

IMPROVING AND ASSESSING PEN-BASED INPUT TECHNIQUES

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This workshop will address interaction and user interface issues related to the use of pen-based free text and image input. This is timely given the take-up and range of uses of pen-based input with tablets and PDAs and the growth of use of digital pens like the Anoto Pen plus the relative lack of HCI-oriented research into the use and usability of these devices and the techniques for their use. In particular we will focus on four themes: handling rich input streams including free text, drawings, annotations, doodles, etc.; the problem of reading pen-generated input; interactive error repair techniques; and methods for evaluating systems using pen-based input. Applications and research related to mobile applications and contexts of use will be especially welcome. The workshop is intended to provide a shared forum for researchers from human language technology, HCI, Language Arts and AI to share good practice, to consider current research challenges and further explore these devices and their fragile but fascinating interfaces..

Keywords: Design, Handwriting recognition, Pen computing, Mobile interfaces, Error handling, Language technology

1. INTRODUCTION

Over the past ten years or so, pen-based interaction with handheld devices has become widespread. Coupled with character and handwriting recognition technologies, it offers a potentially powerful method of interaction. For simple structured or semi-structured input involving a few words, such pen-based techniques work reasonably well. However, they have proved less successful with large amounts of free text or text interspersed with drawings, diagrams, annotations, doodles, etc, especially when entered on small touch-sensitive PDA displays. Furthermore, handwriting recognition remains error-prone and little work has been done to improve user-based identification and correction of errors.

More recently, digital pens have broadened this interaction paradigm by enabling pen strokes to be captured as the user writes on paper. This helps to solve the problem of comfortably entering large amounts of free text and drawings. Furthermore, the recognition problem is no longer such a barrier to acceptance since it is now possible to process and manipulate human language input in its raw form. Thus, digital ink files can be catalogued and sorted without having to convert the writing. These advances provide new opportunities for human language technologies in the user interface [6].

The input and output technologies associated with these products have also evolved. Digital ink can be stored in digital pens with no need for a computer interface at the point of creation. PDAs allow the simultaneous recording of spoken and written language and offer possibilities for multi-modal applications [3].

Nevertheless, recognition remains a potential problem for both forms of pen use. When users are confronted with errors from recognition processes, they are often unsure what has happened, unaware of the options for repair and unable to understand the results of automated correction. This leads to dissatisfaction, and unless the user is highly motivated to use the technology, either by circumstance or devotion, he is likely to leave the technology and not return to it. Thus, a good first user experience is essential for long-term acceptance [1].

2. WORKSHOP FOCUS

This workshop is designed to bring the human back into the investigation of pen-based interfaces and to consider ways in which the interface can be designed to provide a rewarding user experience. With this in mind, we are not especially interested in methods for improving recognition algorithms. Instead, the workshop will focus on four themes:

- *Recognition Techniques for Rich Pen-based Input:*
Input to pen based systems may include handwritten text, drawing, doodles, annotations or structural elements (e.g., arrows). Work is needed to improve the input of such data and/or its subsequent recognition.
- *Methods that improve the Reading Process.*
Recognition will never be 100% accurate but with the appropriate assistance, the user may be able to read the output [4]. This discovery of contextual assistance is one area in which we will solicit contributions.
- *User-based Error Repair:*
We would hope to add to the work by [5] and others with respect to the discovery of and recovery from errors at the interface, and the possibilities for multimodal error repair and error reduction methods.
- *Methods for Evaluating Pen-based Interfaces*
Traditionally, the focus has been on the calculation of recognition error rates and the determination of ratings for user satisfaction [2], novel evaluation methods are have been developed for identifying user

tolerance [7] but these have not resulted in the hoped for illumination and so there is a need to explore these issues in greater depth.

3. WORKSHOP PROCEDURE

The call for papers will be circulated to the usual BCS - HCI mailing lists, the Nordic community and via the ACM lists. We will also target the lists maintained by the language arts community and the ElsNET lists for human language technology. The workshop will be supported by a website hosted at the University of Glasgow where prospective attendees can share ideas and submit their papers. Papers will be reviewed by the workshop organisers and will be selected both for originality and academic rigour as well as for a balanced programme. Thoughtful and reflective papers will be considered alongside more traditional studies.

The workshop will begin with an introduction to the domain and then there will be a series of 15 - minute presentations from the paper authors so that participants can get a feel for one another's work. Summaries of these presentations will be transcribed using digital ink technology for a poster to be displayed during the conference.

Participants will then break into small groups, dependent on their area of interest and will consider the workshop aims. They will report back as groups - again using digital ink as the medium. Each group will identify one possible research activity, one design solution and one unanswered question for their chosen area.

Following the group discussion, the other groups will get the opportunity to consider each other's work and comment on their deliberations.

Participants will also be encouraged to present demonstrations of working systems exploiting pen-based free text input.

4. AFTER THE WORKSHOP

The workshop website www.dcs.gla.ac.uk/pen_workshop will remain in place after the workshop and it is intended that the participants may look to develop a network of researchers in this area.

Authors of selected papers from the workshop will be invited to submit revised versions of their papers as the basis of a special issue of *Interacting with Computers*, to be edited by the workshop organisers and to include additional papers solicited from the HCI community.

5. THE ORGANISERS

Phil Gray is a senior lecturer in Computing Science at the University of Glasgow. He works on mobile interaction techniques and technology, especially for handheld data capture and review systems. In that context he has an interest in error recognition and repair for pen-based input.

Janet Read is a senior lecturer in Human Computer Interaction at the University of Central Lancashire. She has published widely on the use of handwriting recognition with children. Recent work has focused on the use of digital pen technology for note taking and drawing.

5. REFERENCES

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