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Human Computer Interaction Lab

26TH ANNUAL

SYMPOSIUM

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Presentation Summaries, Technical Report Abstracts, Posters, & Other Information

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Human-Computer Interaction Lab

U n i v e r s i t y o f M a r y l a n d

May 28th, 2009

Welcome to the 26th Annual HCIL Symposium!

Thank you for joining us for the Human-Computer Interaction Lab's 26th annual Symposium. This year you will hear diverse talks from the HCIL's faculty, staff, and students on cutting-edge research which focus on three important areas of HCI work: collaboration, search, and visual interfaces. In addition, new this year, we will also be previewing five HCI books that have been either authored or edited in the past year by our lab's faculty. Following these talks, we will continue the long-standing tradition of welcoming you to our lab for demos and posters (and of course birthday cake)! We hope you will be staying the next day as well, May 29, 2009, to enjoy a wide variety of tutorials and workshops topics that range from usability testing, to designing for people who learn differently.

The Human-Computer Interaction lab has a long, rich history of transforming the experience people have with new technologies. From understanding user needs, to developing and evaluating those innovative technologies, the lab's faculty, staff, and students have been leading the way in HCI research and teaching. We believe it is critical to understand how the needs and dreams of people can be reflected in our future technologies. To this end, the HCIL develops advanced user interfaces and design methodology. Our primary activities include collaborative research, publications, and the sponsorship of open houses, workshops and symposiums.

In closing, it's an exciting time of growth for the lab and we are happy you can be here to share it with us. We look forward to hearing your thoughts and feedback on the symposium, our research, and our on-going lab programs. It is with your help, we can continue to change the world of HCI for many years to come.

Sincerely,

Dr. Allison Druin

Director, Human-Computer Interaction Lab and Associate Professor
College of Information Studies (Maryland's iSchool)
Institute for Advanced Computer Studies (UMIACS)

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Human-Computer Interaction Lab

U n i v e r s i t y o f M a r y l a n d

The Human-Computer Interaction Lab (HCIL) was established in 1983 as an interdisciplinary effort within the Institute for Advanced Computer Studies. Today HCIL participants include faculty, staff, and students from the Department of Computer Science, the College of Information Studies – Maryland's iSchool, the Department of Psychology, the College of Education, the Department of English, The Maryland Institute for Technology in the Humanities, and the Dingman Center for Entrepreneurship in the Robert H. Smith School of Business, at the University of Maryland, College Park.

This booklet contains all Symposium presentation summaries, posters and a sampling of technical report abstracts that have come out since our 2008 Symposium.

Please see our web site (www.cs.umd.edu/hcil) for a complete list and on-line versions of these and other papers.

If you would like more information, please contact:

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26th Annual Symposium
May 28, 2009

8:15am Sign-In - and Coffee/Tea

9:00am Welcome

Allison Druin
Director of HCIL

Jenny Preece
Dean, College of Information Studies - Maryland's iSchool

J. Robert Baum
Director of Entrepreneurship Research
Robert H. Smith School of Business

9:20am Keynote Talk

A Call to Action for HCI
Allison Druin and Ben Bederson

SESSION I: Collaboration – 9:50am
Session Chair: *Derek Hansen, Director,Center for the Advanced Studies of Communities and Information (CASCI)*

The Human-Pet Relationship on the Web
Jen Golbeck

Mobile Collaboration for Kids
Jerry Fails

Expertise Tagging Game
Yan Qu

Designing for Organizational Values
Ken Fleischmann

SHORT BREAK – 11:00am

SESSION II: HCIL Book Previews – 11:20am
Session chair: *Ben Shneiderman, Professor, Computer Science, Founding Director of HCIL*

Cyberpsychology: An Introduction to Human-Computer Interaction
Kent Norman

Public Libraries and Internet Service Roles
Paul Jaeger

Computing with Social Trust
Jen Golbeck

Designing the User Interface, 5th Edition
Ben Shneiderman

Mobile Technology for Children: Designing for Interaction and Learning
Allison Druin

LUNCH 12:00 – 1:15pm

SESSION III: Search – 1:15pm
Session chair: *Vibha Sazawal, Assistant Professor, Computer Science*

How do Children Search?
Elizabeth Foss, Allison Druin, Leshell Hatley, Sonia Franckel

Interactive Task of the TREC Legal Track
Doug Oard

Temporal Data Analysis and Electronic Health Records
Ben Shneiderman, Catherine Plaisant, Taowei David Wang, Kris Wongsuphasawat

SESSION IV: Visual Interfaces – 2:15pm
Session chair: *Kari Kraus, Assistant Professor, Maryland's iSchool*

Intergenerational Stories on iPhones
Alex Quinn, Ben Bederson, Allison Druin

Readability Metrics for Network Visualization
Cody Dunne, Ben Shneiderman

Enhancing Air Traffic Control Displays with Perceptual Cues
Tim Clausner, Evan Palmer, Chris Brown, Phil Kellman

Evaluation of Visual Analytics: The Role of Contests
Catherine Plaisant

Demonstrations & Posters

3:30pm to 4:45pm – HCIL Lab, 2117 Hornbake Bldg, South Wing

All interfaces introduced during the symposium will be demonstrated, along with several others including:

Wii for Learning
Greg Walsh

International Children's Digital Library (ICDL)
Anne Rose, Sheri Massey, Greg Walsh, Ben Bederson

International Children's Digital Library on iPhone
Alex Quinn

Interactive Translation
Chang Hu

Mobile Collaboration for Kids
Jerry Fails

A Novice Programming Environment for Children
Sureyya Tarkan

Interactive Exploration of Multivariate Categorical Data: Exploiting Ranking Criteria to Reveal Patterns and Outliers
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TangiFun: A tangible education system for teaching recursion
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GeoStories: Supporing Mobile Storytelling for Children
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Similan: Finding Similar Temporal Categorical Records
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Presentation Summaries

Black Ears to Blonde Cats: A Call to Action for HCI

Benjamin B. Bederson, Allison Druin
Human-Computer Interaction Lab
Department of Computer Science & iSchool
Contact: bederson@cs.umd.edu or allisond@umiacs.umd.edu

As researchers, we both have grown up in the field of Human-Computer Interaction. Over the past two decades, we learned how to understand, design, and innovate for diverse users. The challenging lessons we learned have resulted in technologies that can transform how the world's children read books, how the American public uses their mobile phones, how families can visit U.S. National Parks, and much more. However, as we look to the future, we believe it is time to consider change that goes well beyond innovating technology. We must use our experiences in HCI to lead, innovate, and transform our world.

