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 $S^\star$ 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.

References

[1] S. Camargo, M. Riedl, C. Anteneodo, J. Kurths, T. Penzel, N. Wessel, *Sleep apnea-hypopnea quantification by cardiovascular data analysis* PLoS ONE **9** e107581, (2014)