Decision Support System for Fetus Status Evaluation Using Cardiotocograms

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Abstract : The cardiotocogram is a technical recording of the heartbeat rate and uterine contractions of a fetus during pregnancy. During pregnancy, several complications can occur to both the mother and the fetus; hence it is very crucial that medical experts are able to find technical means to check the healthiness of the mother and especially the fetus. It is very important that the fetus develops as expected in stages during the pregnancy period; however, the task of monitoring the health status of the fetus is not that which is easily achieved as the fetus is not wholly physically available to medical experts for inspection. Hence, doctors have to resort to some other tests that can give an indication of the status of the fetus. One of such diagnostic test is to obtain cardiotocograms of the fetus. From the analysis of the cardiotocograms, medical experts can determine the status of the fetus, and therefore necessary medical interventions. Generally, medical experts classify examined cardiotocograms into 'normal', 'suspect', or 'pathological'. This work presents an artificial neural network based decision support system which can filter cardiotocograms data, producing the corresponding statuses of the fetuses. The capability of artificial neural network to explore the cardiotocogram data and learn features that distinguish one class from the others has been exploited in this research. In this research, feedforward and radial basis neural networks were trained on a publicly available database to classify the processed cardiotocogram data into one of the three classes: 'normal', 'suspect', or 'pathological'. Classification accuracies of 87.8% and 89.2% were achieved during the test phase of the trained network for the feedforward and radial basis neural networks respectively. It is the hope that while the system described in this work may not be a complete replacement for a medical expert in fetus status evaluation, it can significantly reinforce the confidence in medical diagnosis reached by experts.