

# INTELLIGENT ATTENDANCE SYSTEM

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## BORANG PENGESAHAN STATUS TESIS\*

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# INTELLIGENT ATTENDANCE SYSTEM

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This report is submitted in partial fulfillment of the requirements for the  
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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
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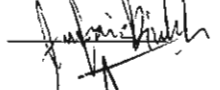
## DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized without citations.

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## **DEDICATION**

This report is dedicated to my beloved parents; friends, supervisors and my dearest to me who have provided encouragement and guidance all the way during the completion of the report.

## ACKNOWLEDGEMENTS

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Thank you.

## ABSTRACT

The purpose of this project is to develop a windows-based expert system that incorporates Image Processing technique and Artificial Neural Network in the decision making area. The main objective of the system is to assist lecturers to check the attendance of students in a classroom by counting the number of students through face detection. The system is called Intelligent Attendance System (IAS). Intelligent Attendance System is a windows-based application system which provide a steps on how the image being processed. By using this system, the users can easily understand the operation of the system on how detection and counting process have been executed to achieve the objectives. IAS has been sucessfully tested via white-box and black-box strategy. It has been fulfilled most of its functional and non functional requirement. IAS is beneficial to the lecturers during the lectures when they want to check the student's attendance.

## ABSTRAK

Projek ini bertujuan untuk membangunkan satu sistem pakar berkualiti yang menggabungkan Teknik Pemprosesan Imej dan Rangkaian Neural Buatan yang berfungsi di dalam membuat keputusan. Objektif utama sistem ini adalah untuk membantu pensyarah untuk memeriksa kehadiran pelajar di dalam kelas dengan mengira bilangan pelajar melalui pengesanan wajah. Tujuan Sistem ini dipanggil *Intelligent Attendance System (IAS)* adalah sebagai satu aplikasi *window-based* yang menyediakan langkah demi langkah bagaimana sesuatu imej diproses. Dengan menggunakan sistem ini, para pengguna boleh memahami dengan mudah operasi sistem tentang bagaimana proses pengesanan wajah dan proses pengiraan dilaksanakan bagi mencapai objektif. *IAS* telah berjaya dalam fasa pengujian melalui strategi kotak putih dan kotak hitam. Ia juga berjaya memenuhi hampir semua keperluan yang berkaitan dengan kefungsiian dan yang tidak kefungsiian. *IAS* akan memberi manfaat kepada pensyarah semasa waktu pengkuliahahan ketika hendak mengambil kehadiran pelajar.



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## CHAPTER I

### INTRODUCTION

#### 1.1 Project Background

A people counter is a device used to count the number of pedestrians walking through a door or corridor. Usually, this system is used at the entrance of a building so that the total numbers of visitors can be recorded. Intelligent Attendance System is important and has played a crucial role for marketing research (pedestrian traffic management, tourists flow estimation, etc) or in security application (in the case of an evacuation, it is essential to know how many people are inside the building at any given time).

The purpose of this project is to design and develop an intelligent system which is able to count how many people inside the building or rooms at a certain time. However, the focus of this project is just to build a simple intelligent system which is able to detect and count the total number of people inside the building without recognition of people entering and leaving the building. The area of this project is inside the university area especially in the laboratory room to check student attendance.

The current system exists is done manually as the example a lecturer who want to know how many students attend his or her class might done this manually and it might be no problem at all when involving small group of students. But what would happen if this kind of situation involving huge number of students? ; Of course it needs a lot of time to do this task



manually and there is a huge potential of unethical or misconduct behavior by the students may happen like cheating on their attendance.

## **1.2 Problems Statements**

The difficulty of lecturers to finish their syllabus and forms a labs activity according to the teaching plan might be due to the time allocated to check student's attendance. In important activities such as lab test and exams, the need of attendance is essential to ensure students are attending the activities. This can avoid the issue of missing exam papers and other unavoidable events occur. The current system exists is done manually and it needs a lot of time besides the tendency by the students to cheat. It does not seen any problem when deal with small number of students but an automated system might be necessary when manage huge number of students.

