Chapter 6
Literature Review

ABSTRACT

This chapter introduces different resources about noise in heart signals. It also provides a short explanation about artificial neural network (ANN), particle swarm optimization (PSO), and presents some of the previous studies related to heart signal noise removal, intelligent methods for detection of disorders, and feature extraction.

6.1 INTRODUCTION

In this chapter, various types of noise that interfere with the ECG signal are discussed in Section 6.1. In Sections 6.2 and 6.3, the basic fundamentals of artificial neural networks (ANN) and swarm intelligence (SI) are explored. In section 6.4, a literature review on previous related studies is provided. Finally the last section summarises the chapter.

6.2 NOISE IN ECG SIGNAL

There are various sources of noise including imperfect contact of electrodes to the body, machine malfunction, electrical noise from elsewhere in the body, respiration and muscle contractions, which corrupts the ECG signal (Poungponsri and Yu, 2009). The produced noise consists of low-frequency components and high-frequency components that cause baseline wander

and powerline interference, respectively (Jesmin et al., 2011). Below is a description for different types of noise in ECG signals.

6.2.1 Powerline Interference

Powerline interference is the 50 or 60 Hz pickup that is caused by improper grounding (Behbahani, 2007). This is due to an impulse or spike at 60 Hz/50 Hz harmonics which can be removed using a 60 Hz notch filter. Figure 1 shows the powerline interference that has corrupted the ECG.

6.2.2 Electrode Contact Noise

Another type of noise that is caused by poor contact between the electrodes and skin is transient interference that effectively reduces the accuracy of the measurement device. Figure 2 shows the false beat in the signal, which is because of the imperfect electrode contact. The contact may be loose

Figure 1. 60 Hz powerline interference
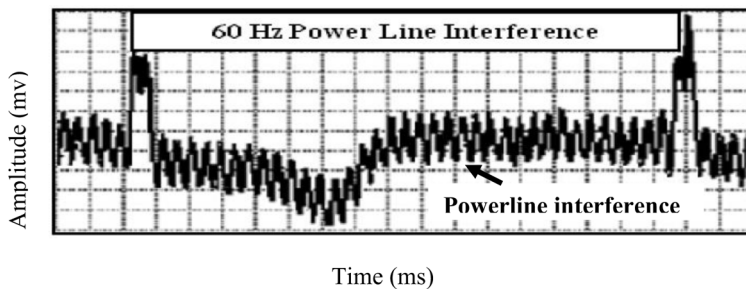
Figure 2. Electrode contact noise
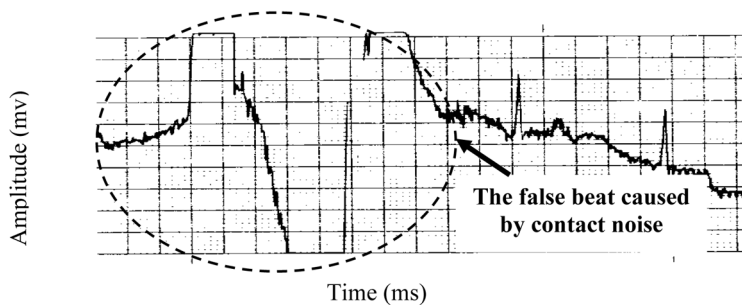
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