In this keynote talk, we will ask you to take action with us in four important ways:

1. Design for the world…
2. Partner for deepest change…
3. Support creative expression…
4. Balance understanding, innovation, and the real world…

We will motivate our discussion with examples from our research and suggest paths to accomplishing these goals.
.

PAPERS FOR FURTHER READING

1. Bederson, B. B., Quinn, A., & Druin**,** A. (In Press). Designing the reading experience for scanned multi-lingual picture books on mobile phones. In *Proceedings of Joint Conference on Digital Libraries (JCDL'2009)*, Austin, Texas.
2. Druin, A. (Ed.). (April 2009). *Mobile Technology for Children: Designing for Interaction and Learning*. San Francisco, CA: Morgan Kaufmann.
3. Druin, A. (January/February 2008). Lifelong Interactions: My Father's Kitchen Table. *Interactions Magazine XIV* (1), 67-69.
4. Druin, A. (2002). The role of children in the design of new technology. *Behaviour and Information Technology, 21*(1), 1-25.
5. Druin**,** A., Bederson, B. B., Rose, A., Weeks, A. (2009). From New Zealand to Mongolia: Co-designing and deploying a digital library for the world's children. *Children, Youth, and Environment: Special Issue on Children in Technological Environments, 19*(1), 34-57.
6. Druin, A., Weeks, A., Massey, S., & Bederson, B. B. (2007). Children's interests and concerns when using the International Children's Digital Library: A four country case study. In *Proceedings of Joint Conference on Digital Libraries (JCDL'2007)* Vancouver, British Columbia, Canada, 167-176.
7. Komlodi, A., Hou, W., Preece, J., Druin, A., Golub, E., Alburo, J.,* Liao, S., Elkiss, A. & Resnik, P. (2007). Evaluating a cross-cultural children's online book community: Lessons learned for sociability, usability, and cultural exchange. *Interacting with Computers 19* (4), 494-511.

Note: The image on the previous page was taken of the researchers who brought digital books to rural Mongolia (see Druin et al., 2009 for more information).

SESSION I: Collaboration – 9:50am

Session Chair: *Derek Hansen, Director,Center for the Advanced Studies of Communities and Information (CASCI)*

The Human-Pet Relationship on the Web
Jen Golbeck

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Jerry Fails

Expertise Tagging Game
Yan Qu

Designing for Organizational Values
Ken Fleischmann

On The Internet, Everybody Knows You're A Dog: The Human-Pet Relationship in Online Social Networks

Jennifer Golbeck
Human-Computer Interaction Lab, College of Information Studies
Contact: golbeck@cs.umd.edu

INTRODUCTION

Over 43 million American households own dogs and over 37 million own cats, with more than 150 million pets between them. Owners invest a lot in their pets, financially and emotionally. In 2007, people spent $21 billion on veterinary care. Studies have shown that 98% of families consider pets to be either family members (68%) or close friends (30%) The vast majority of pet owners talk to and confide in their pets, consider them of great importance to their families, and even celebrate their pets' birthdays. Pets offer their owners many benefits in return. Studies show that owning a pet lowers stress, decreases the need for doctor visits, and can even lower cholesterol and blood pressure.

As social networking has become a popular activity for people, with Myspace and Facebook ranking high in the top ten most visited sites on the web, a number of networks have been created for pets. On these sites (sometimes cleverly called "petworks"), owners create profiles for their pets that are very similar in form to profiles on most major social networks. Pets can become friends, join groups, and post photos or blog entries.

Pets are not just companions, but are also reflections of their owners. In this study [1], we investigated the behavior differences between dog and cat owners in pet-oriented social networks. This allowed for an analysis of the differences between pet owners in general, and a deeper look at the implications of their social contexts on their behavior.

DOGSTER AND CATSTER

Dogster and Catster are the two largest pet-oriented social networks with 466,000 and 185,000 pet profiles respectively. The websites are owned by the same company and thus run on the same platform.

Pet owners create accounts on these sites, however the owners do not have profiles nor are they ever identified or visible on the site. Instead, the owners create profiles for each of their pets (see Figure 1). These profiles contain information similar to what would be expected on any other social networking website – name, photos, birthday,

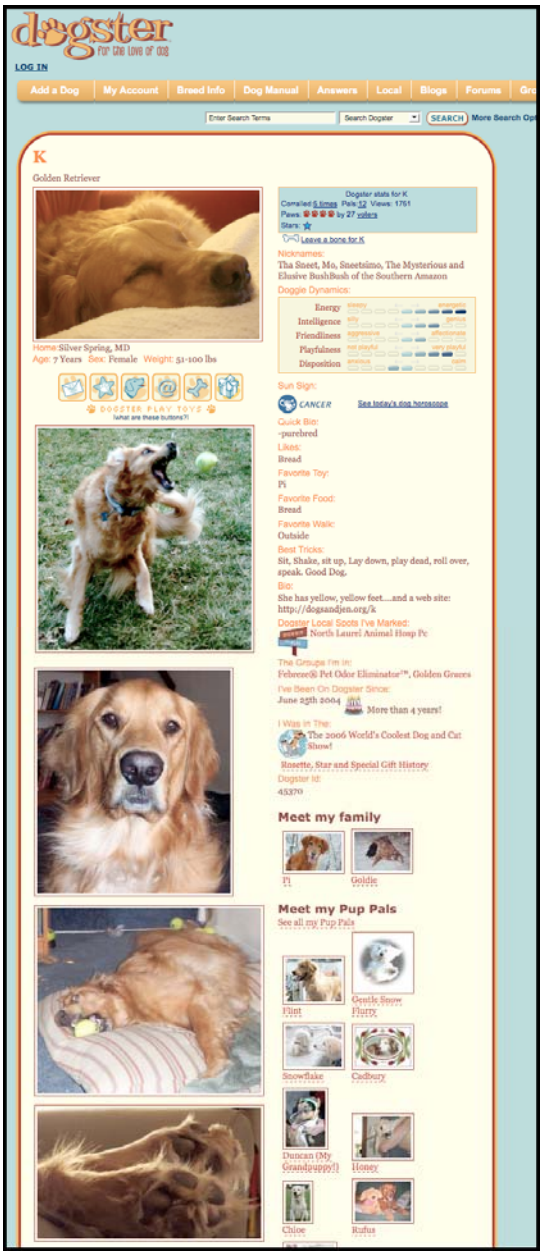

Figure 1: A sample Dogster profile.

hometown, favorite things, as well as blog and photo sharing features.

