Windows Positioning System: Aural Assistance Environment for the Aging in Windows Navigation

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Abstract. This study explored dual-sensory user interface designs that meet the requirements of elderly people. Eight subjects with conventional mouse and the Windows Positioning System interface processing strategies were conducted the experimental tasks where five types of applications were evaluated in different font sizes. The analysis illustrates that for the conventional mouse the difference of response time of each font size of target texts is significant by ANOVA to the five font sizes 8, 10, 12, 14, and 16. However, the difference between large font sizes of 14 and 16 was not significant except the result between font sizes of 10 and 16. But for the WPS, there is no difference of response time among the five font sizes. It showed that the effect of aural information of target texts can benefit user from computer manipulation.

Keywords: Windows Positioning System**,** Text-to-Speech Engine.

1 Introduction

Access to the Internet has emerged as an integral part of human society. For the aging society coming, however, there are some requirements of computer windows manipulation faced with the users in low vision. The elderly people are often less comfortable and perceive themselves as having less control over computers for typical, computer-related tasks [1, 2, 3]. Since a majority of computer-use time is occupied through the use of reading, the presentation of text is important for the elderly people. Although the elderly people perceived 14-point fonts as being more interesting than 12-points font, the various factors associated with age [4]. For assisting the aging with low vision in computer windows navigation, other than visualization hearing sensory information has become another important orientation in computer windows environment. Because it can tell where one stays, where one is going, and read out to identify what the program or object is pointed by the cursor.

2 Windows Positioning System

The design of Windows Positioning System (WPS) (Fig. 1) provides an aural assistance environment which integrates the IBM Chinese Text-to-Speech Engine and

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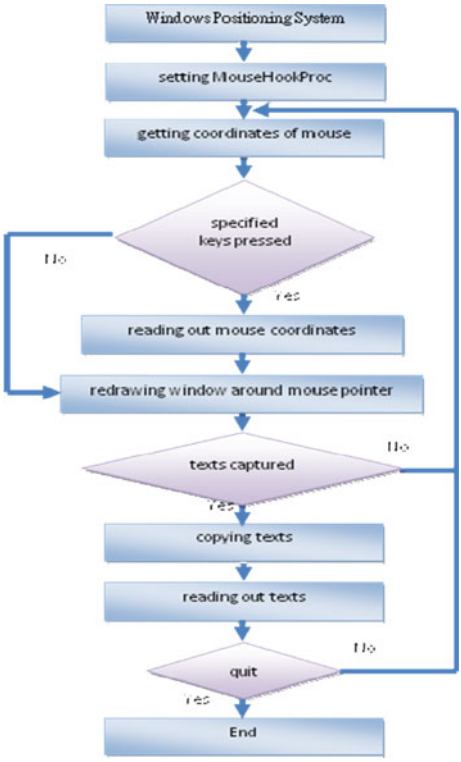

Fig. 1. Windows Positioning System mechanism

Fig. 2. Switching Talking Aid function of Windows Positioning System

technology of capturing screen texts. The WPS focuses on two functions: Talking Aid (Fig. 2) and Cursor Positioning. On the Talking Aid aspect, WPS once triggered is able to read out the texts nearby where the cursor was just moved to. This would confirm users by the voice of IBM Chinese Text-to-Speech Engine stating the associated texts of an application function, a file folder, a computer object, or contents within an application container. Therefore, WPS could identify users with aural information of any object target in computer windows navigation. At the same time

users could also highlight the texts of contents in the opened application or a file for reading out by the WPS. On the Cursor Positioning aspect, WPS can bring users to specifying cursor position by the readout of cursor axes in x-coordinate and y-coordinate, aiming to facilitate the positioning of mouse. Thus while referring to the Cursor Positioning function of WPS, users can distinguish where the mouse cursor is in the computer windows environment.

3 Evaluation of Windows Positioning System

Subjects included in the study were eight elderly users with average age 68 years old. They all have the experience of computer manipulation for over 3 years for daily usage. In the experiment, subjects were asked to use the conventional mouse and the WPS separately to launch everyone's own routines task and new unfamiliar task on the Microsoft Windows platform. The WPS which was developed by Delphi 6.0 is able to monitor the mouse cursor moving and provide corresponding aural information triggered by the function of Talking Aid or Cursor Positioning. The target task texts appear 5 different kinds of font sizes, 8, 10, 12, 14, and 16. Experiments was conducted with a counterbalanced measures design to avoid the pitfalls of standard repeated measures designs, where the subjects were asked to launch one's own familiar task and unfamiliar task interlacedly with conventional mouse and the WPS separately.

Experiment compared the time between the two kinds of familiar and unfamiliar tasks at movement time, the font size variation of target texts by ANOVA and regression analysis. Results show that response time of unfamiliar tasks tends to be longer than the familiar ones for both conventional mouse and WPS. And the response time tends to decrease as the use of WPS compared with use of conventional mouse. The results also show that the response time decreases as the font size of target become larger. The analysis illustrates that for the conventional mouse the difference of response time of each font size of target texts is significant by ANOVA to the five font sizes 8, 10, 12, 14, and 16. However, the difference between large font sizes of 14 and 16 was not significant except the result between font sizes of 10 and 16. But for the WPS, there is no difference of response time among the five font sizes, thus it can be said that the effect of aural information of target texts can benefit user from computer manipulation.

4 Conclusions

The WPS works with an aural assistance environment to allow users to select either the appropriate functions of Talking Aid and Cursor Positioning to navigate where they are in the computer windows. A GPS-like loudspeaker in the computer windows environment, WPS can help guide the aging with low vision by hearing sensory information to facilitate identifying where they are in the computer world.

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