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Automatic artifacts and arousals detection in whole-night sleep EEG recordings.

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Abstract

Background. In sleep electroencephalographic (EEG) signals, artifacts and arousals marking are usually part of the processing. This visual inspection by a human expert has two main drawbacks: it is very time consuming and subjective.

New method. To detect artifacts and arousals in a reliable, systematic and reproducible automatic way, we developed an automatic detection based on time and frequency analysis with adapted thresholds derived from data themselves.

Results. The automatic detection performance is assessed using 5 statistic parameters, on 60 whole night sleep recordings coming from 35 healthy volunteers (male and female) aged between 19 and 26. The proposed approach proves its robustness against inter- and intra-, subjects and raters' scorings, variability. The agreement with human raters is rated overall from substantial to excellent and provides a significantly more reliable method than between human raters. **Comparison.** Existing methods detect only specific artifacts or only arousals, and/or these methods are validated on short episodes of sleep recordings, making it difficult to compare with our whole night results.

Conclusion. The method works on a whole night recording and is fully automatic, reproducible, and reliable. Furthermore the implementation of the method will be made available online as open source code.

Keywords: artifact, arousal, sleep, electroencephalography, automatic, adapted threshold, raw data.

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