SERVICE RESEARCH CENTER
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CGI

Master Thesis Proposal: "Using wireless brain data collection headsets to detect nonverbal preferences"

This thesis project is a co-operation between CGI and the Service Research Center (CTF) at Karlstad university. We expect the project to be quite challenging and suitable for two ambitious students.

Background

Recent developments have made it possible to measure brain activity without being strapped in a machine or being connected to wires. This opens up for many opportunities that earlier was not possible. One such possibility is to use brain reactions to assist in self-customization of services or products. First attempts have been done with a "Car finder" application (see https://www.emotiv.com/blog/intuitive-car-finder-volkswagen-schachzug/), that have been tested at car exhibitions around the world. Here customers view pictures of car attributes or models, and the user's subconscious mind is matched to preferred vehicle and color choices. The technique has though not yet been verified or developed for other purposes.

EPOC+

INSIGHT

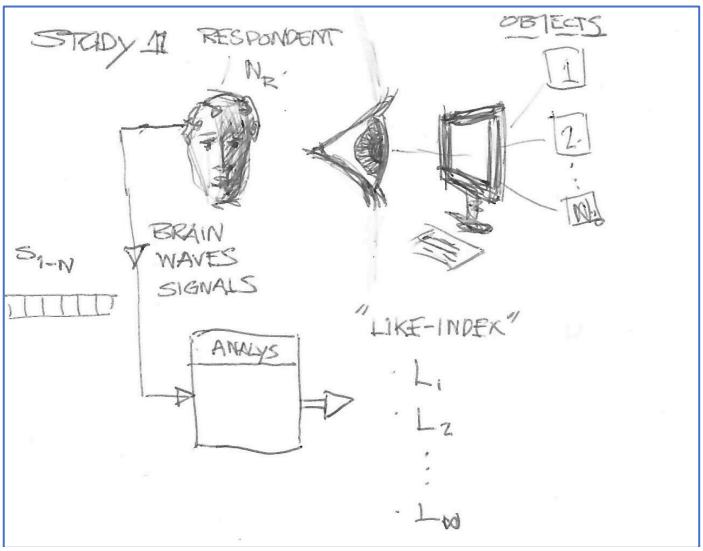
Objective and design

Emotiv is a brand developing headsets for brain measures, aiming at both regular customers and academic research. Two different headsets are at disposal in this project (see above: INSIGHT, 5-channels; EPOC+, 14-channels), that can capture different types of brain waves that can be matched to specific emotional reactions (e.g. arousal, valence, relaxation, stress).

The task for this thesis is to design a tool that can handle brainwave data triggered by visual stimuli presented on a screen, and translate this to individual preferences (a "like/dislike-score"). The context could, for instance, be self-customization of shoes where pictures of different shoe-attributes are shown to potential customers. The headset detects the brain waves that are then analyzed by an algorithm that match emotional preferences. The figure below illustrates how the intended system should function.

Functional description

N different objects O_{1-N} are displayed on a screen. Each object will trigger a specific set of brain waves S_{1-N}. "S" is composed of a number (Y) of components (C). An analysis is performed that translates the signals S_{1-N} into a set of "Like indexes" (L_{1-N}).



Project parts

<u>Part 1: Building the display/record unit</u>

A computer program will display each object (O) on a screen on demand by the test person (in 3D?). The system should then detect the brain waves (S) associated with the present object and store those for each object. As the brain react quickly to different stimuli (both on the screen and in the surrounding environment), this matching procedure must be very precise. After looking through the objects each person should thus have the data below detected. Algorithms should then compile the set of brain waves into one or several indices (to be determined during the project) that determine and maximize the emotional preferences.

Data from brain waves

	C_1	C_2	…	C_Y
S_1				
S_2				
S_N				

Part2: Establishing a like index

Each person who has looked at the objects should also assess (scale to be decided) the different objects that were shown on the screen. For each object Z different criteria (to be decided later) are used.

Data from assessment

	A_1	A_2	…	A_Z
S_1				
S_2				
S_N				

A regression analysis using the collected data will establish how the different components C should be weighted in order to have a "Like index".

Part3: Displaying the results to the user/customer

The system should at the end display the results to the user; one result based on algorithm(s) summarizing the brain waves, and one result displaying the persons own "like-score". Correlational analysis between computer-derived and person-derived choices are then performed.

Part4: Evaluation of the method

The final part consists of interviewing participants of their experiences and thoughts related to the use of the method, and their thoughts related to the results that was presented to them on the screen. This is important for future directions and potential improvements. We acknowledge though that it is hard to beforehand know how much time Part 1-3 may take, and therefore see this Part 4 as a valuable addition if applicable within the given time-frame of the master thesis project.

Contact

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