DREU Summer 2015 Final Report

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Overview

Over the summer I have been learning about the research process at the University of Florida. I have been working in the INIT (Intelligent Natural Interaction Technology) lab in the Computer and Information Science and Engineering department under Dr. Lisa Anthony. In order to experience as much of the research processes as possible, I have been working on three projects over the summer: the Wacom Project, which was just entering the experiment design phase, the Kinect Pose Project, which was in the middle of the development phase, and the IPES (Investigating Public Engagement in Science) project, which was in the prototyping phase. In just ten weeks, I have learned a lot about what it means to do research and work in a human-computer interaction lab.

Wacom Project

Summary

The Wacom Project examines how children use the large, sensitive Wacom tablets, using both pen interaction and their finger. By identifying ways in which children are able to use these tablets, we may be able to build better technology and user interfaces for children. The project looks at ways children touch targets and make gestures using both their finger and the Wacom pen or the Wacom art pen. The project was inspired by the MTAGIC (Mobile Touch and Gesture Interaction for Children) project, which identifies ways children use touchscreen mobile phones differently from adults. [1.][2.]

Background and Motivation

The MTAGIC project identifies differences in the way children make touches and gestures on touchscreen mobile phones. For touches, the project found children make smaller, lighter touches, miss targets more often, and have more holdover touches, or touching a target that the program has already registered as touched.[1.][2.] For gestures, MTAGIC found that children often draw more strokes then adults, and their gestures are not well recognized using current recognizers.[1.][2.] The Wacom project is motivated to see how children use the larger, more sensitive Wacom tablets, and whether or not the use of a pen will show differences.

Methods

To examine differences in how children use touchscreens with their finger and with a pen, participants will be asked to complete a target task and a gesture task once using their finger and once using a pen.

The target task has the participant touch a series of blue blocks, which are presented in different sizes and locations on the screen. The gesture task asks the participant to draw 20 gestures six times each. Each of these tasks will be done once using the participants finger and once using either the Wacom classic pen or the Wacom art pen.

Results

When I began the summer, the Wacom project was nearly done with the development process. It was the project that was the furthest along, and with little research experience, I found myself in unfamiliar territory. I helped build the experiment script, and helped run practices for the experiment. I learned a lot about how an experiment is designed, and how they are run and documented.

Future Work and Conclusion

The Wacom project is looking to see how children use larger, more sensitive touchscreens and touchscreens with pens. The study is expected to run in the fall, and aims to have 12-15 participants, ages 5-10. After the study, data will be analyzed to look for trends in children's touches and gestures, and touch and gesture tasks using fingers will be compared to tasks using pens. The findings may be used to inspire further studies, build better touch and gesture recognizers, and build better touchscreen interfaces for children.

IPES Museum Learning Project

Summary

The IPES Museum Learning Project aims to identify best methods when developing touchscreen displays for public educational environments. By building displays that engage users while informing them, we hope to build displays that increase interaction time and increase learning. Considering observations in a museum environment, traditional design for touchscreen interaction, and informational communication needs, the IPES project intends to create an interactive display that allows users to actively engage in developing questions and exploring the answers.

Background and Motivation

Large touchscreens are becoming more available, providing an opportunity for interactive displays in public settings, such as museum exhibits. Designing for public, interactive displays has challenges not considered when designing for smaller touchscreen devices or static educational displays. Some of these challenges include designing for multiple users and creating engaged interest that results in learning. An observational study at Hatfield Marine Science Center provided insights on how people interact with large tabletop touchscreens in this environment. Considering these observations, traditional design for touchscreen interaction, and informational scaffolding needs, a prototype is being

built. Using this prototype, further studies will aim to identify best practices for developing interactive displays in an educational environment.

Methods

To explore ways of generating curiosity and engaging learning, a prototype museum display is being built. We are selecting features that we hope will engage visitors by helping them generate questions and explore answers. After a complete prototype has been built, the display will be installed in a museum and observed in use. Observations will be used to develop the prototype further, potentially leading to development guidelines for interactive displays in an educational environment.

