S. Diefenbach, N. Henze & M. Pielot (Hrsg.): Mensch und Computer 2015 Tagungsband, Stuttgart: Oldenbourg Wissenschaftsverlag, 2015, S. 437-438.

Kollaboratives Text Lesen: Adaptive Text Scroll Geschwindigkeit

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Zusammenfassung

Diese Demonstration stellt ein System vor, das es mehreren Personen ermöglicht gleichzeitig Texte auf einem großen Bildschirm zu lesen. Unsere Technik basiert auf einem adaptiven Scroll-Algorithmus. Damit wird die Scroll Geschwindigkeit eines Textes der individuellen Lesegeschwindigkeit angepasst. Mit einem mobilen Eye-Tracker erfassen wir die Blicke und Augenbewegungen einer Person, um die Lesegeschwindigkeit zu berechnen.

1 Einleitung

Durch unsere Augen können wir auf eine natürliche Art und Weise interagieren. Meist geben unsere Blicke Aufschluss über unsere Aufmerksamkeit und interessante Objekte in der Umgebung (Vertegaal 2003). Vorhandene Technologien (z.B. mobile Eye-Tracker[1]) ermöglichen es aus unseren Augen ein mächtiges Interaktionswerkzeug für die digitale Welt zu machen. Blick basierte Interaktion findet mittlerweile in verschiedenen Szenarien Anwendung, wie beispielsweise Desktop Interaktion (Turner et. al. 2012).

Auch die digitale Revolution im innerstädtischen Bereich nimmt kontinuierlich zu. Dies zeichnet sich vor allem durch die Verbreitung verschiedener Sensoren, eingebettet in unsere Umgebung, und digitaler Ausgabemedien (z.B. Videowände und öffentliche Displays) aus. Große Bildschirme werden an öffentlichen Plätzen oftmals genutzt, um vielen Personen gleichzeitig Informationen anzuzeigen. Das Hauptproblem dieser Displays ist, dass sie normalerweise nicht interaktiv sind. Daher werden Nachrichten oftmals nur in Form einer Überschrift und einer Zusammenfassung dargestellt. Das führt dazu, dass viele News abwechselnd eingeblendet werden müssen.

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1 http://pupil-labs.com/pupil

Wir zeigen eine Demonstration eines Prototyps, der es mehreren Personen ermöglicht gleichzeitig Texte auf einem Bildschirm zu lesen. Mit Hilfe mobiler Eye Tracker wird die Lesegeschwindigkeit und die Leseposition der Benutzer ermittelt. Anhand dieser Informationen werden die gelesenen Texte automatisch gescrollt. Außerdem zeigen wir in der Demonstration, dass mehrere Benutzer den gleichen Text lesen können.

2 Kollaboratives Text Lesen

Unser System (Lander 2015) realisiert das automatische Scrollen von Texten. Die Geschwindigkeit mit der ein Text gescrollt wird ist von der Lesegeschwindigkeit abhängig. Das adaptive Scrollen ermöglicht uns mehrere Texte auf dem gleichen Bildschirm in verschiedenen Spalten zum Lesen anzubieten. Die Länge eines Textes wird dabei nicht durch die Display Größe begrenzt. Unser adaptiver Scroll-Algorithmus benötigt Informationen über das komplette Display Layout, d.h. Anzahl der Texte, Anzahl von Zeilen eines Textes, Breite, Höhe und Position der Textdarstellung. Mit Hilfe dieses Wissens und der Daten eines mobilen Eye Trackers kann der Algorithmus die Scroll Geschwindigkeit an die Lesegeschwindigkeit anpassen. Die Lesegeschwindigkeit wird dynamisch in einem Fenster von sechs Zeilen berechnet. Das bedeutet, dass die Anzahl der gleichzeitigen Leser pro Text durch dieses Fenster vorgegeben ist. In unserer Demo können insgesamt drei Personen Texte lesen, wovon zwei den gleichen Text lesen können.

3 Fazit

Das demonstrierte System kann in verschiedenen Umgebungen und Szenarien benutzt werden. Vorstellbar ist, ein solches System an öffentlichen Plätzen (z.B. U-Bahn Stationen) zu installieren. Dazu ist jedoch eine Weiterentwicklung hinsichtlich der Aufzeichnung von Augendaten notwendig, sodass es ohne mobile Eye Tracking Brille benutzt werden kann.

