Chapter 19
Integrated Methods for a User Adapted Usability Evaluation

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ABSTRACT

For software development, methods must be able to effectively perform evaluations with respect to financial and time considerations. Usability evaluations are commonly performed to ensure software is usable. Most evaluations are individually performed, leading to some significant disadvantages. Although individual evaluations identify many usability problems, efficient modifications in terms of cost and development time are difficult. Additionally, usability problems in only specific perspectives are identified in individual usability evaluations. It is important to identify comprehensively usability problems in various perspectives. To improve these situations, the authors have proposed a method to automatically integrate various types of usability evaluations.

Their method adds functions to record the operation histories of the target software. This information is then used to perform individual usability evaluations with an emphasis on usability categories, such as efficiency, errors, and learnability. Then the method integrates these individual evaluations to identify usability problems and subsequently prioritize these problems according to usability categories determined by the software developers and end users.

Specifically, the authors' research focuses on employing automatic usability evaluations to identify problems. For example, they analyze the operation histories, but do not focus on manually performed evaluations such as heuristic ones. They assume their research can aid software developers and usability engineers because their work allows them to recognize the more serious problems. Consequently, the software can be modified to resolve the usability problems and better meet the end users' requirements. In the future, the authors strive to integrate more diverse usability evaluations, including heuristic evaluations, to refine integration capabilities, to identify problems in more detail, and to improve the effectiveness of the usability evaluations.

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INTRODUCTION

To develop usable software, usability of software GUIs are very important, because end users directly interact with GUIs. For this purpose, there are various methods. For example, GUIs are developed along with usability guidelines and patterns, and developed GUIs are evaluated and improved. Especially, whether end users feel GUIs usable differs among end users. Thus, developed GUIs are often evaluated and improved iteratively in terms of usability.

Various usability evaluation methods have proposed, including experimental methods in usability testing (Barnum, 2001), analytic analytic evaluations and heuristic evaluations (Leventhal & Barnes, 2008), and each method has a different perspective. That is, when several types of usability evaluations are performed for a specific software package, numerous problems are found according to each usability evaluation. Consequently, it is difficult to resolve all problems due to software development costs and schedule. Thus, the identified issues should be prioritized or grouped together to elucidate the more serious problems.

Herein we propose a method to integrate various types of usability evaluations and to identify the more serious usability problems. Using our method, usability problems are prioritized. Our method initially generates functions to record operation histories of end users in software. This information is then used for usability evaluations. Finally, the results of each usability evaluation are integrated based on the priorities of usability categories (Nielsen, 1994), which are determined by software developers and end users.

Our chapter is divided as follows. The second section describes the features of our method, while the third discusses NEM (Novice Expert radio Method) and AHP (Analytic Hierarchy Process), which are important techniques used in our method. The fourth section provides an overview of our method with an emphasis on operation histories for usability evaluations; in addition to generating and adding functions to record operation histories, the type, acquisition, and analysis of operation histories are discussed. The fifth section describes the types of usability evaluations that our method is applicable to as well as the integration results of the evaluations. Our method adopts three types: efficiency, error, and learnability evaluations. The sixth section shows the results of applying our method to two examples. The seventh section describes related works, and finally the eighth section provides a conclusion and future research.

BACKGROUND

There are many researches focused on usability evaluations.

Babaian et al. proposed a method to use operation histories of end users to design interfaces (Babaian, Lucas, & Topi 2006). In every component, various types of information such as operation time and keystrokes are recorded. Then usability assessments are performed in terms of efficiency of UI operations and work achievements. However, the results are not integrated based on criteria that software developers and end users determine. In our method, the results of usability evaluations can be integrated based on specific criteria.

Fukuzumi et al. proposed a method to evaluate usability of a system via checklists (Fukuzumi, Ikegami, & Okada, 2009). The criteria are clear in the checklists and the evaluation can reflect the evaluator's intent. However, evaluations of a large-scale system are a heavy burden and highly skilled evaluators are necessary to appropriately assess usability. In contrast, usability evaluations in our method only require the evaluators to operate the software.

Fiora et al. proposed to evaluate usability of software using component information and opera-