Four Eyes Lab Open House

Friday, June 4, 2010, 1pm-4pm

Location: 2024 Elings Hall, UCSB Campus

(Second Floor of Elings Hall, next to the Allosphere)

Information and Directions at http://ilab.cs.ucsb.edu

At the "Four Eyes" Lab, directed by Matthew Turk and Tobias Höllerer, we pursue research in the four I's of **Imaging, Interaction, and Innovative Interfaces**. During the open house, we will be describing and demonstrating several ongoing research projects. Feel free to drop by any time from 1:00pm to 4:00pm and have a look at any projects that might interest you, talk to the lab's faculty, students, and visitors, and partake of some refreshments.

List of Presented Projects and Presenters:

The Mixed Reality Simulator Project:

Cha Lee

It is extremely challenging to run controlled studies comparing multiple Augmented Reality (AR) systems. Due to the many choices in hardware and software, direct comparisons between competing systems is neither feasible nor scalable. We use an AR simulation approach, in which a Virtual Reality (VR) system is used to simulate multiple AR systems. In this approach, a high-fidelity VR system is used to simulate a lower-fidelity AR system. The current work of this project is to investigate the validity of results derived from experiments run in simulation. To empirically validate this approach we plan to:(a)analytically compared the level of immersion of the simulator to real world systems to make sure they make sense, (b)replicate a small set of experiments from the literature and show the results are comparable, and (c)do direct comparisons of our own experiments run in simulation and the real world. In previous work, we simulated a prior study from the literature with similar results and looked at the effect of simulator latency on a simulated experiment. Currently we are working on running our own AR experiment in both the real world and in simulation.

Evaluating Visual Tracking & other Enabling Technologies for Augmented Reality

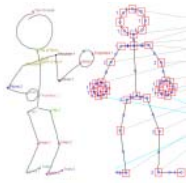
Steffen Gauglitz, Jonathan Ventura

We present our recent efforts in evaluating vision-based enabling technologies for augmented reality: we designed an evaluation framework and dataset for various visual tracking algorithms and conducted an extensive evaluation of the state-of-the-art of a particular type of visual tracking (namely, detector-descriptor-based visual tracking). We also designed a 3D model which is useful to a wide spectrum of augmented reality research: as the first of its kind, it exists both virtually (i.e. as digital model) and physically (as paper models) and may easily be replicated and customized by researchers around the world -- the "City of Sights".

Mmmmm: Multimodal Mobile Music Mixer

Norma Saiph Savage

The Multimodal Mobile Music Mixer provides DJs a new interface for mixing music on the Nokia N900 phones. Mmmmm presents a novel way for DJ to become more interactive with their audience and vise versa. The software developed for the N900 mobile phone utilizes the phone's built-in accelerometer sensor and Blue-tooth audio streaming capabilities to mix and apply effects to music using hand gestures and have the mixed audio stream to Blue-tooth speakers, which allows the DJ to move about the environment and get familiarized with their audience, turning the experience of DJing into an interactive and audience engaging process.



Sketch-Based Recognition System for General Articulated Skeletal Figures

Shane Zamora

We present a new sketch-based recognition system for detecting articulated skeletal figures in sketched scenes. Our algorithm is based on a graph isomorphism solver to detect instances of templated figures in the sketched scene. While the primary motivation for our recognizer is to support the recognition of skeletal figures such as human stick figures, any symbol from any domain that consists of a connected figure of lines and ellipses can be recognized by our system including cars, elephants, cats, geometric shapes, arrows, letters and characters, and many other symbols.

TranslatAR

Victor Fragoso

Researchers have long been interested in the synergy between portability and computing power but had been limited by unwieldy, uncommonly used devices. The latest generation of mobile phones, i.e. `smartphones', are equipped with hardware powerful enough to develop novel, interesting applications with allow users to directly interact with the world around them. This paper describes a multimodal, augmented reality translator developed using a smartphone's (Nokia N900) camera and touchscreen combined with OCR (Tesseract) and online translation services (Google Translation API).We describe our methods for tracking, text detection, OCR and translation, and provide results quantifying OCR accuracy on a set of signs collected around the UCSB campus.

Mobile Computational Photography

Daniel Vaquero

Mobile phones have been gaining attention as a computing platform, due to advances in processing power and interactive displays, as well as enhanced programmability. Modern mobile devices are also equipped with good digital cameras, making them a promising platform for computational photography. I will present two projects in mobile computational photography, implemented on a Nokia N900 smartphone: a system for capturing and stitching extended dynamic range panoramas, and a novel technique for efficient capture and generation of everywhere-in-focus pictures. Both are based on the Frankencamera platform for programmable cameras, developed at Stanford University and the Nokia Research Center in Palo Alto.

WiGis: Web-based Interactive Graph Interfaces

B. Gretarsson, S. Bostandjiev, J. O'Donovan, C. Hall, http://www.wigis.net/

The WiGis project centers around visualization of large-scale, highly interactive graphs in a user's web browser. Our software is delivered natively in your web browser and does not require any plug-ins or add-ons. Our method produces clean, smooth animation in a browser through asynchronous data transfer (AJAX), and access to rich server side resources without the need for technologies such as Flash, Java Applets, Flex or Silverlight. We believe that our new techniques have broad reaching potential across the web.

