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Analysis of infants cry sound using kernel sparse representation-based classifier

A. Akhavan, M.H. Moradi*

Bioelectrical Engineering Department, Faculty of Biomedical Engineering, Amirkabir University

Abstract

Processing of infant cry sound provides useful information about his/her condition. This information can be used to establish a diagnostic method to determine the infant's needs. This paper addresses the analysis of newborn babies cry sound in order to discriminate crying associated with hunger from that originating from pain. Sparse representation models are one of the state of the art processing tools in pattern recognition and machine learning. In this work a novel framework is proposed in order to deal with sparsity-based approach in a classification task. The dictionary atoms of the sparse model are designed using Mel Frequency Cepstrum Coefficient in kernel space. Performance assessment of kernel sparse representation model shows the discriminative power of this model in classifying different types of infant cry sound. In order to compare, the results of conventional sparse representation model and some other well-known classifiers (Hidden Markov Model and Support Vector Machine) are also presented. The results show that the proposed model has better performance in comparison with the other presented classifiers. Using 6-fold cross validation the kernel sparse model can distinguish two types of infant cry with more than 93% accuracy. The pain and hunger databases are recorded from 51 (19 male and 32 female) 2-3 day old healthy infants.

Keywords: Sparse Representation Model, Sparse Representation Classifier, Kernel-based model, Mel Frequency Cepstrum Coefficient, Infant cry sound.

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* Corresponding author E-mail: mhmoradi@aut.ac.ir