

Emo+Eval: Including emotions in the process of evaluating interactive systems

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ABSTRACT

We present preliminary work towards the inclusion of emotions during the evaluation of interactive systems. Our approach comprises four major phases: Selection of relevant emotions; analysis of relationships between emotions and interactive systems; selection of detection mechanisms; and application of evaluation methods.

Keywords

Emotions, evaluation, user experience, usability.

1. INTRODUCTION

Emotions are a fundamental feature exhibited by human beings. Joy, hate, disgust and many other emotions provide significance to the entire human experience. Only during recent decades it has been recognized that emotions play a key role in all activities that people perform with support from computers [1]. Perceiving emotions during system usage can be helpful to determine whether or not the user is satisfied, and that knowledge can be used to adjust and improve subsequent developments [2].

A significant number of projects (see next section) have aimed to explore emotional aspects in the evaluation of usability and user experience. Objective and subjective aspects of emotions are addressed by various methods used to evaluate interactive systems [3]. Still, existing methods have significant limitations. Moreover, in spite of the diversity of approaches, a well-defined methodology for incorporating emotions in the process of evaluating usability and user experience remains to be developed.

In this paper, we introduce Emo+Eval project, a proposal aimed to include emotions in the process of evaluating interactive systems. In the following section we briefly discuss related projects that have included emotions in the evaluation of interactive systems. Our Emo+Eval project is presented in Section 3, including details of each of its phases. Ongoing and future work is presented in the closing section.

2. RELATED WORK

We refer here to salient related projects. Several projects have aimed to strengthen existing methodologies for evaluating interactive systems, typically by identifying the emotions prompted in participants of user studies. Among others, [4] have proposed a methodology that combines verbal and non-verbal

emotion scales so as to consider traditional metrics and information about emotional reactions. A set of guidelines has been developed by Lera and Garreta-Domingo [5] for evaluating efficiently and at a low cost the affective states of users by considering their reactions during the process of evaluating interfaces. Petrie and Harrison (2009) explored the use of two techniques to study user experiences with websites and other interactive technologies: thinking aloud and a list termed Emotion Words Priming List (EWPL). The former technique was adapted using EWPL to detect affective reactions towards interactive technologies, rather than the typical usability problems [6]. Cognitive walkthroughs and Metaphors of Human Thinking (MOT) are two traditional methods that have been studied by [7] in order to compare traditional usability methods with others that consider some psychological aspects in the user.

In addition to work aimed to modify existing usability methods for considering user emotions during system evaluation, other researchers have focused efforts to develop specific methods for identifying user emotions during system or product use. Some of these methods are briefly discussed next.

PREMO is a self-report instrument that measures non-verbally both pleasant and unpleasant emotions. This includes 14 animated characters, which portray distinct emotions through dynamic facial, corporal and vocal expressions [8]. The Positive and Negative Affect Scale (PANAS) is a psychometric scale designed for measuring the independence of negative and positive affect [9]. Emocards [10] is an instrument that consists of 16 animated faces that represent eight different emotional responses. These works represent strides towards the integration of emotional aspects into the evaluation of interactive systems.

It is important to note, however, that subjectivity continues to be an issue when analyzing their results, as they rely on instruments such as questionnaires or direct observation by evaluators.

3. THE EMO+EVAL PROJECT

In this section, we present the Emo+Eval, this approach comprises four major phases: (1) *selection of relevant emotions*; (2) *analysis of relationships between emotions and interactive systems*; (3) *selection of detection mechanisms*; and (4) *application of evaluation methods*. Each phase will be explained in the subsections below.

3.1 Selection of relevant emotions

Activities in this phase are related with this question: *What are the most important emotions to consider during the process of evaluating specific interactive systems?* This is a key question, as identification of only the most relevant emotions is required in order to delimit the research space. Researchers have already identified and classified many emotions. However, it is a good idea to choose emotions that arise in the specific context of interactive systems evaluation. This selection strongly depends on the specific interactive system under evaluation. Some factors that could help determining the most relevant emotions in each case include the purpose of the evaluation, the available or necessary resources, and the estimated time for their detection and interpretation.

3.2 Analysis of relationships between emotions and interactive systems

Activities in this phase are related with this question: *How emotions should be analyzed during the evaluation process?* Three activities are related with addressing this question: (1) Identifying the relationship between the actions performed by the users when interacting with the system and the emotions selected in the previous phase; (2) Establishing metrics to provide an objective assessment of the emotions selected and (3) Interpreting and analyzing the information that has been previously identified.

3.3 Selection of detection mechanisms

The main question at this phase is: *What are appropriate mechanisms for detecting and identifying relevant emotions?* Once emotions have been selected, it becomes critical to opt for feasible mechanisms for dealing with emotions in terms of effectiveness and efficiency. Three activities are related with that question: (1) Establishing subjective mechanisms that are based on user responses after system usage (e.g., questionnaires, interviews, etc.) to identify emotions; (2) Establishing mechanisms related with physiological manifestations of emotions. Progress in this area includes various alternatives to measure heart rate, breathing rate, galvanic skin, among others; and (3) Establishing mechanisms related with the identification of motions based on gesture and voice recognition.

3.4 Application of evaluation methods

Activities to be considered during the evaluation phase include the following: Planning activities in order to "neutralize emotions". In other words, it is necessary give to the participants of the evaluation, some activities that allow them to "relax" before beginning the user study. Subjects in a study might experience emotions that are not necessarily related with the use of the interactive system under evaluation. Hence the importance of defining alternatives for activities to "neutralize" previously existing emotions; (2) Defining an appropriate scenario for conducting the study. This is important as emotions evoked by participants could be affected by factors that are external to the sole use of the system being evaluated; (3) Configuring mechanisms for emotion detection that were selected in the previous phase; (4) Selecting appropriate personnel for coordinating and supporting the evaluation process; (5) Selecting evaluation methods, which typically will depend on the stage of the development of the system to be evaluated (non-functional or functional prototype, specific functionality or completed system).

4. ONGOING AND FUTURE WORK

We currently are working on refining the tasks comprised by Emo+Eval. We aim to provide alternatives that make it feasible

for evaluators to accomplish each or the activities that are included in Emo+Eval's phases. We also are considering the use of physiological sensors to corroborate the experts' judgments on evoked emotions. This will allow us to improve the activities that make up each of the phases of Emo+Eval. We consider Emo+Eval as a starting point for strengthening the process of evaluating interactive systems by providing general guidelines for considering emotions as part of that process.

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