Results

At the beginning of the summer, the prototype consisted of two maps and locations that could be touched to display information. Over the summer, I was able to add images to the information display, so when you tap on a touch spot it can display both images and text. I was also able to add more maps to represent change over time and an up-down swipe in addition to the left and right. Now when you swipe back and forth it changes time, while if you swipe up and down it changes visualizations. While learning how to work with the tabletop and the Microsoft Surface SDK was challenging, I learned a lot about working with touchscreens and programming in C#, as well as working in teams and using version control.

Future Work and Conclusion

The prototype will continue to be developed in the fall, with the goal of building a fully functional prototype that will be able to be installed in a museum environment. By creating an interactive display designed specifically for public exhibits, we hope to increase user engagement and learning. By identifying features that work well in a public educational setting, we may be able to suggest guidelines for developing interactive touchscreen displays for use in an educational setting.

Kinect Pose Project

Summary

The Pose Project's goal is to see if current full-body gesture recognizers work well for children. Children's motor skills are still developing, causing differences in how they are able to use their body to make poses and gestures. By identifying differences in how children make full-body gestures, we may be able to build better recognizers for these gestures. The MTAGIC project shows that there is a difference in the way children use touchscreen devices[1.][2.], and the Pose Project questions whether this may be true for computer-vision interfaces as well.

Background and Methods

The MTAGIC Project identified differences in the way children use touchscreens. Childrens 2D gestures are not recognized well using current recognizers, which are mostly made for adults.[1.][2.] The Kinect Pose Project attempts to see if this is true for current 3D, full body recognition software. By recording full body gestures made by adults and those made by children, the Kinect Pose Project plans to analyze recorded gestures and compare adults gestures to children's gestures. If we can find differences in how children gesture from adults, we may be able to build better full-body recognizers for children.

Methods

To determine if full-body gesture recognizers work as well for children as they do for adults, we are first going to look at how childrens full-body gestures may differ from those made by adults. To do this, we are using the Microsoft Kinect to record full-body gestures and poses made by children and adults. A list of gestures and poses has been accumulated based on prevalence in other research or interest to our lab, such as childrens action games and gestures that might show different intensities. After these gestures and poses have been recorded being performed by both children and adults, they will be analyzed to look for differences in how adults and children make full-body gestures.

Results

When I started working on the Pose Project, it was midway through the project. The majority of the data collection software was complete, but I had the opportunity to add a couple features to this. Working with another DREU student, we built a playback application that would read in the saved data and recreate the animation of the recorded skeleton. After the development was complete, we began generating the gesture list and building the documents for the experiment. We were able to get the experiment organized in the very last week.

Future Work and Conclusion

The Kinect Pose Project hopes to run studies in the early fall. They hope to recruit 10 adults and 10 children ages 5-10 to participate in the study. After the data is collected, it will be analyzed both quantitatively to look for differences in data, and qualitatively to look at differences in how adults and children use their bodies. The findings will be used to consider further studies. If differences are found in how adults and children make full-body gestures, we may be able to build better full-body recognizers for children, leading to better games and hands-free interfaces for children.

References

1. Anthony, L., Brown, Q., Nias, J., Tate, B., and Mohan, S. 2012. Interaction and Recognition Challenges in Interpreting Children's Touch and Gesture Input on Mobile Devices. Proceedings of the ACM International Conference on Interactive Tabletops and Surfaces (ITS'2012), Cambridge, MA, 14 Nov 2012, p.225-234. [Pdf]
2. Brown, Q. and Anthony, L. 2012. Toward Comparing the Touchscreen Interaction Patterns of Kids and Adults. Proceedings of the SIGCHI Workshop on Educational Software, Interfaces and Technology (EIST'2012), Austin, TX, 05-06 May 2012. [Pdf]