EEG SINGLE-TRIAL CLASSIFICATION OF VISUAL ART PREFERENCE

Marc Welter, J Casal Martínez, E Redmond, Jonathan Baum, Tomas Ward, Fabien Lotte

EEG SINGLE-TRIAL CLASSIFICATION OF VISUAL ART PREFERENCE

M. Welter[1], J. Casal Martínez[2], E. Redmond[3], J. Baum[1], T. Ward[3], F. Lotte[1]

[1]Inria Centre at the University of Bordeaux / LaBRI, France
[2] Valencia Polytechnic University, Spain
[3] Dublin City University, Ireland

E-mail: marc.welter@inria.fr

Brain-Computer-Interfaces (BCIs) able to decode aesthetic preference could improve user experience in digital spaces by personalizing aesthetic stimuli selection without requiring explicit user feedback that might interrupt aesthetic experience. However, neuroscientific understanding of aesthetic experience remains lacking, while the tried and tested BCI classification algorithms have not yet been applied to decode aesthetic preferences from Electroencephalography (EEG) signals. We thus conducted an experiment in which 13 participants were exposed to 120 visual artworks in a virtual museum and requested to grade their preferences for each of them, all this while their EEG was being measured. Previous neuroaesthetic research suggested that oscillatory modulations in different neural frequency bands could be informative of aesthetic preference. Therefore, we tested a time-frequency feature classification method widely used in BCIs, i.e. Filterbank Common Spatial Patterns feature extraction together with shrinkage Linear Discriminant Analysis, in a 2-class single-trial aesthetic preference classification problem. Artefacts were removed using Independent Component Analysis. We report promising offline aesthetic preference decoding accuracies with a mean of 0.798% $\pm$ 0.162 (see Figure 1). Despite the relatively high classification

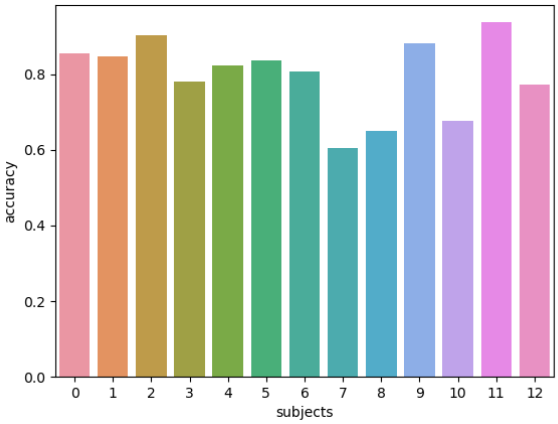

Figure 1: Mean Aesthetic Preference Classification Scores For All Subjects

performance, closing the gap towards online aesthetic preference decoding remains challenging. Many BCIs require training on balanced data samples. However, it is

often uncertain beforehand whether an individual will like an artwork of not. Objective properties of an artwork, such as symmetry or complexity, have been correlated with aesthetic ratings and could be used to estimate aesthetic preference a priori. In conclusion, aesthetic preference decoding BCIs seem feasible, but future work needs to investigate optimal training data selection during online calibration.