histogram of Acquainted Grade) algorithm is used to recognise and segment the face from the VHS frame. Garbling a photo using the Overeater method to obtain a simplified interpretation of the image is the first phase, or pre-processing stage. Find the part of the image that most closely resembles a general Overeater encoding of a face using this simplified image. Also in the next step, figuring out the face's disguise by chancing the primary landmarks in the face. Once we've located those landmarks, we can utilise them to anchor the image such that the eyes and mouth are centred. Run the centred face image through a neural network that understands how to measure facial traits. Save those 128 measurements for later. Examine all of the faces we've measured in the past to find who has the most similar measurements to ours. That's the result of our match. Overall, we developed a Python programme that takes an image from a database and does all of the necessary changes for recognition, as well as checks the image in videos or in real time by accessing the camera using a Stoner-friendly interface. After a successful match is made, the name and time of the individual in attendance is recorded.

ABSTRAK

Pengecaman muka menggunakan pelbagai teknologi dan lokasi untuk menjalankan sistem kehadiran. Untuk mengecam wajah dalam tetapan masa nyata menggunakan peranti tujuan tertentu, sistem kehadiran memerlukan hasil yang tepat. Seni bina video juga dicapai dalam reka bentuk kami dengan menusuk kamera melalui antara muka mesra batu. Algoritma Overeater (Histogram of Acquainted Grade) digunakan untuk mengecam dan membahagikan muka daripada bingkai VHS. Mengolok-olok foto menggunakan kaedah Overeater untuk mendapatkan tafsiran ringkas bagi imej ialah fasa pertama, atau peringkat pra-pemprosesan. Cari bahagian imej yang paling hampir menyerupai pengekodan Overeater umum muka menggunakan imej ringkas ini. Juga dalam langkah seterusnya, mencari tahu penyamaran wajah itu dengan menukar tanda tempat utama di muka. Sebaik sahaja kami menemui tanda tempat tersebut, kami boleh menggunakannya untuk menambat imej supaya mata dan mulut tertumpu. Jalankan imej muka berpusat melalui rangkaian saraf yang memahami cara mengukur ciri muka. Simpan 128 ukuran tersebut untuk kemudian. Periksa semua muka yang telah kami ukur pada masa lalu untuk mencari siapa yang mempunyai ukuran yang paling serupa dengan kami. Itulah keputusan perlawanan kami. Secara keseluruhan, kami membangunkan program Python yang mengambil imej daripada pangkalan data dan melakukan semua perubahan yang diperlukan untuk pengecaman, serta menyemak imej dalam video atau dalam masa nyata dengan mengakses kamera menggunakan antara muka mesra Stoner. Selepas perlawanan berjaya dibuat, nama dan masa individu yang hadir direkodkan.

