Entropy based feature extraction of Electrohysterogram signal for the prediction of preterm birth

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Abstract

The survival rate of preterm infants has been increased by the development in treatment methods, still premature birth increases globally. These infants are at risk of medical condition that affects the respiratory, gastrointestinal, immune, central nervous, auditory and visual systems. Better understanding of preterm birth can be utilized for the prevention of such birth. This paper explores the significance of entropy features and classification using machine learning approach. Classification of spectral energy entropy feature using Elman neural network shows better result with specificity 99.85%, sensitivity 99.92% and accuracy of 99.8875%..

Keywords: preterm birth, entropy, energy entropy, spectral entropy, spectral energy entropy, Elman neural network, Butterworth filter

I. Introduction

Preterm birth is defined as birth before 37 weeks of gestation and term as birth between 37 and 42 weeks of gestation. Preterm birth has significant effect on infant, such as risk of death and health defects [1]. Health defects include impairment to hearing, vision, the lungs, the cardiovascular system and non communicable diseases. In addition, preterm birth has effect on families, economy and society.

Preterm birth occurs for three reasons, medically induced; delivery is brought forward for the best interest of the mother or baby and because of the membranes rupture. Predicting preterm birth and diagnosing early labour have important in both health and wealth. Electrohysterography (EHG) is the electrical activity of uterus. Several studies have shown that there is significant difference in EHG signal for true and false labour.