

# CHAPTER I. INTRODUCTION

## 1.1. Background

In this modern era, of course, we are no strangers to technology that has developed very quickly at this time, the number of tools or a system that makes human work easier has also begun to emerge and is growing all over the world. For example, Indonesia is a country with a population of approximately 272 million people (Direktorat Jendral Kependudukan dan Pencatatan Sipil, 2021) with a device ownership rate of 76% for smartphones (Yosepha Pusparisa, 2020) and a percentage of internet usage rate 98.2% for smartphone (Wahyunanda Kusuma Pertiwi, 2021), but with a large number of existing devices, Indonesia is still outdated for the technological development, such as China which has developed much artificial intelligence (AI), where they can identify through facial recognition in public areas, but in Indonesia, they still use manual identification which can cause errors that are not realized by humans themselves. To reduce errors and increase effectiveness at work, of course, we need to take advantage of technology and implement it fundamentally in the field of an attendance system for students or public events using facial recognition technology, so the event or school attendance can be carried out efficiently and safely without additional fraud such as entrusting absent to another person or absent at an unspecified place and time.

In Indonesia, the attendance system is still quite underdeveloped, because most attendance systems in Indonesia still use a piece of paper and then sign there, gradually this method causes many problems, such as the existence of cheating "titip absen", even someone's delay in taking an absence is still cannot be detected by this method. To reduce all the shortcomings in the manual attendance system, the company surveyed to see which method was more profitable. The results prove that 48% of companies choose online attendance because it can be managed easily and accurately and then reduce the costs incurred in doing attendance (such as reducing paper for attendance) (Teknologi Talenta, 2020).

Face detection is a key procedure for other face-related technologies including face alignment, facial recognition, facial animation, facial attribute analysis, and human-computer interaction. The accuracy of the face detection system directly impacts this technology, which is why the success of face detection is very important. In a general sense, face detection aims to determine if there are faces in the image or not, and recognize those faces detected in images (S. Zhang et al., 2019).

The face recognition technology as an identification tool certainly still has considerable weaknesses in terms of face authentication, traditional face recognition cannot effectively

recognize a person's face in certain positions. To be able to maximize this, it is necessary to refine the existing facial recognition approach by relying on all the feature points on a person's face, so that verification can be done very accurately (Deng et al., 2019).

On the journal entitled “Penerapan Facial Landmark Point untuk Klasifikasi Jenis Kelamin berdasarkan Citra Wajah”, The face of each individual contains several different information. Examples are expression, gender, age, and also race, Therefore, in biometrics technology or biological data recognition technology, faces can be used as identification (Ulla Delfana Rosiani et al., 2020). Based on research entitled “Comparison of Geometric Features and Color Features for Face Recognition”, performance analysis with Geometric Features and Color Features combined will make the results more accurate and the mean accuracy between three models resulted: GNB with an average accuracy of 74.67 %, KNN K=5 w with an average accuracy of 72.1%, and SVM one to one with an average accuracy of 74.83%. And the good condition of the dataset must be set to gain optimum accuracy (Rahmad et al., 2021).

Based on research entitled “Haar Cascade and Convolutional Neural Network Face Detection in Client-Side for Cloud Computing Face Recognition”, In six types of test data (Normal Face, Expression Face, Face with Mask, Face with some Obstacles, Face with Glasses, and More than one Face) using Haar Cascade, an average accuracy of 81.12% was obtained, and compared to using CNN, an accuracy of 86.53% was obtained. Haar Cascade can detect multi-user faces (more than one) is superior by detecting simultaneously without interference which face is more dominant (Andrie Asmara et al., 2021).

Based on the previous research entitled “RetinaFace: Single-stage Dense Face Localization in the Wild” resulted in the conclusion that the RetinaFace method has outperformed the most advanced state-of-art methods for face detection today. With stable face detection in various poses, when RetinaFace is combined with existing state-of-art methods for face detection, it will certainly increase the accuracy of face detection (Deng et al., 2019).

One of the areas of focus in the computer vision community right now is recognition of micro-expressions, which has gained a great attention from academics in recent years. Tracking point facial features have been studied for facial expression identification, particularly macro-expressions, and have shown impressive results in some research. Implementing the tracking points function has the benefit of consuming less time because it can occasionally be used for expression (Asmara et al., 2019).

From this explanation, the method that will be used in this research is CNN to recognize faces optimally. The system will be developed in mobile application because it has been proven above that quite a lot of Indonesians access the internet The attendance using smartphones and

mobile device is designed for highly efficient face localization and recognition that can give high speed real-time recognition (Ulla Delfana Rosiani et al., 2020). This system will mainly develop for offline events (required for a participant to come to event place) such as graduation, music festival, and offline seminars, and support online events such as video conference seminar(Deng et al., 2018).

The attendance system will follow plan that organizers choose, and it is hoped that this research and development can produce good facial recognition accuracy and good attendance system.

## **1.2 Research Problem**

1. How to reduce “titip absen” shortcomings in attendance system?
2. How to recognize faces with various poses and various image condition using the CNN?
3. How is the accuracy of face recognition with various poses and various image condition using CNN?
4. How to implement face recognition system in attendance system?
5. How to implement automatic time and place detection and addition in attendance system?
6. How to make an automatic digital reports of attendance system?

## **1.3 Research Scope**

1. Use Python 3.x Programming Language
2. Using CNN Method
3. Clear lighting conditions
4. Using Mobile Platform
5. Cloud serverless
6. Online Location Feature

## **1.4 Objectives**

The purpose of doing a thesis with the title "FACE RECOGNITION ATTENDANCE SYSTEM USING CNN", are as follows:

- Building a facial recognition model by implementing the CNN method
- Knowing the accuracy and effectiveness of facial recognition system using CNN
- Creating attendance application with advanced face detection method

## **1.5 Benefit**

The research carried out is expected to have the benefit of being a prototype in the development of existing facial recognition technology with most advanced method that

available in face detection method and can be used for the development of existing technology in Indonesia, especially the Politeknik Negeri Malang.

## **1.6. Writing System**

The systematics of writing this thesis report is structured to provide an overview of the research conducted. The systematics of writing this thesis are as follows:

### **BAB I. INTRODUCTION**

This chapter describes the background in the research, formulates the core problems faced in this research, determines the objectives and limitations of this research and the systematics of writing.

### **BAB II. LITERATURE STUDY**

This chapter describes the previous research that was used as a reference for this research and discusses various basic concepts and theories related to the topic of the research and development carried out.

### **BAB III. RESEARCH METHODOLOGY**

This chapter describes the methods used in research and development such as methods of target market analysis, data collection, system description and development method.

### **BAB IV. SYSTEM ANALYSIS AND DESIGN**

This chapter describes the general description of this research and development along with a description of the flow of the program. In addition, this chapter describes an overview of the database system and UI that will be used.

### **BAB V. IMPLEMENTATION AND TESTING**

This chapter describes the application of the system that has been designed by the author. This chapter contains the results of the implementation to the database, the program and the results of the tests carried out.

### **BAB VI. RESULTS AND DISCUSSION**

This chapter contains the sequence in the system testing process and a discussion of the system test results.

### **BAB VII. CONCLUSIONS AND SUGGESTIONS**

This chapter contains conclusions and suggestions from undergraduate thesis research and development.