Pets whose profiles are created under the same owner's account are listed as family members. Pets can also make friends ("pup pals" or "feline friends") with other pets. As is usual in social networks, profiles have buttons to request a friendship be added and once the owner approves it, the relationship exists between pets.

Users of the sites can browse profiles randomly or by features such as breed, location, adoptability, and others.

OBSERVATIONS

Overall, dog and cat owners use these social networking sites in very different ways. Dogs have significantly more pictures than cats do. However, cats have significantly more friends than dogs - roughly twice as many on average. If we break this own into urban and rural groups, we see no difference for dogs, but rural cats have almost twice as many friends as urban cats. This is interesting since cats are much less popular as pets in rural areas.

Both dogs and cats have friends of the same breed significantly more than would be expected by chance. Dogs have friends within the same breed at over 12 times the expected rate, while cats have friends within the same breed just over 6 times the expected rate.

When speaking about their use of discussion boards, dog owners tend to emphasize that the advice and helpful information are most important while cat owners talk about the sense of community.

RESULTS

Dog owners tend to use this site to enhance their connection to their dog. Psychological evidence ties owner personality to their choices in breed groups; it shows that owners feel their dog's breed and its inherent traits are a reflection on and of themselves. There is also much evidence that pets are a representation of the owner's identity.

The results support this. Dog owners do indeed choose friends for their dogs within the same breed frequently - over 12 times more often than would be expected if friends were chosen randomly.

By choosing dog friends of the same breed, they enforce the importance of the breed to their personality through the profiles. Since these owners also share more pictures of their pets and use the community features to find advice about caring for their dogs, the emphasis seems to be on the direct person to dog relationship.

On the other hand, cat owners tend to use the site to build community. While dog owners have opportunities to interact on walks and at dog parks, cat owners have limited opportunities to meet others and interact in the context of their pets. The more isolated a group is from real-world social interaction around their pets (i.e. rural users), the more actively we found they used the site. This is seen in the choice of friends and the use of forums to find community.

CONCLUSIONS AND FUTURE WORK

Pets serve as a social intermediary, and these websites have the potential to allow users to build trust through communication centered around their dogs and cats, which can in turn lead to a stronger more connected community of users. The anonymous nature of the pet profiles encourages users to be more liberal with their friend making than they are in social networks where their profiles represent themselves.

Since users of the pet-oriented networks are taking advantage of the opportunities for finding community and new friendships afforded by these sites, we suggest an important design feature would allow for the pet owners to eventually make friendships directly.

There is great potential for future work in this space. We are examining how pets can facilitate more trusted communication in online communities. Research suggests that pets improve trust between people. We are looking at if and how pictures and/or information about pets provided in online communities affects trust between people, even if the topic being discussed has nothing to do with pets.

We were motivated to do this work by the large body of evidence that pet ownership and interaction has physical and psychological benefits. We are also beginning a study to see if some of these benefits can also be realized in virtual environments like pet-oriented social networks.

REFERENCES

[1] Golbeck, J. 2009. On the internet, everybody knows you're a dog: the human-pet relationship in online social networks. *Proceedings of the 27th International Conference Extended Abstracts on Human Factors in Computing Systems* (Boston, MA, USA, April 04 - 09, 2009).

Notes

Mobile Collaboration for Young Children

Jerry Alan Fails, Allison Druin, Mona Leigh Guha
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www.cs.umd.edu/hcil/mobilecollaboration/

ABSTRACT
From a very young age, children learn from stories they read, hear, and share. Research shows that collaboratively creating stories supports critical social and cognitive development in children. Within the context of empowering children to collaboratively read and create stories, we present interfaces that support different collaborative configurations for mobile devices including *content splitting* and *space sharing*.

INTRODUCTION
Bumping, shaking, tapping, or drawing a line across devices are all proposed ways of connecting devices. But what happens after they are connected? With the ubiquity of mobile devices, and the possibility that multiple devices could help overcome the perceived and real interactive shortcomings of mobile devices, we feel that enabling devices to come together in a collaborative fashion is not only appealing, but also necessary.

While such interactions may be appealing to adults, social activities such as collaboration are fundamental to the emotional and cognitive development of young children. Collaboration enables children to reflect, elaborate, and synthesize information. Reading and creating narratives is one way that children can both collaborate and learn [2]. Numerous narrative systems have been developed, including some designed specifically to foster collaboration. Narrative systems that utilize mobile devices allow children to create content while in the context of the object or situation for which they are creating a representation. This authentic context affords developmental benefits and support learning [1, 3]. While collaborative mobile device systems have been theorized as an effective educational method [4], systems supporting collaboration and story creation in context are scarce.

KEY CONCEPTS
The key concepts we present are the importance of creating stories in context and various collaborative configurations for mobile collaboration including *content splitting* and *space sharing*.

Figure 1 – Bringing mobile devices together to work collaboratively

Several factors influence co-located collaboration including angle, size, and number of devices, user arrangement, privacy of information, and the mapping of display space to input space. Collaborative spaces generally have private and public spaces – spaces where individuals can work alone (and others cannot see), and open spaces, where all information is shared. On mobile devices the screens are so small that the only distinction we make is connected or not connected. When devices are connected all is shared; when disconnected, each user has his own view (see Figure 1). We discuss and compare two configurations that support collaboration when connected: content splitting and space sharing.

Content splitting
Based on our work with children, the idea of *content splitting* has emerged. Content splitting is the notion of parsing out different content to each device (see Figure 2 *middle*). While pictures and words make for a simple delineation of content, we have noticed, especially through our co-design sessions with children, that the concept of role assignment is not only appropriate, but an integral part of the collaborative process. Parsing content can be synonymous with role assignment as each collaborator can take ownership and responsibility for her segment. This division of roles can also allow collaborators to continue to work together even when they are not co-located.

