

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

In the last few decades, artificial intelligence (AI) has gained increasing popularity among researchers. AI is a new technology in computer science and is distinguished from conventional computers. Whereas its counterpart could only perform specific tasks based on instructions given or often referred as program (software), AI tries to adopt the flexibility of the human brain (Sazli, 2006)

One of the most popular branches of AI is that of artificial neural networks (ANN) (Meengoen *et al.*, 2017). ANN has been used extensively in many disciplines, including medicine (Ramesh *et al.*, 2004). ANN is an information processing system that is inspired by biological nervous system (Haykin, 2009). It consists of interconnected neurons which are capable of performing parallel computation for data processing. ANN is able to learn from training data, handle imprecise information (noise-insensitive) and generalize formerly untrained data (Ramesh *et al.*, 2004)

Neural networks can be applied for complex pattern recognition, classification problems and function estimation, but are mostly used for prediction. Due to the non-linear structure of ANN, it can reproduce any function in which conventional statistics fail to do so (Prieto *et al.*, 2016). This feature makes ANN proficient in modelling complex non-linear problems as

commonly found in biological system (Almeida, 2002). Prediction models in medicine typically use ANN for diagnostic and prognostic purposes.

The amount of researches employing ANN in medical disease prediction is increasing in the last two decades. Properly designed clinical trials are needed before ANN finds application in a real clinical setting. However, the number of clinical trials conducted is merely a few (Lisboa and Taktak, 2006). This could be due to the fact that design of most studies are retrospective cohort in which datasets could easily obtained through patient's medical records in order to satisfy ANN requirement of large dataset and presumably, since those studies yielded poor results hence unable to proceed to clinical trial phase.

Therefore, in this review, we aim to examine the application of ANN in medical disease prediction, carefully assess its modelling techniques and identify its aspects for potential improvement so that in the future, plenty of studies can generate substantial results hence more clinical trials can be conducted.

We also attempt to provide an overview of principles of ANN which include definition, components, architecture, training methods and backpropagation as comprehensive understanding is required prior the application of ANN.

## **1.2 Research Question**

How is the methodological quality of artificial neural network employed in medical disease prediction?

### **1.3 Aim of the Research**

To understand the methodological quality of artificial neural network in medical disease prediction.