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Survey on Evaluation of Facial Expressions

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Abstract: ***The facial expressions evaluation survey is born in order to find a way to extract this knowledge directly from the experts. In the issue of expressions evaluation every single human can be considered as an expert and gives his/her contribution in building this common sense knowledge. At the end of the survey we have a dataset created by a population of real human observers, from all around the world, doing different jobs, having different cultural backgrounds, ages and gender, belonging to different ethnic groups, doing the survey from different places. Finally, the analysis of the survey data will be able to provide insights for Human Computer Interaction applications.***

Keywords: Facial Expression, Evaluation, Cohn-Kannade, Survey

1. Introduction

Facial expressions are probably the most visual method to convey emotions and one of the most powerful means to relate to each other. A typical automatic system for the recognition of facial expressions is based on a representation of the expression, learned from a training set of pre-selected meaningful features. The learning process relies on the labels associated by an expert or a group of experts to the training samples. The experts are asked to associate each images in the training set to one of the expressions we are dealing with. In other words we must have label makers reliable enough and who have strong knowledge of the problem in order to ensure the correctness of what we are trying to learn. What is really important is to how get and use this knowledge. The facial expressions evaluation survey is born in order to find a way to extract this knowledge directly from the experts. In the issue of expressions evaluation every single human can be considered as an expert and gives his/her contribution in building this common sense knowledge.

At the end of the survey we have a dataset created by a population of real human observers, from all around the world, doing different jobs, having different cultural backgrounds, ages and gender, belonging to different ethnic groups, doing the survey from different places. This heterogeneity in the respondent population will give us the opportunity to investigate what are the human factors which play different roles in the perception of human expressions. At the same time, we will be able to understand what facial parts are important and what are their impact on the expression recognition task performed by different people. This is important for most of the human-human interactions, given that the face is the most extraordinary communicator, capable of accurately signaling emotion in a bare blink of a second, capable of concealing emotion equally well.

Finally, the analysis of the survey data will be able to provide insights for Human Computer Interaction applications. Indeed, any prior model built on real data can be employed in order to improve the design of an automatic human expression recognition system.

2. Database

The images used in the survey come from the Cohn-Kanade Database. The database consists of expression sequences of subjects, starting from a neutral expression and ending most of the time in the peak of the facial expression. Subjects are university students enrolled in introductory psychology classes. They ranged in age from 18 to 30 years. Subjects were instructed by an experimenter to perform a series of 23 facial displays. Six of the displays were based on descriptions of prototypic emotions (i.e, happiness, anger, fear, disgust, sadness and surprise). There are 104 subjects in the database and only 10 of them gave the consent for publications. The subset of the Cohn-Kanade Database used in this survey consists of the 1274 images of these 10 subjects (8 women and 2 men).

3. On-line Survey

The annotation process consists in associate an expression label (among a set of avail- able human expressions) to each of the images that will be presented to the survey's participant. A simple and intuitive interface has been designed in order to facilitate the annotation process:

- Choice of the language (Figure 1(a)).
- The first time the participant has to create a new account and insert a few personal information as shown in Figure 1(b). The socioeconomics fields are important for us in order to segment the labeler population based on different background knowledge, age, occupation and education. The ethnic group is relevant for us to investigate the choice behavior of people when faced to images of individuals belonging to the same or to another ethnic group.

The user can guarantee her own privacy choosing freely her own username and password. The data will be treated confidentially and only for scientific purposes. Anyway, most of the fields include a "None" option for those responders that don't want to answer.

- Once logged in her account the participant can start a survey by specifying the place where she is (home, work or other) and choosing the number of images she wants to annotate in the current survey.

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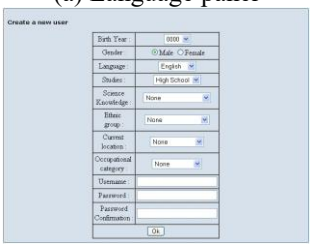
- By clicking on "Start the survey" she will start the labeling procedure for the chosen number of images.

The labeling interface is shown in Figure 1(c). For each image in the group the participant has to choose one of the available options and click on the right arrow in order to validate the current choice and pass to the next image. In the list of the available expressions we included, in addition to the seven prototypic emotions, the "I don't know" and "Other" options.

The survey can be stopped whenever the participants wants by logging off and restart from the first unlabelled image at her next login.

- At the end of the survey the participant can validate the whole survey by clicking on the "Validate survey" button.
- Each participant can take part to the survey as many times as she wants.

