عنوان مقاله:

Artificial Neural Network in Autism Spectrum Disorder Diagnosis Based on Quantitative Electroencephalography

محل انتشار:

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خلاصه مقاله:

Background: Early diagnosis of autism spectrum disorder (ASD) is essential because the challenges that ASD children and their parents face will be managed better by developmental and behavioral intervention at earlier ages. Objectives: This study aims to diagnose ASD based on electroencephalography (EEG) with the help of an artificial neural network (ANN). Materials & Methods: The statistical population includes all girls and boys aged ۳ to ۷ years referred to child psychiatry and neurodevelopmental centers in Mashhad City, Iran. A total of ۳۴ children with ASD (۵ girls and ۲۹ boys) and ۱۱ children without any neurodevelopmental disorders (۸ girls and ۳ boys) participated in this study. EEG signals were recorded through C۳ and C۴ channels based on the standard ۱۰-۲۰ system. With the help of programming codes, the absolute power of the frequency bands (delta, theta, alpha, mu rhythm, beta, and gamma) was extracted from the brain signals of the samples. Results: This study showed a significant difference in mu rhythm between the two groups. The classification result based on discriminant function analysis in two groups gave a sensitivity of ۶۷.۶% in the third stage of EEG recording. Seven band frequencies were used as features for ANN inputs. The results indicated that the radial basis function network with ۴۰۲ neurons in the hidden layer accurately diagnosed and classified the EEG signals of ASD children from non-neurodevelopmental children (mean square error=۱.۲۲۳۲۵e-۵). Conclusion: It can be concluded that band frequencies are notable features in diagnosing ASD.

کلمات کلیدی:

Autism spectrum disorder, Electroencephalography, Diagnosis