An application to test the emotion conveyed by vocal and musical signals.

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Abstract

We present an application that allows straightforwardly to built up, administer and analyze tests designed to measure the emotion conveyed by multimodal and single modal signals, among them voice, music and sounds. The application is available either as stand-alone application and, partially, as web-service.

Index Terms: emotions conveyed, emotions perceived

1. Introduction and rational

One of the main problems met by designers and developers of applications aimed to support the emotional level of the mediated communication is certainly the lack of an universally accepted model of emotions [1,9]. Of course this is due in part to the complexity of the human and in part to the still relatively short time elapsed since the emotional level started to be considered and investigated seriously also within the domain of the human-machine interaction [2]. However, we do believe that the current situation is also partially due to the lack of tools that make easy to build up, administer and analyze perception tests; in particular tests that may help to point out possible correlations among physical characteristics of the stimuli and the human perception.

The application that we present here aim to contribute to fill this gap and to enable more accurate and more extensive studies of the emotional level of human communication.

2. The application

The application was developed in Processing [3] (an open development environment based on a Java preprocessor) and is composed by two modules that can be used in stand-alone configuration: (a) test and (b) analysis.

The test module is available also as on-line service and implements most of the features offered by the stand alone version. At the present the on-line service is available as an internal service of the collaborative working and learning environment, LIFE [4]. Soon, it will be available to external users as open service from the ISIM_garage website [5].

2.1. Text module

The test module allows to build up, administer and analyze in a quantitative manner the ability to perceive the emotional nuances conveyed by any sort of signals/stimuli (voice, sounds, words/text, images, single or multiple movies). The user is allowed to combine at will all the modal channels to produce single modal or synaesthetic tests.

It is important to stress that the design of a new test does not require any modification of the code; in fact, the user has simply to provide a text file written according to a predefined format containing:

a) instructions to show to the subject (in a single or multiple languages);

b) a list of multimedia resources that one intends to present as a random sequence of stimuli (all resources should be made available in appropriate folders);

c) the physical location within the projector area (dark grey box in fig.1) where each resource has to be shown to the subject (this specification is necessary if one wishes to present simultaneously more than one picture or video).

Figure 1: Interface of the design and admin module of the application.

Figure 2: Example of finite states (above), bi-dimensional (below-left) and GEW (below-right) models of the emotions available in our applications.
Figure 1 shows the interface of the test module. In the foreground, a control panel to select the test to run. The choice of a given modal channel corresponds to filter only tests and options available for that channel. In the background you can see a window containing the information for the tester (top-left light grey rectangle), the projector area mentioned above and the area (on the right) where the graphic representation of the model of emotions selected is shown. In the case of fig. 1 one can see a representation of the Plutchik [6] model, modified for use with children of primary schools. Among other models available: Ekman [7], Plutchik standard, GEW [8], two-dimensional models [9] (see Figure 2). In addition it is possible to add sliders to obtain quantitative evaluation of any other dimension of interest. These latter, together with the scale can be defined in the test's configuration file.

Once the setting phase has been completed the control panel can be minimized and the test can start. The subject has to read the instructions, enter the required information (sex, age, etc.) and proceed on, autonomously if foreseen by the protocol. When auditory stimuli (voices, sounds and/or music) are used, the subject is asked to wear a headset. After listening to each stimulus s/he has to indicate on the graphical representation of the emotional model the emotion s/he believe has been conveyed by the stimulus. The indication on the emotional palette can be provided via mouse or wiimote, the latter can be very useful if one wants capture the change of the percept as a function of time, as in the case of musical stimuli [10].

2.2. Analysis module

Figure 2 shows the interface of the analysis module. A first control panel, top left, allow to select, through the use of appropriate filters (e.g. the age or sex of the subjects, their mother language, the tracking system used, etc.) the subset of the data to be analyzed. A second panel on the right allows to apply more specific filters to the selected data. By appropriate combinations of such filter it is possible even to analyze the performance of a single subject or to select data referring exclusively to a given stimulus (single vocal portrayals).

In the background you see the data display window within which one can visually check (left side of the window) the distribution of the mouse clicks made by the subjects that took part in test (white points on the graphical representation of the emotional model chosen to perform the tests). The right side of this window is used to plot the results of more quantitative analysis operated on the selected data set: e.g. histograms, stimulus-response matrix of confusion, stimulus-speaker and stimulus-listener matrices; these latter can be used also to identify problematic or unreliable speakers and listeners [11].

All the plots produced can be saved by clicking on the buttons located at the bottom of the data display window. The module of analysis offers also:

a) the possibility to compare the data sets obtained with different models of emotions;
b) the possibility to display the variation of the emotional percept over time (as long as tracking and recording of mouse/wiimote position as a function of time were kept active during the test session).
c) the possibility to export data in the CSV format.

We would like to stress that flexibility and immediacy of use of our application (also during data analysis) are the key factors that may encourage further researches and comparison between quantitative perceptual data and quantitative physical cues.

In conclusion it would be worthwhile to mention that our application can be used also to study the perceptual "styles" of single individuals or "categories" (provided that validated stimuli are used) [12].

3. References