عنوان مقاله:

Feature Extraction of Visual Evoked Potentials Using Wavelet Transform and Singular Value Decomposition

محل انتشار:

مجله فیزیک پزشکی ایران, دوره 15, شماره 4 (سال: 1397)

تعداد صفحات اصل مقاله: 9

نویسندگان:

Ahmed Almurshedi - *Department of Medical Physics, College of Science, Al-Karkh University of Science*

Abd Khamim Ismail - *Department of Physics, Faculty of Science, Universiti Teknologi Malaysia*

Najwa Sulaiman - *Department of Medical Physics, College of Science, Al-Karkh University of Science*

خلاصه مقاله:

Introduction: Brain visual evoked potential (VEP) signals are commonly known to be accompanied by high levels of background noise typically from the spontaneous background brain activity of electroencephalography (EEG) signals. Material and Methods: A model based on dyadic filter bank, discrete wavelet transform (DWT), and singular value decomposition (SVD) was developed to analyze the raw data of visual evoked potentials and extract time-locked signals with external visual stimulation. A bio-amplifier (iERG 100P) and data acquisition system (OMB-DAQ-3000) were utilized to record EEG raw data from the human scalp. MATLAB Data Acquisition Toolbox, Wavelet Toolbox, and Simulink model were employed to analyze EEG signals and extract VEP responses. Results: Results were verified in Simulink environment for the real recorded EEG data. The proposed model allowed precise decomposition and classification of VEP signals through the combined operation of DWT and SVD. DWT was successfully used for the decomposition of VEP signals to different frequencies followed by SVD for feature extraction and classification. Conclusion: The visual and quantitative results indicated that the impact of the proposed technique of combining DWT and SVD was promising. Combining the two techniques led to a two-fold increase in the impact of peak signal to noise ratio of all the tested signals compared to using each technique individually.

کلمات کلیدی:

classification, Feature Extraction, Singular Value Decomposition (SVD), Visual Evoked Potentials Wavelet Transform

لینک ثابت مقاله در پایگاه سیویلیکا:

https://civilica.com/doc/893221