

A systematic review of automated pre-processing, feature extraction and classification of cardiotocography

Abbadullah H Saleh, Shahad Al-Yousif, Arie Jaenul, Wisam Al-Dayyeni, Ah Alamoodi, Ihab Jabori, Nooritawati Md Tahir, Ali Amer Ahmed Alrawi, Zafer

Abstract:

The interpretations of cardiotocography (CTG) tracings are indeed vital to monitor fetal well-being both during pregnancy and childbirth. Currently, many studies are focusing on feature extraction and CTG classification using computer vision approach in determining the most accurate diagnosis as well as monitoring the fetal well-being during pregnancy. Additionally, a fetal monitoring system would be able to perform detection and precise quantification of fetal heart rate patterns. Objective. This study aimed to perform a systematic review to describe the achievements made by the researchers, summarizing findings that have been found by previous researchers in feature extraction and CTG classification, to determine criteria and evaluation methods to the taxonomies of the proposed literature in the CTG field and to distinguish aspects from relevant research in the field of CTG. Methods. Article search was done systematically using three databases: IEEE Xplore digital library, Science Direct, and Web of Science over a period of 5 years. The literature in the medical sciences and engineering was included in the search selection to provide a broader understanding for researchers. Results. After screening 372 articles, and based on our protocol of exclusion and inclusion criteria, for the final set of articles, 50 articles were obtained. The research literature taxonomy was divided into four stages. The first stage discussed the proposed method which presented steps and algorithms in the pre-processing stage, feature extraction and classification as well as their use in CTG (20/50 papers). The second stage included the development of a system specifically on automatic feature extraction and CTG classification (7/50 papers). The third stage consisted of reviews and survey articles on automatic feature extraction and CTG classification (3/50 papers).