STUDYING THE FEASIBILITY OF USING BRAIN-COMPUTER INTERFACES TO LOCATE MISSING PEOPLE

Gabriel Aversano, Victor Cho, Dr. Miguel Vargas Martin
Faculty of Business and Information Technology, University of Ontario Institute of Technology, Oshawa ON

SUMMARY

Low-cost, non-invasive electroencephalography (EEG) headsets are becoming increasingly popular over recent years. Most noteworthy is the adaptation of brain-computer interfaces (BCIs) by non-academic personnel. BCIs are devices that utilize the brainwave information collected by the EEG headset as input to perform a certain task. We hope to utilize the information captured by BCIs to determine the location of missing people.

BACKGROUND

According to the National Centre of Missing Persons and Unidentified Remains, over 60,000 people went missing in Canada in 2013 [1]. Today, the authorities use methods such as hotlines to obtain information about missing people.

We would like to use the data from a person's subconscious mind to be able to pinpoint errors where a missing person has been seen. For example, if a person subconsciously recognizes a photo of a missing person, this data can be transmitted via the Internet to the appropriate authorities.

We believe that this technology can be used to benefit society due to the acceptance and adoption of low-cost EEG headsets in the near future.

EXPERIMENT SETUP

Subjects will be asked to focus on a computer screen while wearing the Emotiv EPOC EEG headset as pictures of famous people are shown. The subject will be asked to press a key indicate whether they consciously recognize the photo.

The photo database will contain photos of people in various disciplines to ensure the subject will recognize some people but not all. This is required as we try to differentiate subconcious data between people who are known (target) and not known (non-target).

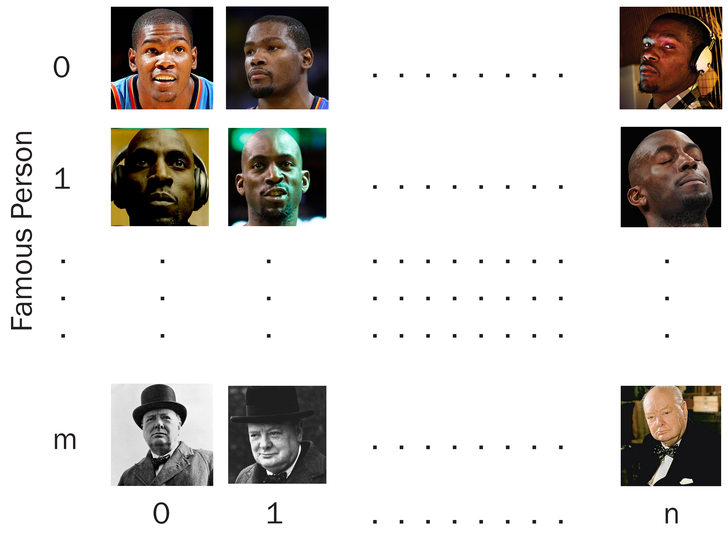

Figure 1. Photo Database Matrix.

PROJECTED RESULTS

In these experiments, we will be looking for signs of the event-related potential (ERP) at 300ms after the stimulus is shown; this is also known as a P300 wave. An exit questionnaire will be given provided with the photos and short biography of the people that the subject did not recognize. At this time if the subject recognizes the image, it will be considered subconscious recognition during the experiment. We expect to see an ERP for the photos that were consciously recognized, and hope to see an ERP for those that were also subconsciously recognized. An undistinguishable wave should be seen for those that were not recognized by the subject.

Data is processed using EEGLAB, a Matlab toolbox [2]. Noise filtering in EEGLAB is crucial for accurate data.

Figure 2. Emotiv EPOC EEG Headset.

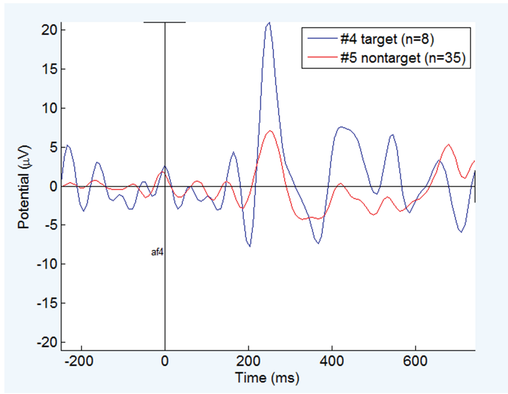

Figure 3. Example of a P300 wave.

FINAL REMARKS

These tests will only be conclusive upon completion of experiments on human subjects, which will be conducted in the very near future.

REFERENCES

[1] "Background - 2013 Fact Sheet," Canada's Missing, 23 April 2014. [Online]. Available: http://www.canadamissing.ca/pubs/-fac-ren-2013-eng.htm. [Accessed 24 June 2014].

[2] "EEGLAB - Open Source Matlab Toolbox for Electrophysiological Research", EEGLAB. [Online]. Available: http://sccn.ucsd.edu/eeglab/. [Accessed 18 Aug 2014].

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