# QUALITY CONTROL OF BIOMEDICAL SIGNALS

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## ABSTRACT

Up to now, quality control of biomedical signals was paid little attention. In the following experiences of an European multi-center study (SIESTA) are discussed. It is shown that significant defectiveness were found.

More than 300 all-night polysomnograms (total 16 channels of biosignals, 7 EEG, 2 EOG, 2 EMG, 1 ECG, 1 Oxygen saturation and 3 respiration channels) from eight European sleep laboratories were analyzed with this histogram method. The data were stored in EDF-format. From these data, the histograms were calculated; the histograms used for calculating the probability density function (PDF) and cumulative PFD (CPFD). Furthermore, the histogram was used to calculate the mean, standard deviation, median, several quantiles and the entropy of information.

Some recordings were incomplete, because sensors and electrodes were detached. For detecting such technical artifacts it is important to know the saturation thresholds. Unfortunately, it was found that these could not be obtained from the EDF-Header information. As a consequence, no automated overflow detection could be provided. Here the histograms were useful for identifying the saturation values visually.
Moreover, the CPDF was used for analyzing the recordings of the Oxygen saturation (SaO2). Easily, without looking at the all-night record, it could be seen which recordings were abnormal. Furthermore, the mean, standard deviation, median and quantile values were calculated without much computational effort.
Furthermore, the entropy as a measure for the signal-to-noise ratio was calculated for all recordings. Average entropy values of EEG, EOG, ECG, EMG, respiration and SaO2 - channels were 9, 9, 8, 7, 10, and 3 bits, respectively.

The experience from the SIESTA project underlines the need and importance of quality control for biomedical signals. In case of the Oxygen-saturation it is recommend to take measures for increasing the resolution. Furthermore, the saturation values of each channel should be stored in order to be able to perform an automated overflow detection. Finally, using the presented quality control, an objective comparison my means of quantifying the data quality is possible.

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