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Analysis and classification of lung tissue in ultrasound images for pneumonia detection

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Abstract

Pneumonia is an infection of the lungs caused by virus, bacteria or fungi. It affects mainly children under five and can be life-threatening. Diagnosis of pneumonia is usually performed using imaging techniques such as chest radiography, ultrasound, and CT. Several studies have shown that ultrasound is an effective, safe and cost-efficient technique for pneumonia detection. However, due to the low signal-to-noise ratio of the images, this technique is highly dependent on the experience of the practitioner. This paper proposes an approach for pneumonia detection from image texture features. We used empirical mode decomposition for feature extraction, principal component analysis for dimensionality reduction and supervised learning methods for classification. Results show that features of the first mode present large differences between healthy and pneumonia patients according to the Cohen's d index. Pneumonia detection was possible with a rotation forest model with a mean accuracy of 83.33%.

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