SLEEP APNEA-HYPOPNEA QUANTIFICATION BY CARDIOVASCULAR DATA ANALYSIS

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Abstract

Sleep apnea is the most common sleep disturbance and its detection relies on a polysomnography, i.e., a combination of several medical examinations performed during a monitored sleep night. In order to detect occurrences of sleep apnea without the need of combined recordings, we focus our efforts on extracting a quantifier related to the events of sleep apnea from a cardiovascular time series, namely systolic blood pressure (SBP). Physiologic time series are generally highly nonstationary and entrap the application of conventional tools that require a stationary condition. In our study, data nonstationarities are uncovered by a segmentation procedure which splits the signal into stationary patches, providing local quantities such as mean and variance of the SBP signal in each stationary patch, as well as its duration $L$. We analysed the data of 26 apneic diagnosed individuals, divided into hypertensive and normotensive groups, and compared the results with those of a control group. From the segmentation procedure, we identified that the average duration $\langle L \rangle$, as well as the average variance $\langle \sigma^2 \rangle$, are correlated to the apnea-hypoapnea index (AHI), previously obtained by polysomnographic exams. Moreover, our results unveil an oscillatory pattern in apneic subjects, whose amplitude $S^*$ is also correlated with AHI. All these quantities allow to separate apneic individuals, with an accuracy of at least 79%. Therefore, they provide alternative criteria to detect sleep apnea based on a single time series, the systolic blood pressure.
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REFERENCES