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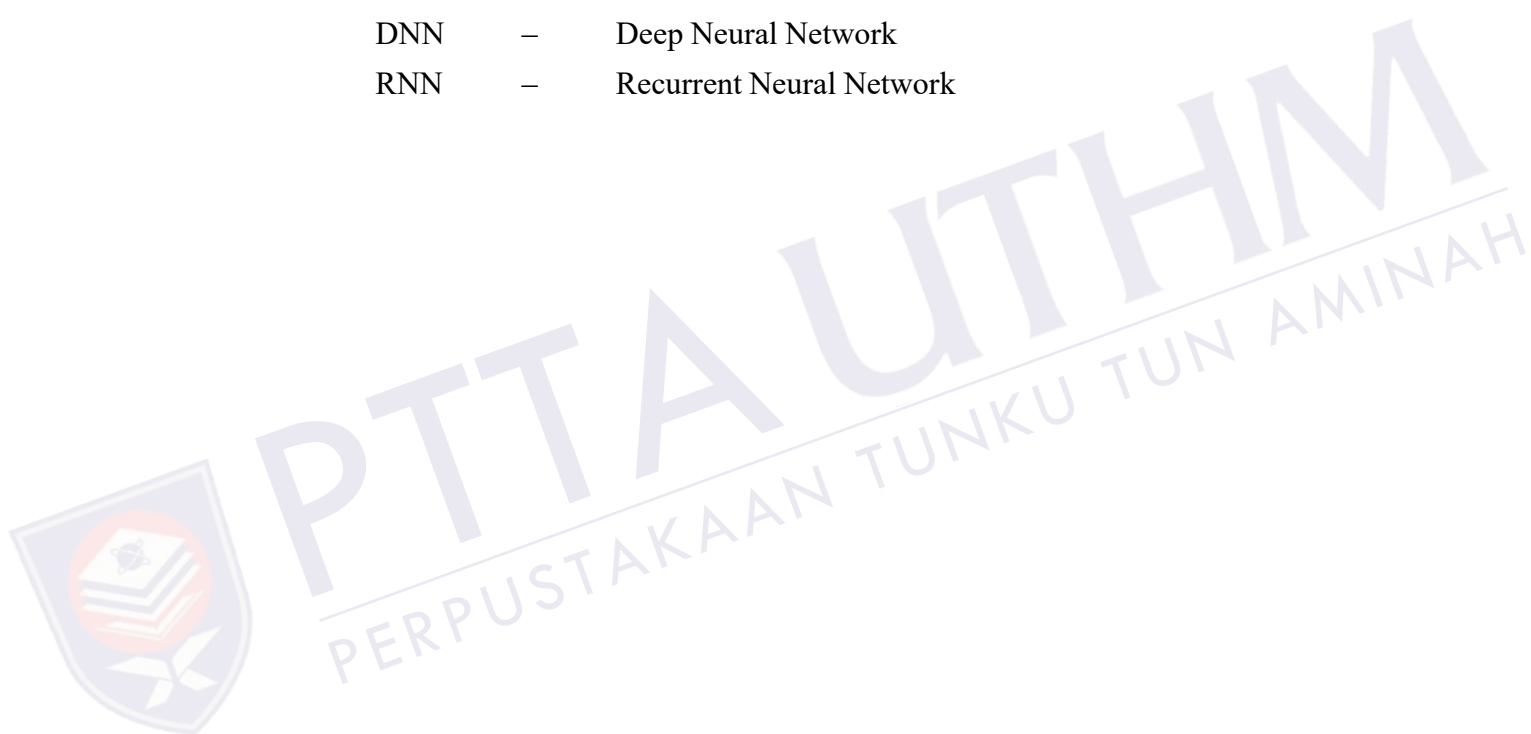
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LIST OF ABBREVIATIONS

DL	–	Deep Learning
EAS	–	Employees Attendance System
CNN	–	Convolutional Neural Network
IoT	–	Internet of Things
DNN	–	Deep Neural Network
RNN	–	Recurrent Neural Network



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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Face recognition has piqued many people's curiosity in recent years, and it has become a major topic of study. It's also a crucial process in image analysis, and creating an automated system based on face identification that can appreciate mortal face delicacy is a real problem. Working on the primer attendance problem is time-consuming, thus a lot of research has been done with the automated [1], or smart attendance operation, system to tackle the problem. However, because there are many students in the classroom, the biometric attendance operation system finds it difficult to verify each student, and it interrupts the student when the system responds to the pupil if the system cannot support discovery or recognition. Furthermore, the biometric system necessitates further discussion or negotiation with the student, who must spend some money on peripherals and, on occasion, still has time constraints. The research into real-time facial recognition has been a long and arduous process with the attendance management system. Automatic attendance marking can solve problems like the inaccuracy in the first attendance when the academic office enters data from a distance into the system. We know that we can't guarantee that the data in the university office is 100 percent correct, which is a concern when we use the traditional system of attendance marking in the university, which has a large number of scholars enrolled at any given time, multiple departments, and multiple classes in the council. The attendance marking system has evolved into a difficult, engaging, and real-time system. It's difficult to track a hand's attendance in a huge corporation, especially when there are so many employees [2].

1.1.1 Face Recognition

Once a new system is invented we might thought this is a face recognition system due to trends nowadays, face recognition system has received a lot of attention recently, the wide range of applications it can be used for, such as access control, surveillance and security, workforce profiling, and biometric. Even though the fact that a significant amount of man hours and resources have already been invested in the subject, It is still a very appealing sector to enter because most of the work done basically on the computer, many companies have implemented this system on their establishments in different system of feature, which refers to many resources than traditional PCs [3].

