

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 PROJECT BACKGROUND**

Face recognition is very important for our daily life. It can be used for remote identification services for security in areas such as banking, transportation, law enforcement, and electric industries, etc. For this security access project is aimed at demonstrating facial recognition techniques that could antiquate, substitute, or otherwise, supplement, conventional key, and can be used as an alternative to existing fingerprint biometrics method. A computerized system equipped with a digital camera can identify the face of a person and determine if the person is authorized to start the vehicle. This integrated system would be able to authorize a user before switching on the vehicle with a key. Whilst facial recognition systems are by now readily available in the market, the vast majority of them are installed at large open spaces, such as in airport halls. The focus of this project is, thus, to compare the extracted feature with face image database for the recognition analysis using Neural Network.

Biometric identification is the technique of automatically identifying or verifying an individual by a physical characteristic or personal trait. The term “automatically” means the biometric identification system must identify or verify a

human characteristic or trait quickly with little or no intervention from the user. Biometric technology was developed for use in high-level security systems and law enforcement markets. The key element of biometric technology is its ability to identify a human being and enforce security. Since the beginning of time, humans have relied on facial recognition (FR) as a way to establish and verify another person's identity. FR technology isn't any different. Using software, a computer is able to locate human faces in images and then match overall facial patterns to records stored in a database.

Face recognition, although a trivial task for the human brain has proved to be extremely difficult to imitate artificially, because although commonalities exist between faces, it can vary considerably in terms of age, skin color, face angle, facial expression and presence of facial furniture such as glasses or facial hair.

Artificial neural network (ANN) is a complicated, able-to-learn, nonlinear and dynamic system. It is very useful for pattern recognition such as face recognition to increase identification accuracy and robust of the recognition system. Principle component analysis (PCA) is a statistic method. Though it can overcome some bright problem, its identifying accuracy is not very high. To overcome the problem of brightness and to increase the identifying accuracy, this project apply ANN to face recognition system. [1]

Facial recognition is one of classical applications of the Artificial Neural Network. This recognition system use neural network approach to recognize the image according to the neural network, this project use backpropagation network. The backpropagation learning is a technique discovered by Rumelhart, Hinto, and Williams in 1986 and it is a supervised learning that learns by propagating the signals through the network, computing the input and output using a feedforward network, then calculates the error values and propagates the error back through the network to adapt the weight during training. To perform this project, a simulator program, Matlab R2008a is applied in such a way that the image face can be able to assign an input pattern or to train the network. According to the Matlab software, there is a Neural Network Toolbox that helps this project to train the network.

## 1.1 PROBLEM STATEMENT

Face recognition is a pattern recognition task performed specifically on faces. It can be described as classifying a face either "known" or "unknown", after comparing it with stored known individuals. It is also desirable to have a system that has the ability of learning to recognize unknown faces. Computational models of face recognition must address several difficult problems. This difficulty arises from the fact that faces must be represented in a way that best utilizes the available face information to distinguish a particular face from all other faces. Faces pose a particularly difficult problem in this respect because all faces are similar to one another in that they contain the same set of features such as eyes, nose, and mouth arranged in roughly the same manner.

In view of the high rate of crime, fraud and terrorism in the world today, it is becoming increasingly more important to have remote monitoring systems that work well with other security devices. As security threats and frauds become increasingly rampant, it is necessary to have systems that allows recognition and monitoring of unauthorized people being in an area, using an equipment.

Identity fraud starts when an individual uses multiple identification documents such as driver's licenses, passports, visas, national Identification Card (IC), etc., under assumed identities. This is possible because in most countries, documents such as birth certificates are very easy to fake. Databases may contain facial photographs and thus in principle, have the information required to prevent duplication. However, in practice, it is impossible for a human to search over millions of photos to find those duplicates. Fortunately, computers are able to do this function. Using Face Recognition, millions of images can be checked for possible matches quickly, automatically and with phenomenal accuracy. The software returns to the investigator any matches exceeding a confidence threshold and rank these matches in terms of diminishing resemblance or likelihood of a match.

With the emergence of biometric recognition systems, it is possible to achieve the above by combining a password, for example, with a face recognition system or a