A minireview on the use of wavelet analyses on physiological signals to diagnose and characterize ADHD

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Abstract

Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent psychological disorders in pediatric patients. The actual golden standard of ADHD diagnosis is based on conclusions derived from clinical questionnaires. Nowadays, there is no quantitative measurement performed with any imaging system (MRI, PET, EEG, etc.) that can be considered as a golden standard for this diagnosis. This issue, is highlighted by the existence of international competitions focused on the production of a technological (quantitative) solution capable of complementing ADHD diagnosis (ADHD-200 Global Competition). Wavelet analysis, on the other hand, is a flexible mathematical tool that can be used for information and data processing. Its advantage over other types of mathematical transformations is its ability to decompose a signal into two parameters (frequency and time). Based on the prevalence of ADHD and the extra functionality of wavelet tools, this review will try to answer the following question: How have wavelet analyses been used to complement diagnosis and characterization of ADHD? It will be shown that applications were not casual and limited to time-frequency decomposition, noise removal or down sampling of signals, but were pivotal for construction of learning networks, specific parameterization of signals or calculations of connectivity between brain nodes.