

DePaul University – College of Computing and Digital Media
School of Computing - Research Colloquium Fall 2011

organized by Jose P. Zagal

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September 9

[John Scheidemantel, NYSE Euronext](#)

The Financial Industry Race to Zero

This talk will describe the evolution of the modern exchange, the business needs that drive technology, the current and future network requirements of running an exchange.

Bio

John Scheidemantel is Global Head of Wide Area Networks and Networking Services Operations for NYSE Euronext, the world's leading Exchange servicing equities and derivative markets for the US and EU. John received his Masters of Science in Telecommunications in 1996. He makes his home in Wheaton, Illinois.

September 16

[Marcus Schaefer, DePaul University](#)

The crossing number: From Puzzles to Computer Science

Graphs are a powerful and ubiquitous model in computer science, useful for representing anything from social networks or communication networks to printed circuit boards or metro maps. One of the main tools in measuring the ease with which a graph can be visualized is its crossing number. Unfortunately, the crossing number is an intractable parameter (in many senses, among other things, it's NP-complete). In this talk, we'll survey graph drawing problems related to crossing numbers. Some of these problems can be traced to century-old puzzles, and we will do so in this talk, while also presenting some current research.

Bio:

Marcus Schaefer came to CDM in 1999 as an Assistant Professor of computer science after finishing his PhD at the University of Chicago. Previously, he had obtained master degrees in mathematics and computer science at the Universitaet Karlsruhe in Germany. He has published actively in complexity theory and graph theory in particular, including numerous conference talks and journal publications.

September 23

Jacob Furst, DePaul University

Amateurs vs Experts

Classical machine learning relies on a labeled set of training samples in order to learn a model of truth to apply to unlabeled samples. In practice, these training labels are provided by domain experts. However, not all domain experts are equally expert, nor are they always in agreement, which has led to significant work on dealing with uncertainty in training labels. Given this, it becomes less clear that one needs domain experts in order to provide training labels; given a noisy environment anyway, perhaps enough amateurs can provide a machine learner a model of truth as good as the experts. A few studies in diverse fields have explored this possibility and come to interesting results. I will explore some of these papers and discuss preliminary research in medical image processing which attempts to answer a natural follow-on question: if amateurs are good enough, what about machines?

Bio

Jacob D Furst is an Associate Professor in the College of Computing and Digital Media (CDM) at DePaul University. His research interests are in medical informatics with applications of machine learning and data mining to medical image processing and computer vision. His current work concentrates on being able to generate semantically meaningful information about lung nodules in computed tomography images of the human torso. Dr. Furst also has a strong interest in computer security and is the director of the DePaul Information Assurance Center. He has helped design two majors and three courses in the CDM security curriculum. He has taught Secure Electronic Commerce, Social Aspects of Information Security, Information Systems Security, Host Based Security, and Introduction to Networking and Security. Dr. Furst earned his PhD in computer science from UNC Chapel Hill; he has a master's degree in education and a bachelor's degree in English literature.

September 30

Andy Johnson, University of Illinois Chicago

Teaching in the Cyber-Commons

A Cyber-Commons is a technology-enhanced meeting room that supports local and distance collaboration, and promotes group-oriented problem solving through high resolution displays and high-speed networking. The Electronic Visualization Laboratory at the University of Illinois at Chicago has been investigating teaching classes in these kinds of environments since 2004. In 2008 we outfitted the latest incarnation of this room with a

20" wide 18 megapixel wall with 20 gigabits of networking. This talk will discuss our experiences teaching several courses in this space.

Bio

Dr. Andrew Johnson is an Associate Professor of Computer Science and member of the Electronic Visualization Laboratory at the University of Illinois at Chicago. His research and teaching focus on inter-action and collaboration using advanced visualization displays and the application of those displays to enhance discovery and learning.

October 7

Cancelled

October 14

Matthew Easterday, Northwestern University

Designing educational technology to teach engaged citizens: Video games and the new civics

A functioning democracy requires citizens that can analyze policy, persuade others, and organize, however, we know little about how to educate students for engaged citizenship. Furthermore, the ill-structured nature of policy problems, the psychological challenges of confirmation bias, and conflicting design principles of educational technology all present serious barriers toward the development of a new civics.

