OPTIMISING TEXT INPUT FOR YOUNG CHILDREN USING COMPUTERS FOR CREATIVE WRITING TASKS

Janet C Read
Department of Computing
University of Central Lancashire
Preston, PR1 2HE
jcread@uclan.ac.uk
www.uclan.ac.uk/computing/read.htm

ABSTRACT

Novel text entry input technologies including speech recognition and handwriting recognition are attractive alternatives to the QWERTY keyboard but for most adult users they are less efficient and less effective. This research is intended to investigate text entry for children and in particular to determine the efficacy of handwriting recognition for free text input to a word processor. The usability of different text input methods has been investigated and error handling for children using recognition technologies is being investigated.

Keywords

Usability, Handwriting recognition, Errors, Children,.

1. INTRODUCTION

The motivation for this PhD study came from observing children writing in a school classroom. Children are encouraged to write and to then revise and improve their work. This task of revision and improvement is greatly simplified by the use of a word processing package allowing easy deletion, insertion, and reorganization of text.

Efficient use of a word processor relies on an acceptable level of keyboard proficiency. The goal of this research study is to examine ways of optimising text input for children who are writing free text. It has since been decided that handwriting recognition is a suitable platform for this.

2. THEORETICAL BACKGROUND

The process writing approach to language relies on the ability of the student to revise and improve on their work [1]. This is facilitated by the use of a word processor to edit and alter text. Studies have confirmed that the use of word processors can be helpful for children [2], [3], but access to the computer, via the QWERTY keyboard can hamper the child and even interfere with the writing process [4]. Alternative input devices for children include the mouse, speech recognition, and handwriting recognition.

Speech recognition has been used with secondary school children who were found to enjoy using the technology, but character recognition rates of around 80% gave rather disappointing 'copy' for the children. [5]

Handwriting recognition has been less researched than speech [6], but the growing PDA market and improved recognition algorithms are making the technology attractive. Research into handwriting recognition suggests that accuracy rates of between 87% and 93% are achievable with constrained writing [7].

3. WORK TO DATE

At the beginning of the PhD a questionnaire was circulated to schools to elicit information about their usage of computers for writing [8]. It was observed that many teachers found using the computer problematic, partly as there was only one for 15 children, and also due to the increased work caused by problems with hardware and software.

An experiment was devised to ascertain whether or not children's writing could be recognized by handwriting recognition software. Postcards were used to gather handwritten text samples and these were then traced using a Wacom® tablet. An off-the-shelf handwriting recognition package was used to recognise the characters. Over 25% of the cards were recognised at 90% or better and the average recognition rate was over 80%. This experiment showed that the software was reasonably effective and there was scope in using handwriting recognition with children of the target age. [9]

A subsequent experiment was devised to establish the relative usability of speech recognition, handwriting recognition, keyboard input and mouse input. This study involved children using all four methods, and measures of efficiency, effectiveness,

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and satisfaction were taken. Results were written up as a paper that was subsequently presented at the IHM/HCI Conference, 2001 [10]. The sample for this experiment was small, but the results did highlight a number of areas for further study. Speech recognition, whilst attractive to the children, was far too erroneous to consider further, and the mouse, being considered the least enjoyable input method by the children, offered no benefit over the keyboard. Handwriting was more erroneous than the keyboard, but it was faster to use and the children preferred it.

Considerable work has been done to develop useful tools for measuring user satisfaction with children. A model has been proposed based on the endurability and expectations of an event [11]. A smiley face 'Likert type' scale has been extensively used to measure the fun children experience during an event [12].

4. FUTURE WORK

It is hypothesized that children may prefer to use interfaces that are 'easier' and need correcting, than 'harder' interfaces which are generally more reliable. It has been reported that adults consider recognition rates of less than 97% accuracy to be too encumbering [13]; but for children, this figure may be considerably lower. An experiment is currently being devised to measure tolerance of errors with children.

Optimising text input using handwriting recognition needs to consider the erroneous nature of the interface. An observational study is currently being undertaken which is comparing the error-recovery strategies that children use with keyboards, pen and paper and handwriting recognition. Work has begun on classifying and counting these errors, and the actions, which children take on encountering and identifying errors, are being recorded.

Given a good overall view of the errors a prototype interface will be built which takes account of the errors; minimizing their occurrence, assisting their identification, and aiding recovery. This will be tested with children and recommendations for the design of handwriting interfaces for children will be made. These will be generalized both for adults and for other disobedient interfaces such as speech and gesture recognition.

5. OPEN ISSUES

Some of the cognitive issues relating to the child have not been fully addressed. The enchantment of the technology is a concern when measuring user satisfaction with the children. There is also work to be done on investigating the mental models that the children have, both of the computer, and of the software that they are using.

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