Space sharing

Based also on our work with children, s*pace sharing* suggests combining the visual space of multiple devices (see Figure 2, *right*). Expanding an environment to multiple displays is an area of active research. Current systems support opportunistic annexing where users can easily expand their interface to other devices. Dual display devices could support space-sharing as well as content splitting. While this research is applicable, it has a fundamental difference in that these devices are primarily for a single user looking to expand their interactive space. The focus here is to allow multiple users to expand their interactive space together.

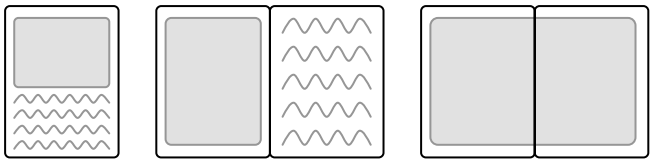

Figure 2 – Collaborative configurations; ***left,*** a single page from a book with a picture and words; ***middle*****:** *content splitting*, two devices showing the same page (one device shows the picture, the other, the words); ***right*****:** *space sharing*, two devices showing the same picture on a page (picture is spread across both devices).

COMPARATIVE STUDY

To investigate these configurations further, we designed a three-part study where pairs of children would read, create, and share narratives using the prototype system Mobile Stories 3.0 which implemented the content splitting and space sharing configurations. Twenty-six (26) children ages 8-9 years old participated. For the reading portion, the pairs had the opportunity to use each of the two collaborative configurations for four minutes. Order of presentation was alternated. Children had fifteen (15) minutes to create a brand new story, and then as long as necessary to share their story with the adult facilitators. For the creation portion, children could work independently (e.g. navigation was not synchronized), splitting the content, or sharing the space. They were given reminders that they could use these modes every five minutes. For the sharing experience, children were asked to use one of the two "connected" modes, namely content splitting or space sharing.

We are still analyzing the data, but we present here, initial findings from the data. The data include: interviews, field-notes, video (of interviews and software usage), software logs, and the child-created collaborative stories. This rich set of data suggests overall preferences, and can lead to scenarios when each configuration may be more beneficial.

The initial findings include:

- Content splitting is preferred overall. Research participants suggest this is easier to use, in spite of not having the picture and words integrated on one screen. Boys tend to like content splitting more than the girls.
- Space sharing is less preferred overall. Research participants suggest it is harder to use. Being able to see both the picture and words is noted as an advantage of space sharing. When space sharing, children generally use the two page spread view more than zooming in on the picture or words.
- According to research participants, content splitting is well-suited for reading with someone who is younger. Participants suggested a younger child can have the picture device and look at the words when they want to. Those who like space sharing, suggested it might be better when reading with someone who reads as well or better than you.

CONCLUSION

We believe these collaborative principles are applicable to more than just storybook reading and story creation – applying to widgets and other collaborative role assignment. Our design experiences have shown us that the collaborative configurations of content splitting and space sharing could leverage the ubiquity of mobile devices and overcome their alleged limitations.

ACCOMPANYING VIDEO

www.cs.umd.edu/hcil/fails/videos/VideoShowcase-26.wmv

FOR MORE INFORMATION SEE ALSO

- Fails, J.A., Mobile Collaboration for Young Children. in *Interaction Design and Children (IDC)*, (Aalborg, Denmark, 2007), ACM Press, 181-184.
- Fails, J.A., Druin, A., Bederson, B., Weeks, A., Komlodi, A., Rose, A. and Browne, T. A child's mobile digital library: collaboration, community and change. in Druin, A. ed. *Mobile Technology for Children: Design for Interaction and Learning*, Morgan Kaufmann, New York, 2009, 125-146.

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Notes

Making Sense of People Tagging in Organizations

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Introduction

Understanding what knowledge an organization has and how the knowledge is distributed in organizational social networks is important for knowledge workers to conduct their daily tasks, such as organizing project teams, brainstorming innovation ideas, or locating expertise to solve difficult problems. Such understanding also informs managers about what kinds of expertise are available in an organization and what kinds of expertise are lacking, which is essential for talent management.

There are many previous works in the area of expertise finding [1]. They mostly focus on building expert databases for known experts or creating expertise profiles for individuals. The challenging issues in this area include collecting and validating expertise data, searching and matching expertise, and handling related social issues.

Recently, along with other researchers [3][4], we have started to explore social tagging as a new mechanism to collect expertise information in organizations because the best source of a person's expertise information is her friends and colleagues. Such systems allow users to assign expertise tags to themselves and other people. A bag of expertise tags then serves as a person's expertise profile, which enables basic keyword search on expertise. Moreover, such systems collect social network information as a person usually only tag those people she knows well. Several incentive design ideas has been explored to encourage continuously creating and updating of the expertise tags, including lightweight operation [3], adopting social games [4], helping people to shape their identities in organizations, etc. Empirical data shows that such systems can collect a large amount of tags during a short period of time. The quality of the tags can also be improved by certain validation mechanisms [4].

In this paper, we present how to make sense of the data collected in a people tagging system.

Making Sense of Tags on People

We introduced a people tagging system to two graduate-level courses in the iSchool at the University of Maryland. The tags were collected after 59 students across two classes used the system for 4 months. Sixty-eight students were tagged. The system collected 2072 tags. Among them, 931 tags are unique.

Figure 1 is the tag cloud visualization of the top 150 most-used tags. The bigger the size of a tag is, the more students have the tag in their expertise profile. The figure shows us the popular expertise or knowledge among these students.

Figure 1. A cloud of expertise tags assigned to 68 graduate students in the iSchool at the University of Maryland[1]

To further make sense of these collected tags, we categorize the tags under different topics. Independently, two researchers developed their won topical classification scheme and coded these tags. Next they compared their classification schemes with each other and with general classification schemes such as the Library of Congress Classification and the Wikipedia categories. They then consolidate the two classification schemes through discussion. The final classification scheme is shown in Figure 2, with the number of tags under each category attached. It has six top level categories: *Science or Technology*, *Sports or Recreation*, *Geographic Locations*, *Community or Organization*, *Job or Title*, *and Others*.

The classification tree is heavily unbalanced as one category "*Science or Technology*" contains 46% of the tags. We realize that the general-purposed knowledge structures are often too broad and too shallow to organize expertise tags because the community often has a much

[1] The image is generated by http://www.wordle.net/.

narrower focus on more specific topics. Therefore, input from community members is a necessity to build the knowledge structure. Moreover, local community knowledge is needed to understand and categorize specific expertise tags.

