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(Research Article)
Multilevel pain recognition to analyze infant crying sound using fractal dimension features and logistic regression with a maximum likelihood classifier

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Abstract

In contrast to other automatic pain detection methods for infants, the diagnosis of pain through sound analysis to understand the infant's condition has not received much attention. Although extracting appropriate features from infant sounds when crying leads to desirable classification results, this requires sufficient knowledge of the features acquired and an effective selection of attributes. In this paper, several descriptors are proposed for extracting discriminative information and weighting voting in feature selection. Also, the improved logistic regression method with maximum likelihood to classify the type of pain was employed. The proposed method was evaluated by an infants sound dataset. A total recognition of 96.6% has been achieved in classifying five different levels of pain sense using different types of features. The results indicate that the optimized classification is significantly more effective than similar solutions in terms of diagnostic accuracy. Challenges such as uncertainty and the high classification errors, which often occur with the application of unseen data, have been addressed due to the adaptation ability of the proposed method. The comparative analysis illustrates the fact that by using the suggested method combined with perceptual features, significant progress has been made in the performance of multilevel diagnosis.

Keywords: Pain recognition, Infant cry, Sound processing, Feature extraction, Weighting voting, Optimized classifier.

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