WiGipedia: Eliciting Semantic Feedback through Visual Analysis of Context in Wikipedia

Svetlin (Alex) Bostandjiev, John O'Donovan http://www.wigis.net/wigi/index.php/wigipedia

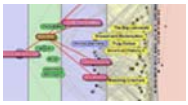
Recently, large numbers of Wikipedia users have collaborated to produce more structured information in the online encyclopedia. For example, the information found in tables, categories and infoboxes. Infoboxes contain key-value pairs, manually appended to articles based on the unstructured text therein. WiGipedia is a web based interactive visualization tool designed to simplify the elicitation of semantically structured information from the average Wikipedia user, and to boost the consistency of structured Wikipedia information, thereby supporting better visual analytics and more complex SQL-like querying. By leveraging structured data in DBpedia, we generate an interface which is embedded on every Wikipedia article as an interactive graph visualization of a collection of entities with typed connections between them. The interface supports single-click editing of structured information in Wikipedia and dynamic infobox attribute suggestions from a range of sources.

TopicNets: Interactive Topic-based Data Exploration

B. Gretarsson, J. O'Donovan, S. Bostandjiev, C. Hall http://www.wigis.net/wigi/index.php/topicnets

In collaboration with the Center for Machine Learning and Intelligent Systems at UC Irvine, we have developed TopicNets. The tool is an application of the core WiGis framework to the task of information discovery across large document sets. TopicNets works by extracting "Topics"-- sets of associated terms with probability and confidence values, from large documents or document sets. An interactive graph is then generated, showing document-topic (and/or section-topic) relationships across the large data set.

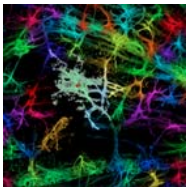
SmallWorlds: Visual Recommender for Facebook



B. Gretarsson, J. O'Donovan, S. Bostandjiev, C. Hall http://apps.facebook.com/smallworlds/

Deployed as a Facebook application, SmallWorlds, is a visual interactive graph-based interface that allows users to specify, refine, and preference profiles in a variety of domains. The interface facilitates expressions of taste through simple graph interactions and these p are used to compute personalized, fully transparent item recommendations for a target user. Predictions are based on a collaborative preference data from a user's direct friend group on a social network. We find that in addition to receiving transparent and accurate ite recommendations, users also learn a wealth of information about the preferences of their friends through interaction with our visualiza information is not easily discoverable in traditional text based interfaces.

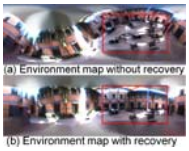
Interactive Visualization of Uncertain Data in a Mouse's Retinal Astrocyte Image



Mock Suwannatat, Rama Hoetzlein http://cs.ucsb.edu/~mock/retinaproject/

A visualization system is designed to help biology researchers visually and interactively explore a mouse's retina (astrocyte network). Prior to visualization, some image processing, semi-manual and automatic analysis, and a spatial modeling have already been done. The results from each of these steps can be viewed independently. But to allow for a comprehensive understanding of the entire data pipeline and the relationship among the different pieces, this system is designed to visualize all the data in context. Goals and subgoals for data exploration tasks are explored, and various interactive visualization techniques are employed to address these goals. Examples of the techniques include focus-n-context visualization, graph diagram, animation, glyphs, and probability density function visualization. CREDITS: Raw biological images were collected by Gabe Luna in Professor Steve Fisher's laboratory. Brian Ruttenburg computed cell segmentations and a Markov Random Field spatial model of the cell area distribution. Synthetic biological images are produced by Rama Hoetzlein. Contributions were also made by Rotem Raviv.

Virtual Keyframes for Environment Map Capturing



Sehwan Kim, Christopher Coffin

The acquisition of surround-view panoramas using a single hand-held or head-worn camera relies on robust real-time camera orientation tracking and relocalization. We present robust methodology for camera orientation relocalization, using virtual keyframes for online environment map construction. Instead of solely using real keyframes from incoming video, our approach employs virtual keyframes which are distributed strategically within completed portions of an environment map.

Comparing Physical and Virtual Viewpoint Rotation on a Handheld Display

Jonathan Ventura, Cha Lee, Chris Coffin

We designed and ran two experiments to evaluate user performance in tasks involving viewpoint rotation on a mobile phone. We tested two types of interfaces: physical rotation, where the user moves his or her body; and virtual rotation, where the user touches the screen. Prior studies motivated our hypothesis that physical rotation should perform equally well or better than virtual rotation when searching. Our findings support this hypothesis, and reveal a strong learning effect with the handheld display. In a second study, we examined the influence of rotation technique on spatial memory when using a small display. Physical movement was found to have the advantage for memorization. Based on our experimental results, we present ideas for how to better design search and navigation interfaces for mobile phones.