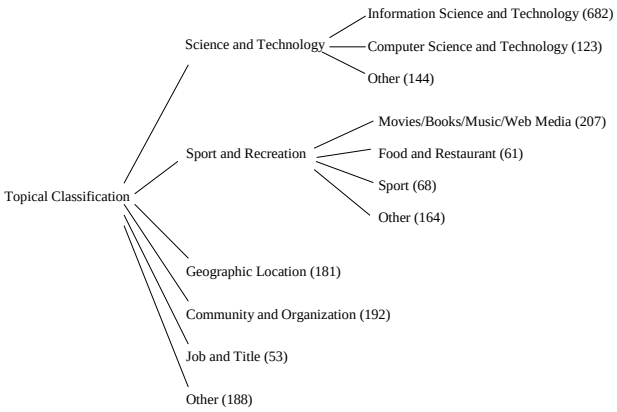

Figure 2: Consolidated classification

As a result of the coding process, we also identified other problems in the current people tagging system, such as the lack of context information to correctly interpret the tags and the vocabulary problems.

Making Sense of the Tagging Network

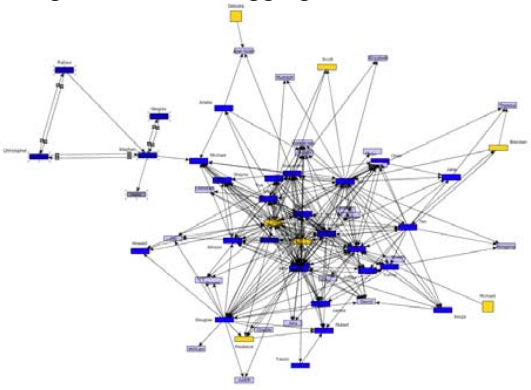

Figure 3: The network of who tags whom

Another interesting result from people tagging is the social network about "who knows who know what". Figure 3 shows part of the tagging network in our experiment. Each node in the diagram is a person. A directed link between two nodes tells us one person tagged the other. We can see that the tagging network is unbalanced (like a lot of other networks). There are several "popular" students who have received a lot of tags, while some others have only received a few. We can also see that there are some sub communities (like three students at top left corner). At last, surprisingly, the percentage of reciprocal tagging relations is not as high as we expected. More detailed analysis and discussion of this tagging network will be in later reports.

Summary

As shown in this study, we can make sense of how the knowledge is distributed and shared in organizational social networks by examining the tags assigned to people,. However, in order to provide efficient and effective interface for people to browse and search for expertise, we need to augment the free form tags with extra knowledge structure to better organize the tags and provide contextual information.

Acknowledgements

We would like to thank Samantha Mahindrakar, Tao Dong, Mark Ackerman, and researchers at Pitney Bowes for their work and suggestions in this project.

PAPERS

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Notes

Designing for Organizational Values

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This paper seeks to answer the following question: What is the relationship between human values and organizational culture? Specifically, this study focuses on computational modelers, who are involved in designing tools that are used for important decision-making processes with profound scientific, societal, and policy implications. The field sites for this research project included a corporate research lab, an academic research lab, and a government research lab. This study was funded by the National Science Foundation.

Data collection included surveys of 76 modelers and interviews with 40 of those modelers, as well as focus groups at all three sites before and after the surveys and interviews. The survey included as a component the Schwartz Value Survey, which includes 56 human values. Interviews were coded using the 56 values included in the Schwartz Value Survey. For the analysis of both the survey and interview data, Mann-Whitney U was used to compare differences between organizations in individual pairings, and Kruskal-Wallis H was used to compare differences among all three organizations together. Both of these non-parametric tests are more robust than and carry fewer assumptions than their parametric equivalents. All statistical calculations were completed using SPSS.

This paper reports results about the relationship between organizational culture and human values based on both the survey and interview data collected and analyzed as part of this study. Six values were statistically significantly different among the three different organizational cultures on the survey (see Figure 1). Unity with nature scored particularly high within the corporate lab, curious scored particularly high within the academic lab, and clean scored particularly high within the government lab. Further, obedient, loyal, and honoring of parents and elders scored particularly low within the academic lab.

In the survey results, while the findings about unity with nature and clean appear to be specific to the organizations studied, the other four values are consistent with stereotypes about scientific research within the three different types of organizational culture. Specifically, academic research tends to provide more freedom and opportunities for independently directed research, while corporate and government research tends to be more structured and top-down. Thus, it is not surprising that modelers working in the academic labs tended to value curiosity more than modelers working in government or corporate labs. Contrastingly, modelers in corporate and/or government labs tended to value obedience, loyalty, and honoring parents and elders more than modelers in academic labs. Curiosity is usually a feature of unrestrained science, while obedience, loyalty, and honoring parents and elders are more likely to occur within a highly structured and more hierarchical context. Based on these results, it is not clear whether modelers with high degrees of curiosity and low degrees of obedience, loyalty, and honoring of parents and elders were more likely to choose to work in academic labs, if academic labs tended to show preference in hiring to individuals with those compatible values, or if the environment tended to shape the values of the individuals working within it, but it is entirely possible that the results are a combination of all three factors, which is likely given the statistical significance of these findings.

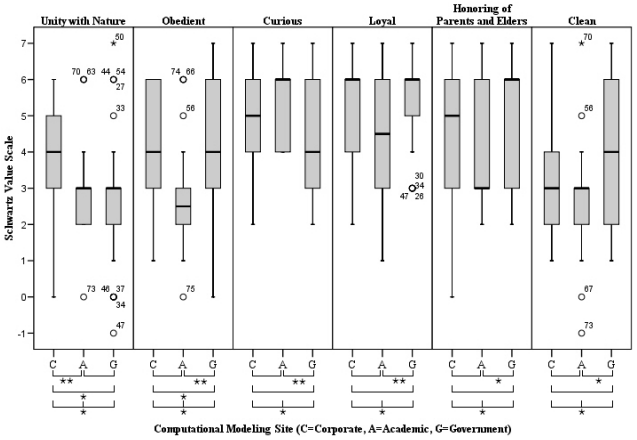

Figure 1 – Statistically significant survey results (***=p<0.001; **=p<0.01; *=p<0.05).