This talk will focus on the design of Policy World, an educational game for teaching policy argument. First, I will describe a cognitive framework for policy argument. Next, I will discuss a series of studies that identify the errors and biases that students exhibit during policy argumentation. These findings have led to the development of an intelligent tutor embedded in a game-like environment for teaching citizens how to construct causal diagrams to improve policy argument. Further experiments with Policy World have begun to shed light on principles for designing more effective educational games.

The talk will conclude with a brief description of strategies for incorporating this technology into policy and citizen journalism classrooms.

Bio

Matt Easterday is an assistant professor in the School of Education and Social Policy at Northwestern University. He received his PhD in 2010 from the Human-Computer Interaction Institute at Carnegie Mellon University, where he was a fellow in the Institute for Educational Science's Program for Interdisciplinary Educational Research and a Siebel Scholar.

Matt's research focuses on technology for the new civics – producing scientifically supported educational technology to create informed and engaged citizens who can solve the serious policy problems facing our society such as poverty, global warming and militarism. Training such citizens requires us to understand how competent citizens analyze policy, communicate issues, and organize to make change. It also requires us to design more effective educational technology that can teach the knowledge, skills and dispositions citizens need.

October 21

Beth Kolko, University of Washington

When Innovation and Expertise Don't Mix

Expertise, especially the kind we cultivate in academia, is often seen as the cornerstone of invention and discovery. However, there are other kinds of communities that engage in research, communities outside the formal institutional structures of academic and industry labs. And it is in those other, informal, unofficial research spaces that real innovation increasingly takes place. In fact, one might argue that the kind of truly game-changing technologies -- disruptive technologies in the language of innovation studies -- are most likely to be found in these unsanctioned research communities. This talk examines the Hacker and Maker communities as sites of innovation most likely to contribute to truly disruptive technologies, and it contrasts the discovery process in formal and informal spaces.

This talk will not report on the findings from a specific research project. It is, instead, a reflection on the academic enterprise, seventeen years of teaching across two disciplines, and six years of participation in hacker and maker communities. I could call this six years of participant-observation, but it wasn't that -- it was merely life. What I hope to accomplish with this talk is expose some of the ways the margins of research get overlooked, and how a fixation on expertise can obscure innovation.

Bio:

Beth Kolko is Professor of Human Centered Design & Engineering at the University of Washington. She is director of the Design for Digital Inclusion Lab, and for the past two decades she has been conducting research on how issues of race, gender, and culture contribute to patterns of technology use. She started this work as an English professor, and in 2000 made the transition to Engineering in order to not just critique technologies, but actually help design better stuff. In her research she does extensive fieldwork to figure out what kinds of problems diverse communities face in their everyday lives, and she then imagines which of those problems are addressable via technology. Then she collaborates with interdisciplinary teams to develop solutions that can be easily used and implemented within the communities in question. For over a decade she ran a project looking at the spread of information and communication technologies in Central Asia (Kyrgyzstan, Uzbekistan, Kazakhstan and Tajikistan), and she is currently studying whether 'playful' uses of technology such as gaming and social networking contribute to employability in Brazil. She's spent the last two years leading a team that has developed a low-cost, simplified ultrasound system for use in low resource communities. Finally, for close to two years she's been building the Hackademia project, which aims to bring the exploratory discovery of hackers and makers into academic settings, and bring non-technical people into contact with things like arduinos and blinky LEDs. Her goal is to build functional rather than accredited engineers.

October 28

Eelke Folmer, University of Nevada Reno

Game Interfaces for Users with Visual Impairments

Playing video games relies upon being able to see as typically visual cues indicate what input to provide and when. For users with visual impairments most video games are therefore inaccessible, though it can be argued that the educational, social and health opportunities offered by video games could benefit them the most. In this talk Eelke Folmer will present and demo several novel game interfaces developed by his player-game-interaction lab that allows for gamers with visual impairments to explore virtual worlds, such as Second Life, using synthetic speech and to play gesture based exercise games, such as Microsoft Kinect, using haptic feedback.

