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EEG signal segmentation for assessing the time-course of brain response to stimuli

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Signal detected by electroencephalography (EEG) exhibits a power spectrum with a predominant $1/f$ component. As such, the signal is nonstationary. When EEG is applied to the study of cortical response to stimuli, the event-related potential (ERP) technique is commonly used.
It led to innumerable insights into the mechanisms of cognition. However, it has significant limitations:
A) it relies on averaging the EEG signal around the stimuli over many experimental trials; as such, it does not fully exploit the data's non-stationarity,
B) it requires careful pre-processing of the signals to ensure reliable results.

We propose an alternative technique utilizing an algorithm introduced by Camargo et al. (2011), which recursively divides the series into segments based on maximizing statistical distance between them.
We compare the original algorithm utilizing the KS-statistic with the potentially better-suited AD-statistic, and validate both variants on synthetic data.
We then validate the method's performance on standardized EEG recordings from the ERP CORE dataset and compare it with the ERP technique, including testing of the impact of pre-processing steps.

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