

# Analysis and classification of lung and muscular tissues in ultrasound images using 2D wavelet transform and machine learning

## Abstract

Ultrasound has been considered a safe and accurate alternative to radiography and computerized tomography to diagnose lung diseases such as pneumonia. However, speckle noise, artifacts or certain conditions can difficult image interpretation. For example, in some cases, the pleura line cannot be observed. This work proposes an approach for discriminating between lung and muscular tissues in ultrasound images. We evaluated the symlet and daubechies wavelets for feature extraction, principal component analysis and recursive backward elimination for feature selection, and supervised learning methods for classification. Statistical moments and the energy of the second horizontal coefficient and peak-to-peak root mean squared ratio were the features more outstanding over the rest. The best model was obtained with recursive backward elimination for feature selection and knearest neighbor for classification. Tissue classification was possible with a mean accuracy of 97.5% and area under the curve of 99%. These results offer great insights on the recognition of lung and muscular tissues, which could improve the effectiveness of automatic segmentation and analysis algorithms.