1.1.2 Machine Learning

Machine learning (ML) is a kind of artificial methods which is used for discovering knowledge from massive data for making better intelligent decisions. Machine learning algorithms categorize the learning task in three types such as supervised, unsupervised and reinforcement learning [4].

1.1.3 Deep Learning Network

Deep learning is an area of machine learning that deals with artificial neural networks, which are algorithms inspired by the structure and function of the brain. A multi-layered neural network with a high level of complexity is known as a deep neural network. Deep neural networks, often known as "deep learning" networks, are a type of machine learning in which artificial intelligence-based technologies attempt to classify and order data in ways that go beyond simple input/output protocols [5].

1.1.4 Employees Attendance System

The employees attendance system is to monitor and track the attendance of employees at work, in the past such system used to be manually by signature or clock printer, with the growth of world the system has improved gradual evolution. Employees attendance system can easily detect the employee at the check in with exact time and detect by recording the attendance automatically.

1.2 Importance of the study

The importance of this study is to be able to know the details of recognition and detection in order to specify the work of system in a good condition, furthermore, Face Recognition is a system has been used in old dynamic method, thus, this system been developed according to the Deep Learning Network as automatic system that can be functional perfectly , this study is one of the most important studies nowadays due to the demand of every attendance system or recording system that can recognise and detect the human face with good facial feature.

1.3 Problem statement

- Most companies need a lot of datasets of images to have a system that can recognise the face of employees.
- The system of face recognition has improved from time to time but still missing the performance and productivity such initial company works with manual system to key in the attendance of employees.
- System of attendance in the past can just record when you check in and check out without recording the total time hours worked to calculate for salary and claim for overtime working hours.

1.4 Objectives

1. To collect employees images as dataset in order to detect and recognise into the system.
2. To be able to recognize the faces of employees from the Webcam.
3. To design a Face Recognition PyQt App using Qt Designer for the attendance system.

1.5 Scopes of study

In order to do this project to detect a company employee face, the three limitations that decided to work with are:

- a) For dataset, the system basically builds on database such as name, date and name of employees, the GUI been used here is QtPy5.
- b) For Machine Learning , the system based on algorithms and Python programming language codes(Python 3.9) to enhance the functionality of system which can be integrated by virtual environment named as(env_Munef) which integrated by Anaconda 3 with Pycharm IDEs.
- c) For Image section, the camera_(Webcam) of laptop is used to detect and capture the image for recognising the face as a apart of detection and recognition system.

1.6 Thesis Organization

This project consists of five main chapters from chapter one until chapter five. Chapter one gives the basic idea of the project, the addressing of the problem that is to be solved and the objective of the project, which is usually a solution to the mentioned problem. In the second chapter, previous research papers that are related and used as a reference. The highlight is to study the techniques used to be implemented to a project and decide on what method is suitable. The third chapter emphasises on highlighting all the techniques that had been agreed to be used in this project. It explains all the process flow throughout the process of getting the desired output. For the following fourth chapter, the most important part which is the results of this project are discussed, the output and results of full features of detecting and recognition and system been used. The last chapter is the 5th chapter that going to conclude the system of project and recommendations.



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CHAPTER 2

LITERATURE REVIEW

2.1 Overview

A Face recognition system is a system that has been gradually developed and investigated in order to obtain a suitable system that is applicable and performs well. Since face recognition systems were first developed, several studies have been conducted, firstly, they have started doing system with the normal camera that can save and record the employee face, then improved by using face detection in order to recognise the employee, the next improvement was with good technology to include the IoT which is Internet of Things, this feature has added a lot of development to the face recognition system. Furthermore, system has advanced and developed with a wide range of capabilities and no end to its development when it comes to Deep Learning. Previous studies of the Face Recognition System project are included in the literature review.

