

عنوان مقاله:

Evaluating the Effect of Quran Memorizing on the Event-related Potential Features by Using Graphs Created from the Neural Gas Networks

محل انتشار:

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خلاصه مقاله:

Background: Quran memorizing causes a state of trance, which its result is the changes in the amplitude and time of P₃₀₀ and N₂₀₀ components in the event related potential (ERP) signal. Nevertheless, a limited number of studies that have examined the effects of Quran memorizing on brain signals to enhance relaxation and attention, and improve the lives of patients with autism and stroke, generally have not presented any analysis based on comparing structural differences relevant to features extracted from ERP signal obtained from the two groups of Quran memorizer and nonmemorizer by using the hybrid of graph theory and competitive networks. Methods: In this study, we investigated structural differences relevant to the graph obtained from the weight of neural gas (NG) and growing NG (GNG) networks trained by features extracted from the ERP signal recorded from two groups during the PRM test. In this analysis, we actually estimated the ERP signal by averaging the brain background data in the recovery phase. Then, we extracted six features related to the power and the complexity of these signals and selected optimal channels in each of the features by using the t test analysis. Then, these features extracted from the optimal channels are applied for developing the NG and GNG networks. Finally, we evaluated different parameters calculated from graphs, in which their connection matrix was obtained from the weight matrix of the networks. Results: The outcomes of this analysis show that increasing the power of low frequency components and the power ratio of low frequency components to high frequency components in the memorizers, which represents patience, concentration, and relaxation, is more than that of the nonmemorizers. These outcomes also show that the optimal channels in different features, which were often in frontal, peritoneal, and occipital regions, had a significant difference ($P < 0.05$). It is remarkable that two parameters of the graphs established based on two competitive networks, i.e. average path length and the average of the weights in the memorizers, were larger than the nonmemorizers, which means more data scattering in this group. Conclusion: This condition in the mentioned graphs suggests that the Quran memorizing causes a significant change in ERP signals, so that its features have usually more scattering

کلمات کلیدی:

Event-related potential signal, neural gas and growing neural gas networks, Quran memorizer and nonmemorizer, visual memory

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