## **1.3 Objective**

In certain situation, like managing large number of people, it might be necessary to do this task intelligently so that the process of learning or any activities in the class is not interrupted. This task may look like a simple task to do it manually but it can be difficult when involving huge number of student besides the tendency of student to cheat in their attendance list. Therefore, the objective in building this such system is:

1. To design and develop intelligent attendance system by using faces detection and artificial neural network.

2. To reduce human effort (lecturers) in terms of time by doing this task manually while checking the attendance of the student.
3. To reduce the unethical behavior by the students to cheat. Indirectly, the lecturers will know the accurate number of the student in the class at any given time.

#### **1.4 Scope**

The scope for this project is concentrated in university area especially laboratory rooms. This system will be fixed in laboratory rooms to detect and count the number of students in the class. It will count the number of students in class based on the number of faces that has been detected. By using artificial neural network for detection process, the system should detect the faces of student successfully and in further action it should count those detected faces as the number of student have in a class at any given time.

#### **1.5 Project Significance**

This project will bring benefits to the university especially UTeM. By this intelligent system, it can help human (lecturers, staff and etc) in terms of time, energy and unethical behavior by the students or the community in the university.

In a close future, some improvement can be done to make this such system more intelligent, effective and can be distributed to community not only in educational area but also in many fields like commercial area (supermarket), tourism area (Resort), marketing area (marketing company to do behavior analysis on their customer) and etc.

## 1.6 Expected Output

The system should be able to processed identified images and do intelligent task to detect and count people by using some algorithm implemented with digital image processing that suit this case. The system will make decision and decide how many people in the class at any given time.

## 1.7 Conclusion

The aim of this project is to design and develop a system that could count the people in the laboratory rooms intelligently to reduce human effort in terms of time and energy when deal with huge number of student and the tendency of unethical and misconduct behavior by the students (cheating).

This simple intelligent system just has the special task to detect and count the people (student) in the class without tracking and recognizing them. Despite this system have limitation on its ability, but for sure this system can be very useful to the community in the university. In future significance, some improvement can be added to make this such system to be more intelligently, effectively functional and can be implemented in more wide area.

## CHAPTER II

### LITERATURE REVIEW AND PROJET METHODOLOGY

#### 2.1 Introduction

In software development, it will go through a several phases of techniques and methodology in order to achieve the goals or the objectives of the project. With different resources, there are several methodology phases that will go through. In this project, Matlab software and the tools inside the software has been chosen to develop the system. In this chapter, the discussions are about the fact and findings, project methodology, project requirement, and project schedule and milestone.

#### 2.2 Facts and Findings

Fact and findings is references or past researches that have been found in the internet, books, and documentation.

### 2.2.1 Domain

In every project, it is important to know what domain is it in. For this project, the aim is to develop a system for detect people and counting the number of people in a certain place (i.e. classroom) at particular time easily. The system will be used by the lecturers in university to do the task of checking attendance of the students and the number of students in a class at any given time. This system will detect whether there is a student in a class and perform counting process to count the number of student in a class. Hence, the system ability can reduce human effort, in this case lectures will save more time and energy to check the attendance of students rather than check and count them manually.

### 2.2.2 Existing System

There a lot of similar system that has been develops for people counting. Considerable of Intelligent Attendance System is based on real-time image processing. In this project, the system is developed based on digital image processing. One of them is Traffic System (Traf-Sys Inc,). It will record the traffic and counting in real time.

Their goal is to help the clients achieve higher profits by using traffic counting systems data along with the other key metrics that have always been analyzed in running a business. This way, their customers can find out how many sales they are getting in relation to the traffic, how much staff needed, how much security staff, etc. Their customers can even use the information to team with sponsors-by knowing exactly how many people go by a kiosk or display.

