Applicability of automatic classification of multifocal visual evoked potentials signals in multiple sclerosis assessment.

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Introduction: The purpose of this project is to explore the applicability of automatic classification of multifocal visual evoked potential (mfVEPs) signals for future research and clinical diagnosis in patients with Multiple Sclerosis (MS). The k-nearest neighbor's algorithm (k-NN) is a non-parametric method used for automatic classification, where a test sample is assigned the class most frequently represented among the k nearest training samples.

Methods: MfVEP amplitude and latency from 33 patients with MS and 22 control subjects were examined. The eyes of MS subjects were also marked as Optic Neuritis affected (ON) and no affected (noON). Typical 60 sectors per eye mfVEP division were used. Amplitude was computed as signal to noise ratio and latency was computed as cross correlation using as reference a control template (monocular) or fellow eye (interocular). To avoid statistical correlation bias only one eye for each individual was used for comparison between the groups. The input features set was constructed as 60sectors x 3 parameters. The distance function was fixed to Euclidean.

Results: The accuracy obtained to classified between control and MS patients was 95.8%. Once, identified the MS subjects, another K-NN classifier obtains an 71.1% accuracy discrimination between ON and noON eyes. Parallel pool computation was used to reduced computing time to 1.87 and 1.18 seconds in each case. The best values were obtained for K=1.

Conclusion: Good classification accuracy results were obtained between control and patients and moderate for ON and noon. Our results suggest that automatic classifier as k-NN used in combination with the actual techniques (MRI, OCT) could improve multiple sclerosis diagnosis.