2.2 Libraries

All the implementation process of the face recognition by using computer vision project been presented. Modules used are:

a) OpenCV

Intel created the Open-Source Computer Vision library, which is known as opencv. This library is cross-platform and available for free under the Apache 2 open-source licence. This library focuses mostly on real-time computer vision and includes GPU acceleration for real-time tasks.

b) CV2

In older OpenCV versions, the "cv" interface was used. When they constructed the binding generators, the OpenCV developers chose the name "cv2."

c) Face Recognition Module

This package uses Python or the command line to recognise and alter faces. It was created with deep learning and dlib's state-of-the-art face recognition. On the "labelled faces in the wild" benchmark, this model is 99.38 percent accurate. Where "Labeled Faces in the Wild" is a publicly available benchmark for face verification (also known as pair matching).

d) "Dlib" library

It's a C++-based general-purpose cross-platform software library. It's a cutting-edge C++ toolkit that includes a variety of AI algorithms and tools for building complicated software systems that tackle real-world problems.

e) "OS" Module

In Python, the OS module provides features for establishing a connection between the user and the operating system. It includes a number of helpful OS functions that may be used to complete OS-related activities and obtain all relevant information about the operating system.

f) NumPy Module

The term "Numerical Python" refers to a Python package. NumPy is a Python package that includes multidimensional array/cluster objects as well as records for array processing. A developer can use NumPy to conduct logical and mathematical operations on arrays, among other things.

g) Datetime Module

This module contains classes for manipulating dates and times, as well as the ability to integrate the current date and time in a user's programme.

h) PyQt5 Module

This is the entire Python bindings package for Qt v5. Anyone may develop an interactive desktop application with ease thanks to the facilities and simplicity given by this framework.

2.3 Previous Studies

This paper outlines a simple and effective way for keeping track of attendance. Face recognition provides an accurate method that solves ambiguities such as fraudulent attendance, high cost, and time consumption, as it is understood that any human's primary identity is their face. This system uses a face recognizer library for facial identification and attendance storage. In addition, the supervisor or parents of the absentee are notified about the absence of their employees or wards through email. The goal of this project is to improve existing projects by adding features such as massive data storage and fast processing at a lower cost of hardware [6].

Face recognition for an automatic attendance system is the focus of this research; student attendance is critical to the learning process. There are numerous methods for recording student attendance, one of which is through student signatures.

To address this, the work proposed a face-recognition-based web-based student attendance system. Convolutional Neural Networks (CNNs) are used to recognise faces in photos, deep metric learning is utilised to create facial embedding, and K-NNs are used to classify student faces in the proposed system. As a result, the computer is able to distinguish faces [7].

This related study shows automatic face recognition (AFR) systems have achieved numerous advancements. Smart Attendance with Real-Time Face Recognition is a practical option for managing student attendance systems on a daily basis. Face recognition-based attendance system is a procedure that uses high-definition monitor footage and other information technology to recognise a student's face for the purpose of taking attendance. In this face recognition project, a

computer system will be able to identify and recognise human faces in photographs or videos collected by a security camera quickly and accurately. For enhancing the performance of face recognition, a variety of algorithms and techniques have been created, but the concept to be utilised here is Deep Learning. It aids in the conversion of video frames into photos, allowing the student's face to be easily recognised for attendance purposes and the attendance database to be automatically updated [8].

The goal of this study is to create a facial recognition-based intelligent attendance system that can recognise multiple persons at once without needing to establish direct contact, utilising the Deep Convolutional Neural Network approach. According to research conducted on 16 students in a lecture, the technique can accurately record student attendance with an accuracy of 81.25 percent when the student is facing forward, 75.00 percent when the student is facing sideways, and 43.75 percent when the student is facing down [9].

According to this study, This proposed solution can easily solve the problem of absence and pupils being labelled present even when they aren't physically present. The goal of this research is to create a framework for employing facial recognition techniques like Eigenface values and Principle Component Analysis (PCA) in conjunction with Convolutional Neural Networks to create an automated attendance management system for students in a class (CNN). As a future step, a link between recognised faces and a database of student faces should be possible [10].

In this related study, For programmed facial recognition on the cloud, it comes with a tree-based deep architecture. The model divides the extra size into several sections, each with its own stick. The proposed method is evaluated across a number of publicly available data sets. The eye-to-eye link is also examined using top to bottom crafting models. The example was assessed to have precision of 98.65 percent, 99.19 percent, and 95.84 percent, according to the results of the tests [11].