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Mid-Air Gestures for Window Management on Large Displays

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Abstract

We can observe a continuous trend for using larger screens with higher resolutions and greater pixel density. With advances in hard- and software technology, wall-sized displays for daily office work are already on the horizon. We assume that there will be no hard paradigm change in interaction techniques in the near future. Therefore, new concepts for wall-sized displays will be included in existing products. Designing interaction concepts for wall-sized displays in an office environment is a challenging task. Most crucial is designing appropriate input techniques. Moving the mouse pointer from one corner to another over a longer distance is cumbersome. However, pointing with a mouse is precise and commonplace. We propose using mid-air gestures to support input with mouse and keyboard on large displays. In particular, we designed a gesture set for manipulating regular windows.

1 Introduction

The standard display space and screen resolution for office applications has been constantly increasing over the last decades. While the monitor of the first personal computer, the IBM 5153, had a 13” diagonal with a resolution of 640 x 200 pixel, today, three decades later, standard monitors have a diagonal of 24” or even more. In addition, the resolution increased to 4096 x 2160 pixels and more. This trend will continue in the next years and visionary ideas of the office of the future (Raskar et al. 1998) will become a reality. However, to apply the advantages of wall-sized screens to office environments successfully, multiple design challenges need to be solved. Designing input methods for wall-sized office environments is one of the most critical challenges. Today, common input devices in office environments are mouse and keyboard and in a mobile environment touch displays. Both are highly optimized for the corresponding setups. Mouse and keyboard, in the way we use them today, and touch input are not optimal for wall-sized displays in office environments. Moving the mouse pointer over multiple thousand pixels or multiple meters is simply tiring. Increasing pointer speed and precision would lead to a decrease in pointing accuracy and even a dynamic mouse speed is outperformed by fixed settings on common tasks requiring short mouse movements (Tang & Lee 2007).

Depending on the setup, because the user is not able to reach all points of the display with his or her fingers, direct touch might be not an appropriate solution for interacting with wall-sized displays. To overcome mouse usage and direct touch, a well-known idea in HCI is mid-air pointing (Bolt 1980). Vogel and Balakrishnan (Vogel & Balakrishnan 2005) analyze different pointing techniques for interacting with wall-sized screens. Exclusive mid-air pointing might be tiring to perform for a whole working day. Hence, we propose combining mid-air gestures with the regular use of mouse and keyboard. In our developed prototype, tiring mouse interaction for window management is hereby replaced by simple mid-air gestures. For all other tasks, the mouse and keyboard interaction remains unchanged.

2 System

2.1 Demonstrator

Our demonstrator consists of one Microsoft Windows 8.1 Workstation and six Panasonic 50” screens. Every screen has a resolution of 3840 × 2160 (88 PPI). All of them are mounted in portrait mode next to each other. Thereby, we get a screen with a length of 4.04 x 1.13 meters and 12960 x 3840 pixels. As shown in figure 1, we placed the screens curved around the user’s desk. For sensing hand movements, we utilize a Microsoft Kinect v2 for Windows.