(a) Language panel



(b) Socio-economic form

(c) Image annotation interface

Figure 1: On line survey interface

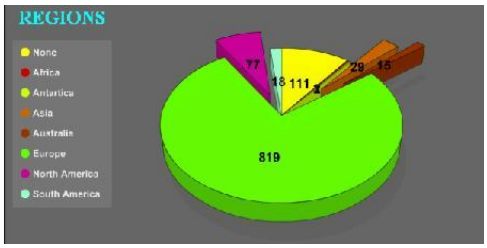
4. Collected Data

Until now 1488 participants took part to the survey for a total of around 33800 annotated images. In Figure 2-3 we reported some statistics on the participants. The 6 pie charts show how they are distributed based on their personal information:

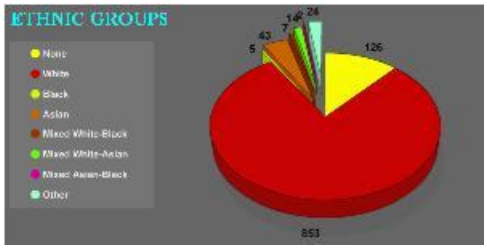
- Regions: the majority of the participants are in Europe, but we have representatives from all the populated continents.
- Ethnic groups: the white group is the most numerous one, but all the ethnicities are present with at least 2 representatives.
- Science knowledge: computer science and other not listed science branches are the 2 biggest groups for this category, but a good number of participants with social, behavioral and cognitive science background took part to the survey as well.
- Formation: almost half of the participants have a University formation.
- Ages: concerning the age of the participants the majority of them is concentrated in the interval between 18 and 30.
- Occupations: all the occupations categories are quite well represented, with prevalence for jobs in scientific domains.

The collected data will be available as a csv file (Figure 4) Each column represents:

- SurveyID: number indicating to which survey, among the set of surveys made by the current participant, the current choice belongs to.
- Image Name: name of the annotated image.
- UserID: participant identifier.
- UserBirthDate: participant birth year.
- UserLanguage: language of the interface chosen by the participant.
- UserGender: participant gender.
- UserLocation: participant location of the current survey (home, work or other).
- UserRegion: participant world region location.
- UserEthnic: participant ethnicity.
- UserScienceKW: participant science knowledge.
- UserFormation: participant school formation.
- UserJob: participant professional activity.
- UserChoice: participant expression choice.
- TimeMadeSelection: date and time of the choice.



(a)



(b)

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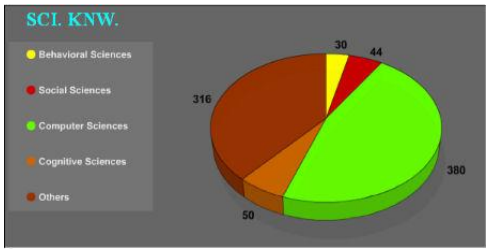
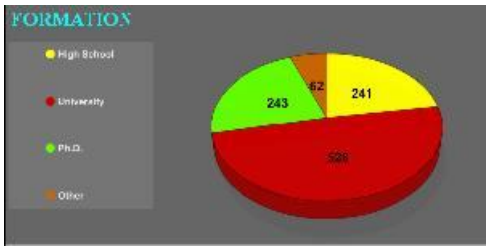
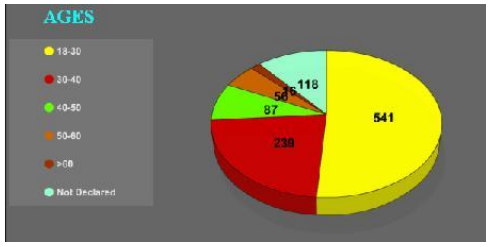


(c)

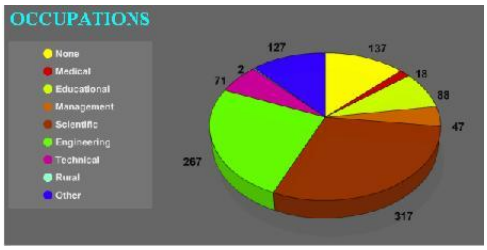
Figure 2: Survey Statistics



(a)



(b)



(c)

Figure 3: Survey statistics

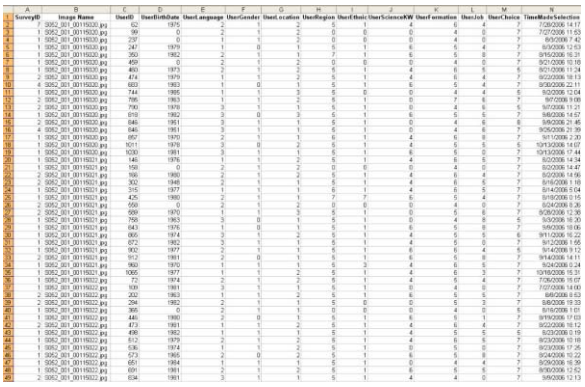


Figure 4: Surveys csv collected data

References

[1] Kanade, T., Cohn, J., Tian, Y.L., "Comprehensive database for facial expression analysis," In Proceedings of the 4th IEEE International Conference on Automatic Face and Gesture Recognition (FG'00), pp. 46-53, 2000.

Author Profile

Dr. Senthil Ragavan V K obtained his Ph.D. in CSE from Anna University, Chennai, Tamilnadu, India. Also, awarded with D.Sc. in computer Science by Corllins University. He has 16 years of teaching experience and 1 ½ years of industry experience. He has published 12 papers in National conferences and journals, 15 papers in International Conferences and Journals. He is a member of ISTE, SPIE, IETE and IEEE. His area of interest includes Data Structures and Algorithms, Network Security, Artificial Intelligence and Image Processing.

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