7 Classification of patients with COPD using topic models-based features and nighttime data

Night-time symptoms are important indicators of impairment for many diseases and particularly for respiratory diseases as Chronic Obstructive Pulmonary Disease (COPD). This work introduces a technique for predicting the pathological condition in patients with COPD using features extracted from multimodal sensor data during night-time only. Sensor data were discretized and presented as the units composing symbols that describe subjects' night-time. The co-occurrence of these symbols in different ways and proportions during the night creates thematically coherent groups describing particular sleep modalities used for classification. We demonstrated the capabilities of our approach by applying it to a real-world COPD patient cohort showing its validity in assessing sleep in relation to the pathological condition. The results showed that it is possible to differentiate between healthy subjects and patients with COPD with 94% accuracy and to classifying the level of the disease and dyspnoea severity with an accuracy of 94% and 93%, respectively.

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