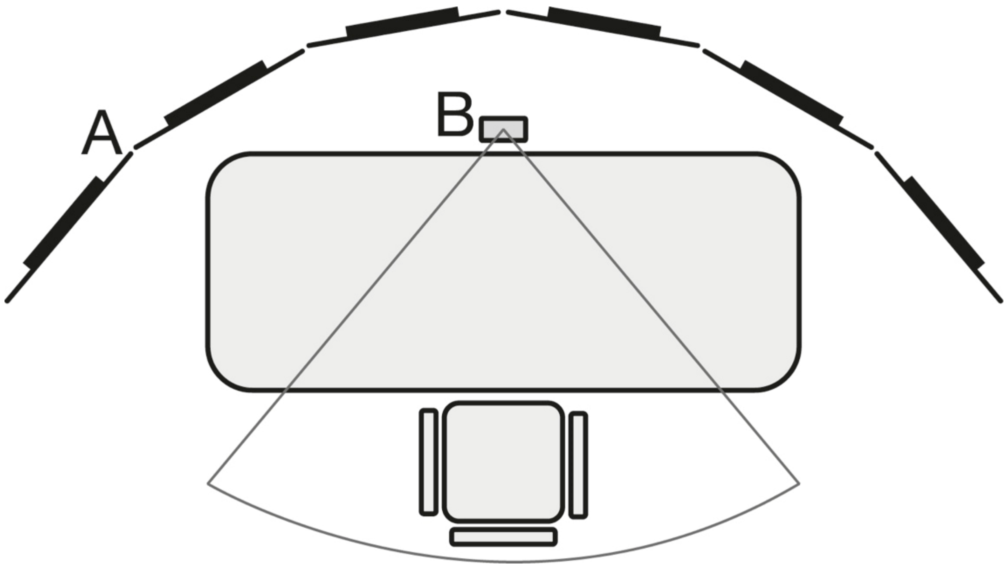

Figure 1: Demonstrator setup including large displays (A) and a Microsoft Kinect (B) observing the user.

2.2 Gesture Set

We aimed to support daily office work on large displays. One common task, which requires interaction with the entire display space is managing and arranging different content. For different tasks application windows have to be selected, moved to the focal area or in the periphery. Application windows have also to be resized, minimized or closed.

Inspired by Wobbrock (Wobbrock et al. 2009), we conducted a user study to design a gesture set for manipulating application windows. We recruited 10 male and 2 female participants through our mailing lists. In the study, we ask them to perform gestures for a given command set (see Fig. 1). We repeated this for every command and participant three times. For analyzing the performed gestures, we recorded all sessions on video. Through the analysis of the user study, we were able to generate a set of gestures to perform the 14 most common window management tasks e.g. select window, move window or resize. In a second step, we implemented the gesture set as fully working application for Windows 8.1.

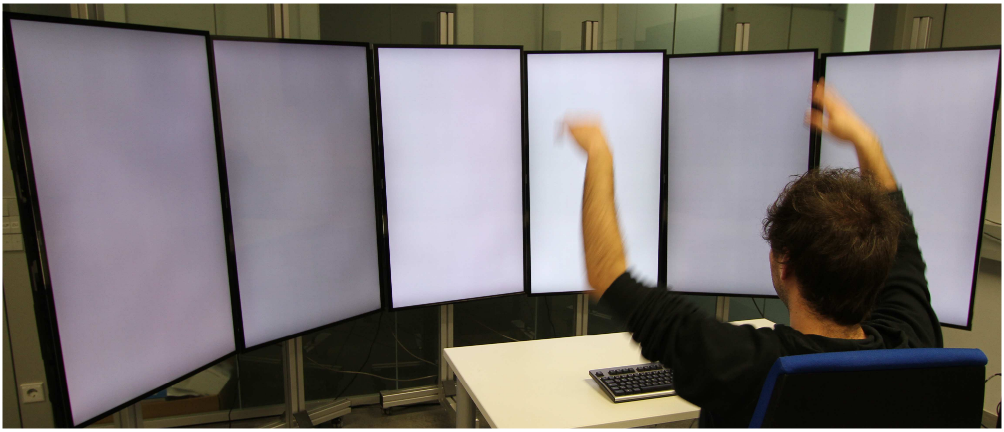

Figure 2: A participant is performing a gesture.

3 Conclusion

In this work, we present our novel prototype that enables window management with mid-air gestures to support mouse and keyboard input on large displays. To design a meaningful gesture set, we conducted a user study. We deduced gestures for the 14 most common window management commands from the gestures presented by the participants. Furthermore, we developed a prototype that is capable of recognizing these gestures using a depth-sensing camera and performs the intended action in a regular Windows 8.1 environment. Next, we are planning to evaluate the quality of the gesture set including recognition quality, speed and possible fatigue.

Acknowledgement

This work was partially funded by the European Community's H2020 Program under the funding scheme "FETPROACT-1-2014: Global Systems Science (GSS)", grant agreement #641191 "CIMPLEX: Bringing CItizens, Models and Data together in Participatory, Interactive SociaL EXploratories" (https://www.cimplex-project.eu/).

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