Guess the Number - applying a simple brain-computer interface to school-age children

Although research into brain-computer interfaces is more common in recent years, studies concerning large groups of specific subjects are still lacking. This paper describes a simple brain-computer interface (BCI) experiment that was performed on a group of over 200 school-age children using the technique and methods of event related potentials. In the first phase, experimental data were recorded in various elementary and secondary schools, mainly in the Pilsen region of the Czech Republic. The task was to guess the number between 1 and 9 that the measured subject thinks on. Concurrently, a human expert made a decision about the target number based on averaged P300 waveforms observed on-line. In the second phase, an application for automatic classification was developed for off-line data. A small subset of the data was used for training; the rest of the data was used to evaluate the accuracy of classification. Two feature extraction methods were compared; subsampling and discrete wavelet transform for feature extraction. Multi-layer perceptron was used for classification. The human expert achieved the accuracy of 67.6%, while some of the automatic algorithms were able to significantly outperform the expert; the maximum classification accuracy reached 77.2%.

21.02.2016   ?ím