A Machine Learning Framework Based on Biometric Measurements for Automatic Fetal Head Anomalies Diagnosis in Ultrasound Images

Authors : Hanene Sahli, Aymen Mouelhi, Marwa Hajji, Amine Ben Slama, Mounir Sayadi, Farhat Fnaiech, Radhwane Rachdi

Abstract : Fetal abnormality is still a public health problem of interest to both mother and baby. Head defect is one of the most high-risk fetal deformities. Fetal head categorization is a sensitive task that needs a massive attention from neurological experts. In this sense, biometrical measurements can be extracted by gynecologist doctors and compared with ground truth charts to identify normal or abnormal growth. The fetal head biometric measurements such as Biparietal Diameter (BPD), Occipito-Frontal Diameter (OFD) and Head Circumference (HC) needs to be monitored, and expert should carry out its manual delineations. This work proposes a new approach to automatically compute BPD, OFD and HC based on morphological characteristics extracted from head shape. Hence, the studied data selected at the same Gestational Age (GA) from the fetal Ultrasound images (US) are classified into two categories: Normal and abnormal. The abnormal subjects include hydrocephalus, microcephaly and dolichocephaly anomalies. By the use of a support vector machines (SVM) method, this study achieved high classification for automated detection of anomalies. The proposed method is promising although it doesn't need expert interventions.

Keywords : biometric measurements, fetal head malformations, machine learning methods, US images
Conference Title : ICBEB 2018 : International Conference on Biomedical Engineering and Biosensors
Conference Location : Paris, France
Conference Dates : June 25-26, 2018