Infant cry classification to identify asphyxia using time-frequency analysis and radial basis neural networks

Abstract

A cry is the first verbal communication of infants and it is described as a loud, high-pitched sound made by infants in response to certain situations. Infant cry signals can be used to identify physical or psychological status of an infant. Recently, acoustic analysis of infant cry signal has shown promising results and it has been proven to be an excellent tool to investigate the pathological status of an infant. This paper proposes short-time Fourier transform (STFT) based time-frequency analysis of infant cry signals. Few statistical features are derived from the time-frequency plot of infant cry signals and used as features to quantify infant cry signals. Two types of radial basis neural networks such as Probabilistic Neural Network (PNN) and General Regression Neural Network are employed as classifiers for discriminating infant cry signals. Two classes of infant cry signals are considered such as normal cry signals and pathological cry signals of infants with asphyxia. For comparison, the proposed features are also tested using two neural network models such as Multilayer Perceptron (MLP) and Time-Delay Neural Network (TDNN) trained by scaled conjugate gradient algorithm. The experimental results show that the PNN and GRNN give very promising classification accuracy compared to MLP and TDNN and the proposed methods can effectively classify normal and pathological infant cries of infants with asphyxia.