DIAGNOSING HEART DISEASES USING ANN AND GA

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DIAGNOSING HEART DISEASES USING ANN AND GA

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By

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ABSTRACT

The heart is complex systems that reveals many clues about its condition in electrocardiogram (ECG), and is one of the most important organs in a human body .The walls of the heart contain myocardial tissues which contract to push the blood through the body. This contract occurs because of passing electrical current in the heart muscle the electrical current can be captured and analyzed to diagnose the heart state. This operation is done by using electrocardiograph (ECG) device; this device captures the electrical signal, filters it from noise signals, and amplifies it. Then it displays the signal on the screen or prints it on the trace paper then the doctor interprets the ECG signal to diagnose the disease.

This project discusses using artificial intelligent (AI) to process and analyze the ECG signal to diagnose the heart disease directly and display detailed report about the heart state by using the artificial neural network (ANN) after training it and finding the values of the connection weights using the genetic algorithm (GA) to choose the best values to the weights.

The GA is qualified in enhancing the weights of the ANN since the ANN is trained using the classical algorithm (back-propagation), the genetic algorithm is used as a co-training algorithm for enhancing the connection weights values and minimizing the error value.

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LIST OF ABBREVIATIONS

GA

Genetic Algorithm

ANN Artificial Neural Network

ECG Electrocardiogram

BP Back-Propagation

SDLC System Development Life Cycle

CHAPTER 1

INTRODUCTION

The human heart is a complex system that reveals many clues about its condition in electrocardiogram (ECG) signal, an example of ECG is provided in Figure 1.1. Trained physicians are able to recognize patterns in a patient's ECG signal and use them as the basis for diagnosis [1], for instance to diagnose heart ailments such as arrhythmia [2], ischemia [3, 4],or prediction of an impending heart attack [5]. Researchers have tried since the inception of computers to develop techniques and algorithms for automated processing of ECG signals for various medical applications [6, 7], whether as standalone applications or as a decision aid to physicians.

Early detection of ischemia is crucial because, in most cases, the effects of myocardial ischemia are completely reversible if detected early enough [8, 9, and 10].

However, patterns of an ECG signal are difficult to discern due to the multitude of characteristics that are embedded in the signal. As a result, researchers have focused on developing specific techniques to extract information from ECG's for specific applications.

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