

CHAPTER 1

INTRODUCTION

1.1 Background

Attendance system is one of the most important aspects of an academic organization. Its purpose is to record students' attendance for assessment or even passing requirements [1]. There are two categories of attendance system: conventional and automated. The most popular conventional method is the attendance register, a piece of paper consisting of names of people which they sign if they are present in the event. Automated methods include scanning ID card barcode and fingerprint identification [2].

Manual attendance system is known to be prone to inaccuracy. In a university scenario, a student might sign another student's name. There are also possibilities of the lecturer or the administration office losing the attendance register [3]. In addition, having to manually recap the register is a tiresome job which usually causes the person to do it quickly without paying attention to the faultlessness.

Automated attendance system, on the other hand, provides better accuracy. Most people would be reluctant to lend their ID card to another person, and fingerprint identification means that the person needs to be physically present at the event. Furthermore, all records are automatically stored as is, making the data more valid.

Although widely used and provide a better accuracy than the manual system, ID card scanning and fingerprint identification are still not efficient as it can be a waste of time. Prior to entering a classroom or a work cubicle, a person needs to go to a certain place to scan their ID card or fingerprint to record their attendance. During rush hour, a queue might form which can caused lateness.

That is why the writer proposes another method to record attendance using the facial recognition technology. The proposed system utilizes common device such as CCTV cameras to do an automatic detection of the people recorded, identifies the identity of each person, then automatically record their attendance. This method can provide a better accuracy than the manual system and is more efficient than ID card and fingerprint identification.

1.2 Research Question

The main problem that is going to be discussed in this paper is to design an automatic attendance system using facial recognition. The research questions are:

1. How are Discrete Wavelet Transform and Discrete Cosine Transform implemented in image processing?
2. How is Support Vector Machine implemented to develop an automatic attendance system using facial recognition?

1.3 Research Objectives

The objectives of this research are:

1. Implementing Discrete Wavelet Transform and Discrete Cosine Transform for image processing.
2. Implementing Support Vector Machine to develop an automatic attendance system using facial recognition.

1.4 Limitations

Some limitations that are applied in this research are:

1. The data used are obtained from pictures taken of some students in a classroom setting in Universitas Pelita Harapan. The SVM model is only able to recognize people from this data. To perform recognition on other people, the model needs to be retrained.
2. Discrete Cosine Transform will be performed using the type II definition of DCT from the SciPy library.
3. For cases when there are tied classes during the SVM model training phase, all data in the tied class area will be classified as the first class among the tied classes.

1.5 Significance of the Study

1.5.1 Theoretical Significance

1. Research outcomes can be used to give a broader knowledge on how to implement Discrete Wavelet Transform, Discrete Cosine Transform, and Support Vector Machine for facial recognition.

1.5.2 Practical Significance

1. Research outcomes can be used to develop an automated attendance system using facial recognition.
2. Research outcomes can be used to develop various applications involving facial recognition.

1.6 Overview of Chapters

The overview of the chapters in this thesis are as follows:

1. Chapter 1 - Introduction

Chapter 1 elaborates the background of the research, the research questions, objectives, limitations, and significance of this research. Other than that, this chapter also clarifies the outline of this thesis.

2. Chapter 2 - Theoretical Framework

Chapter 2 explains the theoretical frameworks related to this thesis. The theories mentioned are on Discrete Wavelet Transform, Discrete Cosine Transform, and Support Vector Machine.

3. Chapter 3 - Methodology

Chapter 3 explains the methods that will be used to achieve the objectives of this thesis. The data used in this thesis will also be described in this chapter. The data will include sample images taken from a classroom setting in Universitas Pelita Harapan.

4. Chapter 4 - Analysis and Results

Chapter 4 shows the data processing process and the results obtained. The model used for face recognition will be shown and explained in this chapter as well.

5. Chapter 5 - Conclusions and Suggestions

Chapter 5 will summarize the results obtained from this research, as well as provide suggestions for further researches in the future.