### 2.2.3 Technique

In this project, the artificial intelligence technique that is Neural Network will be used to train the data and learn to discriminate different texture of image. Initially, pattern recognition problems were often solved by linear and quadratic discriminants or the (non-parametric) k-nearest neighbor classifier. In the mid-eighties back-propagation learning algorithm was introduced for neural networks. Since then, neural network has obtained a widespread used in image processing. When no gold standard is available, the Self-organizing Map (SOM) is an interesting alternative to supervised techniques. The current use of ANNs in image processing exceeds the aforementioned traditional applications. The role of feed-forward ANNs and SOMs has been extended to encompass also low-level image processing tasks such as noise suppression and image enhancement. Hopfield ANNs were introduced as a tool for finding satisfactory solutions to complex (NP-complete) optimization problems.

This makes them an interesting alternative to traditional optimization algorithms for image processing tasks that can be formulated as optimization problems. The different problems addressed in the field of digital image processing can be organised into what have been chosen to call the image processing chain. Below is the following distinction between steps in the image processing chain, see Figure 2.1.

1. Preprocessing/filtering
  - Operations that give as a result a modified image with the same dimensions as the original image (e.g., contrast enhancement and noise reduction).
  
2. Data reduction/feature extraction
  - Any operation that extracts significant components from an image (window). The number of extracted features is generally smaller than the number of pixels in the input window.

### 3. Segmentation

- Any operation that partitions an image into regions those are coherent with respect to some criterion. One example is the segregation of different textures.

### 4. Object detection and recognition.

- Determining the position and, possibly, also the orientation and scale of specific objects in an image, and classifying these objects.

### 5. Image understanding.

- Obtaining high level (semantic) knowledge of what an image shows.

### 6. Optimization.

- Minimization of a criterion function which may be used for, e.g., graph matching or object delineation.

Optimization techniques are not seen as a separate step in the image processing chain but as a set of auxiliary techniques, which support the other steps. Besides the actual task performed by an algorithm, its processing capabilities are partly determined by the abstraction level of the input data. It has been distinguish between the following abstraction levels:

#### 1. Pixel level.

- The intensities of individual pixels are provided as input to the algorithm.

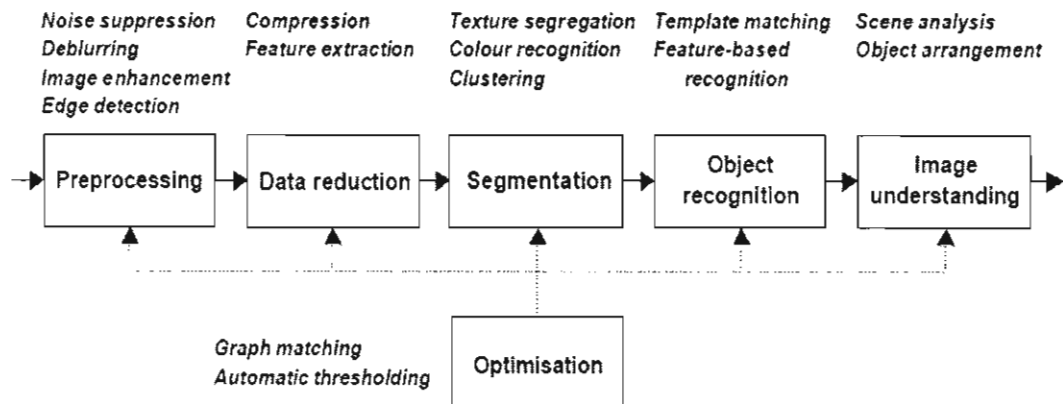
#### 2. Local feature level.

- A set of derived, pixel-based features constitutes the input.

#### 3. Structure (edge) level.

- The relative location of one or more perceptual features (e.g., edges, corners, junctions, surfaces, etc.)

4. Object level.
  - Properties of individual objects.
  
5. Object set level.
  - The mutual order and relative location of detected objects.
  
6. Scene characterisation.
  - A complete description of the scene possibly including lighting conditions, context and etc.



**Figure 2.1: Image processing chain**

### 2.3 Project Methodology

Methodology used for this project is Object-Oriented Analysis and Design as the project methodology. The following topic will explain more details about the methodology.