Ten values were statistically significantly different among the three different organizational cultures on the interview (see Figures 2 and 3). The corporate lab had high frequencies of occurrence for responsible, authority, equality, wealth, and accepting my portion in life, and low frequency of occurrence for influential. The academic lab had high frequencies of occurrence for national security

and a world at peace. The government lab had high frequencies for healthy and capable.

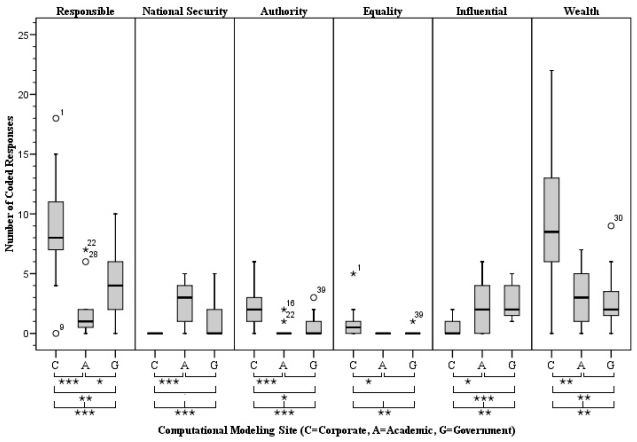

Figure 2 – Statistically significant interview results (***=p<0.001; **=p<0.01; *=p<0.05).

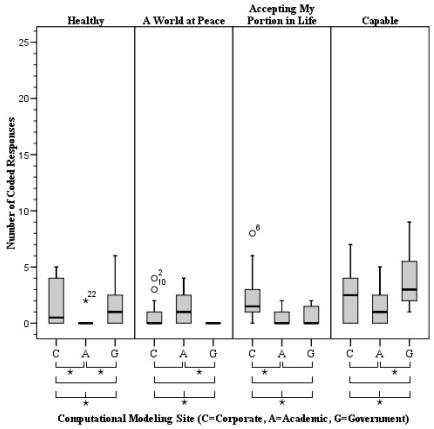

Figure 3 – Statistically significant interview results (***=p<0.001; **=p<0.01; *=p<0.05).

The interview results also help to illustrate conflicts within and among different organizational cultures. For example, the academic lab had a significant conflict between national security insofar as many of the research projects were funded by the military-industrial complex, and a world at peace, insofar as there tends to be strong anti-war sentiment on college campuses, including among many faculty and students involved in computational modeling research. There was also a conflict between authority and equality at the corporate lab, as the highly structured and hierarchical power structure within the corporation had to be balanced with the need for bottom-up emphasis on scientific research yielding findings that trump any corporate mandates and the need to consider all inputs. Finally, there also appeared to be a conflict in the corporate lab between the emphasis on wealth, which is related to the profit motive of the corporation, and accepting my portion in life, which appeared to be related to employees of the corporate lab feeling that they needed to make compromises relative to their own value system due at least in part to the profit motive of the corporation, especially in cases where they are required to work on projects that will lead to downsizing and workforce reductions. Thus, there are important conflicts within these different organizational cultures, and there are also statistically significant differences in the incidence of these values among the three different organizational cultures.

Interestingly, the surveys and interviews identified distinct statistically significant differences among the three organizational cultures, but this result is not surprising given that the surveys and interviews measure values in quite different ways. The survey indicates self-reported adherence to particular values. In contrast, the interviews measure the frequency with which values arose in the interviews, which provides a sense of the extent to which particular values are salient within particular organizational contexts. Thus, the surveys measure the values of individuals as acknowledged by those individuals, while the interviews measure the organizational contexts within which those individuals are situated. While there is certainly interaction between the individual and the environment, it is not surprising that there are differences in these two levels of values (personal and organizational).

Different organizations will build models differently – providing an opportunity for the values of the organization to influence the model building process. Our research shows that this is in fact the case; values inherent in an organization's culture do affect the modeling process. The danger is that models will reflect only the values of designers and not the values of users, which has negative implications not only for users but also ultimately for designers. While models that conflict with the values of users certainly may be problematic for users, users may choose not to use models that are opposed to their values, and thus failing to consider the values of users may ultimately hurt designers as well as users.

PAPERS

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2. Fleischmann, K.R. & Wallace, W.A. 2009. "Ensuring Transparency in Computational Modeling." *Communications of the ACM* 52(3): 131-134.
3. Fleischmann, K.R., Robbins, R.W., & Wallace, W.A. 2009. "Designing Educational Cases for Intercultural Information Ethics: The Importance of Diversity, Perspectives, Values, and Pluralism." Journal of Education for Library and Information Science 50(1): 4-14.

Notes

SESSION II: HCIL Book Previews – 11:20am

Session chair: *Ben Shneiderman, Professor, Computer Science, Founding Director of HCIL*

Cyberpsychology: An Introduction to Human-Computer Interaction
Kent Norman

Public Libraries and Internet Service Roles
Paul Jaeger

Computing with Social Trust
Jen Golbeck

Designing the User Interface, 5th Edition
Ben Shneiderman

Mobile Technology for Children: Designing for Interaction and Learning
Allison Druin

Cyberpsychology: An Introduction to Human-Computer Interaction

Kent L. Norman
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lap.umd.edu/cyberpsychology

The field of human-computer interaction has emerged and grown to maturity over the past two and a half decades. Today most colleges and universities have courses on the topic. Many of these courses are taught in the departments of psychology, computer science, information systems, and information management. Instructors for these courses are often at loss to find the "right" book for their course. Most often, they use books on user interface design, which meet only part of the objectives of the course. Other topics dealing with human performance, cognitive psychology, and social issues are covered with supplemental readings.

The intent of this book is to provide a board survey of topics in one text. As a psychologist who has worked in human-computer interaction for over twenty years, I believe that I have provided a balanced perspective from psychology and the breadth of coverage generally found in an introductory psychology course.

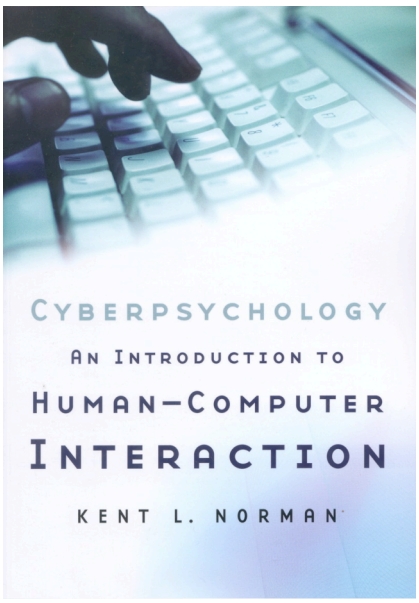

Figure 1 – Book cover.