Bio:

Eelke Folmer is an Assistant Professor in the Department of Computer Science and Engineering, University of Nevada, Reno. His research interests lie in the area of Human-Computer Interaction, specifically researching interfaces for immersive 3-D applications such as video games and virtual worlds that accommodate the abilities of users with severe visual and motor impairments. Through extreme interaction design, Eelke and his research team try to solve interaction design problems for the most extreme gamer, with the

potential to develop solutions that may benefit anyone. He is currently investigating how video games can create new exercise opportunities for children that are blind, who have higher levels of obesity due to limited exercise opportunities. His lab has developed several-gesture based games for users who are blind that can be played for free, e.g., Blind Hero, VI Tennis, VI Bowling, Pet-n-Punch. His students have also engineered interaction solutions that allow users with visual and severe motor impairments to access the popular virtual world of Second Life.

November 4

Cynthia Putnam, DePaul University

Technology in Non-Western Context: Technology use, Adoption and Diffusion in Central Asia

How does Shirin, who lives in Bishkek, the capital city of Kyrgyzstan, order a book she needs for her upcoming college class on Amazon.com? She doesn't.

Here, in Chicago, when we order a book on Amazon we make many assumptions about other structures in place, including access to a reliable Internet connection, a connected banking/credit system, and roads for a delivery truck to bring the book to our homes. Our assumptions inform our 'western' understanding about how technologies are used.

However, we cannot apply our western understanding about technology use when we consider how all seven billion (or so) people in the world live, many in non-western contexts. Come join us this Friday and we will discuss one example of technology use in a non-western context; specifically, we will discuss research about technology use, adoption and diffusion in Central Asia.

Bio

Cynthia Putnam is an assistant professor at the College of Computing and Digital Media at DePaul University. She is interested in human-centered approaches to design. Her framework for this field is informed by over ten years of working in industry as a visual and interaction designer, illustrator and animator prior to earning her PhD. Cynthia received her PhD in Human Centered Design & Engineering from the University of Washington.

Her current research work is focused in two areas. In the first area she is investigating how human-computer interaction professionals do their work, for example, methods used to investigate and communicate about end users. In her second research area she is exploring how motion-related video games are used in rehabilitation treatments for people who have suffered a brain injury.

November 11

Samuel Armato, University of Chicago

Everything You Always Wanted to Know About the Lung Image Database Consortium

The development of computer-aided diagnostic (CAD) methods for lung nodule detection, classification, and quantitative assessment can be facilitated through a well-characterized repository of computed tomography (CT) scans. The Lung Image Database Consortium (LIDC) and Image Database Resource Initiative (IDRI) completed such a database, establishing a publicly available reference for the medical imaging research community. Initiated by the National Cancer Institute (NCI), this public-private partnership demonstrates the success of a consortium founded on a consensus-based process. Seven academic centers and eight medical imaging companies collaborated to identify, address, and resolve challenging organizational, technical, and clinical issues to provide a solid foundation for a robust database. The LIDC/IDRI Database contains 1018 cases, each of which includes images from a clinical thoracic CT scan and an associated XML file that records the results of a two-phase image annotation process performed by four experienced thoracic radiologists. In the initial blinded-read phase, each radiologist independently reviewed each CT scan and marked lesions belonging to one of three categories ("nodule > 3 mm," "nodule < 3 mm," and "non-nodule > 3 mm"). In the subsequent unblinded-read phase, each radiologist independently reviewed their own marks along with the anonymized marks of three other radiologists to render a final opinion. The goal of this process was to identify as completely as possible all lung nodules in each CT scan without requiring forced consensus. The Database contains 7,371 lesions marked "nodule" by at least one radiologist and 2,669 lesions marked "nodule > 3 mm" by at least one radiologist, of which 928 (34.7%) received such marks from all four radiologists. These 2,669 lesions include nodule outlines and subjective nodule characteristic ratings. The LIDC/IDRI Database is expected to provide an essential medical imaging research resource to spur CAD development, validation, and dissemination in clinical practice.

Bio

Sam Armato received a B.A. in physics from The University of Chicago in 1987. After spending several years outside of academics, he returned to The University of Chicago and entered the Graduate Program in Medical Physics to pursue research in computer-aided diagnosis. He earned a Ph.D. from the program in 1997. He is currently an Associate Professor of Radiology and the Committee on Medical Physics at The University of Chicago, where he continues his work on computer-aided diagnosis, specifically for thoracic imaging and head and neck imaging. His main research interests include the automated detection of lung nodules in computed tomography (CT) scans, enhanced visualization techniques for chest radiography, image-based tumor response assessment for lung cancer and mesothelioma, quantitative assessment of sinusitis in head CT scans, and inherent variability in image-based assessments of "truth."