

Audio Signal Processing for Respiratory Evaluation within the WELCOME Project

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Abstract.

Chronic Obstructive Pulmonary Disease (COPD) is characterized by an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases, causing breathing difficulties to the patient. Nowadays, mortality and morbidity rates associated to COPD are increasing, with a prevalence in Europe ranging from 3.5% to 14%. A 2007 report from the World Health Organization (WHO)¹ predicts that, by 2030, COPD will become the fourth cause of mortality and seventh cause of morbidity worldwide.

Presently, COPD patients are discontinuously monitored, leading to frequent exacerbation episodes that cause significant negative impact on their health status and life quality. Moreover, such exacerbations have also high socio-economic impact. Among respiratory diseases, COPD is the leading cause of lost work days. In the EU, approximately 41,300 lost work days per 100,000 population are due to COPD, amounting to a total of €28.5 billion annually. In addition, inpatient care and expenses with pharmaceuticals generates costs of €2.9 billion and €2.7 billion, respectively².

The WELCOME project aims, then, to develop an integrated care approach for continuous monitoring, early diagnosis and detection of worsening events and treatment of patients suffering from COPD with comorbidities such as Chronic Heart Failure, Diabetes, Anxiety and Depression.

Within this project, processing of lung sound signals provides important diagnosis and prognosis features for evaluation of the respiratory function. Namely, automatic detection of wheezes, crackles and cough assumes particular relevance towards that goal.

In this work, we will present the main goals of the WELCOME project and, in particular, preliminary research work on the detection of crackles and cough.

¹ WHO. Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach. 2007.

²ERS European COPD White Book, ERS 2003.