The book has been more than 20 years in the making. In 1984, I taught a college course titled "Psychology in the Age of Computers." Over the years, I have collected materials and references, added to my notes for the course, conducted empirical research on the topic, and thought a lot about the topics and issues.

Since the introduction of the first personal computer in the 1970s, computer technology has developed to such a rich and pervasive state that affects nearly everyone in the world. "Cyberpsychology" has become the portmanteau that now encompasses where we are in psychology and technology. Consequently, the time has come for a general textbook on cyberpsychology.

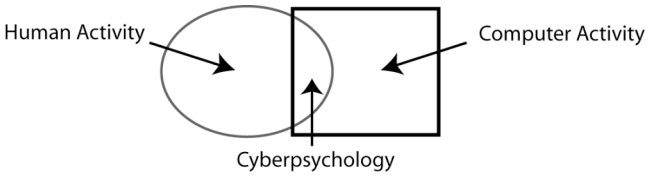

Figure 2 – Area of cyberpsychology.

This book is meant to be an "introduction." First, it encourages the reader to come to the topic with a fresh and ready mind. There are no other prerequisites. Second, as an introduction, it emphasizes breath rather than depth. It attempts to cover a number of topics in the psychology of human-computer interaction rather than exhaustively delve into one topic. Finally, as an introductory textbook, it attempts to be engaging, give a good first impression of the topic, and hope that the reader will follow up on the invitations to spend more time with the topics and ideas.

Cyberpsychology is primarily intended for students in technological programs who do not have a sufficient background in psychology to begin studying HCI, for psychology undergraduates who need to know about how people fit into the changing world of technology and computer science, and for the general public seeking a broader perspective on psychological issues in the world of technology.

Cyberpsychology is more about people than about machines. The organization and the perspective of the book come from psychology, not from computer science. The book is centered around human issues first and issues in technology second.

The first section of the book lays the foundation of the psychology of human-computer interaction in terms of historical background, biological and technological systems, theoretical models, and empirical methods.

Chapter 1 (Introduction: Importance, Implications, and Historical Perspectives) emphasizes the importance of the human-computer interfaces today, the implications for psychology, and the history of psychology and computers relative to one another.

Chapter 2 (Fundamentals: Biological and Technological Bases) presents the biological bases of behavior, the brain, and the human nervous system in contrast to an overview of computer hardware and software.

The way that we understand things is through models and metaphors. Consequently, Chapter 3 (Theoretical Approaches: Models and Metaphors) discusses the use of models to describe the relationships between human behavior and computer systems. It introduces a model of the flow of information and control through the human-computer interface and a community of models and perspectives assumed by interface designers, users, psychologists, and the machine itself.

Modern science is based on empirical, verifiable results. Chapter 4 (Research: Modes and Methods) presents standard methods of research applied to HCI (e.g., surveys, observational data, and experiments) as well as new technologies for usability research.

The next section starts with the input/output systems of the human and the machine and then moves deeper into cognitive systems.

"Garage In/Garage Out" is an expression used to refer to problems with computers. What about humans? Chapter 5 (Sensory-Motor Interfaces: Input and Output) discusses visual, auditory, haptic, and other sensory input from the human-computer interface and motor output to the interface (e.g., keyboard, mouse, touch screen).

Learning has always been an essential part of human behavior. It is becoming even more important in the complex world of technology. Chapter 6 (Learning, Memory, and Retrieval) deals with learning and memory issues on the part of the human and the computer. What must the human learn and remember about the computer (e.g., commands, procedures, passwords)?

Chapter 7 (Cognitive Psychology: Thinking and Problem Solving) discusses the human processes of thinking and problem solving while using computers. How does the user figure out how the application works? How can the computer be used to help solve problems?

Language is a fundamental means of communication. Chapter 8 (Language and Programming) discusses the use of language with computers. It discusses issues in the use of programming languages and natural language. How do tell the computer what we want it to do?

The third section moves into how individual differences, human motivation, feelings, interpersonal relationships and psychological problems are mediated by the interface.

Are people becoming more alike or more different in the age of technology? Chapter 9 (Individual Differences: People, Performance, and Personality) discusses individual differences at the human-computer interface.

Chapter 10 (Motivation, Emotion, and Affect) discusses issues in intent, motivation, and satisfaction with respect to the human-computer interface. How does interacting with the computer reward or frustrate us?

Chapter 11 (Interpersonal Relations) discusses issues in person perception (e.g., stereotyping, bias, and prejudice), attitudes (e.g., toward self, others, and the computer system), interpersonal communication (e.g., email and chat), and aggression.

In Chapter 12 (Abnormal Behavior and Cybertherapies), we discuss new psychological problems and pathologies as the result of computers and technology (e.g., computer phobia, stress) and we discuss online counseling and the use of self-help resources.

The final chapters turn to issues of particular interest in cyberpsychology.

Artificial intelligence is adding a new dimension to HCI with AI agents working at and around the interaction with humans. In Chapter 13 (Automation and Artificial Intelligence), we discuss the implications of living in an automated environment, the development of AI, and its pervasive presence in technology today.

Our relationship with technology can be synergistic. In Chapter 14 (Assistive and Enhancing Technologies), we look at how technology is being used to enhance our abilities to perceive, think, and solve problems. We also look at assistive technologies that make up for disabilities and impairments in some individuals.

Chapter 15 (Media: Games, Entertainment, and Education) discusses digital convergence and psychological issues in computer media, computer games, and online education.

What does the future hold for psychology and the human/computer interface? Chapter 16 (The Future: The Ultimate Human/Computer Interface) surveys a number of ideas and discusses their implications.

BOOK CITATION

1. Norman, K. L. (2008). *Cyberpsychology: An introduction to human-computer interaction.* Cambridge, England: Cambridge University Press.

