

Feature Engineering for the Detection and Classification of Respiratory Sounds

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Abstract. The existence of respiratory disorders may be assessed by the auscultation of lung sounds. In fact, lung sounds are of significance as they provide valuable information on the health of the respiratory system. Auscultation-based diagnosis of pulmonary disorders relies heavily on the presence of adventitious sounds such as crackles, which occur frequently in cardiorespiratory diseases, or wheezes, which are a common clinical sign in patients with obstructive airway diseases such as asthma and COPD. Besides adventitious sounds, cough is a key symptom in the diagnosis of conditions such as asthma or bronchiectasis.

In this work, we propose algorithms for the detection and classification of wheezes, crackles and cough based on the design and extraction of a set of meaningful audio features (e.g., a novel feature for the detection of the wheezes signature in the spectrogram space, Teager energy and musical, pitch and low-level spectral features). To evaluate the performance of our algorithms, we created the first sizeable and publicly available dataset in the area. Our algorithms attained results on par with the state of the art, i.e., above 80% sensitivity and specificity scores in the three mentioned problems.