The way of this study is suggested a tree-based deep model for automatic face recognition in a cloud environment. A proposed deep model consumes less computational power while maintaining accuracy. An input volume is separated into

multiple volumes in the design, each with its own tree. It is described by the branching factor and the height of a tree. Each branch is represented by a residual function that consists of a convolutional layer, batch normalisation, and a non-linear function. As can be seen, the suggested model is tested in a variety of publicly accessible databases. In addition, the performance of cutting-edge deep models for facial recognition is compared. Experiments demonstrate that the proposed model achieved accuracies of 98.65%, 99.19%, and 95.84 percent on the FEI, ORL, and LFW datasets, respectively [12].

Automatic facial recognition has brought many improvements to the world, and it is improving every day. The attendance technology we use is one of the best solutions to practical problems, which is brought about by handling the daily activities of the student attendance system. The attendance system based on facial recognition is the process of facial recognition and used to mark students' attendance. The facial biometric technology here is used by high- definition automatic surveillance video and other technologies. All the photos we get from the camera of the phone or computer will be processed accurately, and the system will automatically do everything from scratch. Many algorithms and techniques have been developed to improve the performance of face recognition, but the concept we use in this project is "deep learning". It helps to convert frame-by-frame video into images, so that students' attendance can be easily identified, and the attendance database can be easily and automatically reflected [13].

This research proposes a novel deep learning-based facial recognition attendance system. The whole procedure for creating a facial recognition model is detailed. This model is made up of many key steps created utilising the most cutting-edge techniques available today: CNN cascade for face detection and CNN for face embedding generation. The fundamental purpose of this study was to apply these cutting-edge deep learning algorithms to facial recognition problems in the real world. On a short dataset of original face photos of employees in the real-time context, the total accuracy was 95.02 percent. The proposed facial recognition model could be used as a supporting or major component for monitoring purposes in another system with or without minimal changes [14].

This work begin with a video framing which is accomplished by activating the camera using a user-friendly interface. After that, pictures are enhanced via contrast-limited adaptive histogram equalisation (CLAHE). In the face recognition process, enhanced local binary pattern (LBP) and principal component analysis (PCA) are utilised to extract features from facial images. The test images' extracted features are then compared to the training images' extracted features. Finally, the recognised student's attendance will be recorded and saved in an excel file. When two photographs per person are trained, the average recognition accuracy is 100 percent for good quality images, 94.12 percent for low-quality images, and 95.76 percent for the Yale face database [15].

This study is a previous study that made a survey on Deep learning-based models have been very successful in achieving state-of-the-art results in computer vision, speech recognition, and natural language processing tasks. These models appear to be a perfect fit for dealing with the growing number of biometric recognition difficulties, ranging from cell phone authentication to airport security. This period, we'll look at some of the most widely used public biometric recognition benchmarks. We'll also talk about some of the issues that come with employing these models, as well as some future areas for study in this area. We'll look at how deep learning can be used to recognise people's faces in particular [16].

This system verifies who is in class and sends their attendance information to an attendance database system through email. The attendance checking procedure can be more convenient for both students and instructors if the attendance is processed by an automatic attendance checking system rather than manually. This study presents an IoT-based Automatic Attendance System to achieve these benefits (IAAS).

IAAS is a facial recognition technology-based attendance monitoring system. A capturing device (such as a smartphone or tablet PC) collects student image data, which is then processed by a face recognition system. This system verifies who is in class and sends their attendance information to an attendance database system through email [17].

As it shows this previous study the most tiring task in any organisation is attendance marking. They offer an autonomous management system that can make face recognition in biometric systems subject to various real-time features such as rotation, lighting, and scale. The model was helped by a camera that captured the input image, an algorithm that detected a face from the input image, encoded and recognised it, and marked the attendance in an Excel-sheet file. The system camera first takes a picture and saves it in a database. Following that, a training process based on the image is carried out, in which the faces are recognised from the database and attendance is computed using multiple Deep Learning techniques such as the Local Binary Pattern Histogram algorithm and the Convolutional Neural Network [18].



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