Notes

Book Preview: Mobile Technology for Children-- Design for Interaction and Learning

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College of Information Studies (iSchool)
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During two snowy February days in 2008, 42 leaders from industry, academia, government agencies, and non-profit organizations came together for a workshop at the University of Maryland, supported by the National Science Foundation. Representing work in 12 countries, experts talked about the development and use of mobile phones, educational laptops for the developing world, pen-based computing, and much more. Participants gave examples of how children from around the world could use these mobile devices for everything from learning the alphabet, to collecting science data, to playing outdoor games, to collaboratively reading books.

Representatives from the World Bank and the United Nations began the workshop by describing the needs, opportunities, and challenges in this area of research and deployment. There were lively discussions that followed concerning classroom use or non-use, the unintended consequences these technologies can have, and the power and importance of an array of learning applications for the world's children. We explored issues comparing the importance of mobile phones to inexpensive educational laptops. Concerns were raised in regards to the impact on local cultures and industry. We discussed the implications of these technologies and how they might influence research, new products, and government policies**.**

From this extraordinary experience, we began to understand the depth and importance of what is being done in this area of mobile technology for children. But more importantly, we began to understand what is needed in the future for the world's children. Already, this workshop has led to new research initiatives in labs around the world; it has led to shared conference panels and discussions at international venues; and it has led to this book (Figure 1): *Mobile Technology for Children* (Druin, 2009).

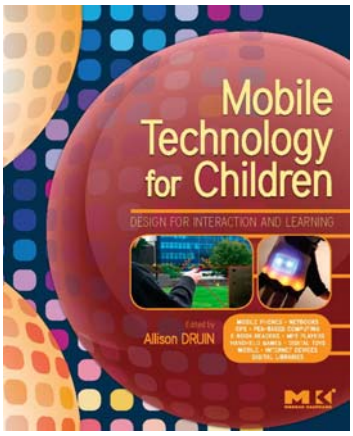

Figure 1: Mobile Technology for Children

This book is not about how to make mobile technologies. It is about how to make BETTER mobile technologies for the world's children. This book is about how to understand the impact that these technologies can have, and apply those lessons to making new learning experiences for children that are more effective, engaging, and expressive. This book will ask you to consider a diverse landscape of research and products to inspire and challenge your thinking.

This would have been a much easier book to write if the authors could give you a step-by-step guide on what to build and how to use it, but that just isn't possible. The world is too large, diverse, and messy, and the pace of innovation is just too fast. There are so many technological solutions to consider, so many contexts to explore for scenarios of use, and so many different goals that could support learning. Together this suggests the need for a rich and complex book.

This is the book I now present to you. It contains the work of 43 authors from 9 countries. These authors have diverse points of view, in part due to the disciplines they represent. They are computer scientists, HCI professionals, social scientists, educational researchers, non-profit or NGO leaders, academic and industry researchers and practitioners. They are people making change in their organizations. They work in developing countries and industrialized nations, in war-torn areas and established centers of commerce and peace. They consider the use of mobile technologies in classrooms, homes, outdoors, and public spaces. And the "mobile technology" that they consider spans a wide variety of platforms – including mobile phones, GPS systems, laptops, game controllers, mp3 players, book readers, and even pen-based computing. This diversity in perspective, experience, and technology is critical in understanding future new directions.

TODAY'S YOUNG PEOPLE—THE I-CHILDREN

What makes this book on mobile technologies unique is its focus on children as users. Before reading any chapter in this book, you should consider that there are large differences in how people define "children." There is no one "correct" answer, just a spectrum of possibility. The only thing most people can agree upon is that children are quite different than adults. They have different needs, abilities, and interests than their parents, teachers, extended family and friends (Druin, 2002).

For the purposes of this book, we discuss children as technology users that range from 24 months to 12-years-old. The *i-children* we describe live in industrialized countries where access to mobile technologies is commonplace. They also live in developing countries where mp3 players, mobile phones, and laptops are not common. However, they may have access to mobile phones, where the number of "minutes" of online time, and the quality of the phone may be limited. I call all of these young people: *i-children* because they are *interactive*, *independent*, and *international*. These young people use many forms of technology, where they expect to interact with others. They are also surprisingly independent or self-sufficient as they wander the web and use media. These children can also be refreshingly aware of the greater world around them. Technology has helped increase children's understanding of others from around the world – from a YouTube video to a blog written half-way around the world.

On the other hand, the "digital divide" still exists not just between those in developing and industrialized countries, but for those in various parts of industrialized countries. Poverty changes the technologies children can access. In certain parts of the world, children see these cell phone minutes as more valuable than almost anything else, and can at times purchase cell phone minutes before choosing to buy shoes or other basic necessities. Unfortunately, the use of mobile technologies for learning remains inconsistent at best.

THIS BOOK

There are three lenses used in this book to look at the world of mobile technology for children. In the first section, *The Landscape*, five chapters take a broad look at what is possible. They give an overview of the technical research, the educational possibilities, and the important commercial options. In addition, cautions, unintended consequences, and critical considerations are shared both in a worldwide context and within the walls of the classroom.

In the second section *Designing Mobile Technologies* is explored. It starts with an overview of various kinds of design methods which are then followed by chapters that focus on specific approaches to mobile design. In the final section, *Learning and Use*—authors discuss what children are doing with mobile devices from Uruguay to northern Virginia: from supporting literacy development, to enhancing parent/child relationships, to supporting the well-being of children through UNICEF programs. The book ends with a look at the future, the technical possibilities, pitfalls, and the power of learning.

Throughout this book, no matter what the section or authors, you will find a focus on the important problems to solve and the trade-offs to consider when it comes to hardware, content, and context of use. Ultimately, the goal of this book is for each of you to look at the future and explore opportunities and challenges with mobile technologies in ways you never thought possible.

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Notes

SESSION III: Search – 1:15pm
Session chair: *Vibha Sazawal, Assistant Professor, Computer Science*

How do Children Search?
Elizabeth Foss, Allison Druin, Leshell Hatley, Sonia Franckel

Interactive Task of the TREC Legal Track
Doug Oard

Temporal Data Analysis and Electronic Health Records
Ben Shneiderman, Catherine Plaisant, Taowei David Wang, Kris Wongsuphasawat

How Children Search the Internet with Keyword Interfaces

Allison Druin, Elizabeth Foss, Leshell Hatley, Evan Golub, Mona Leigh Guha, Jerry Fails
Human Computer Interaction Lab
iSchool and Computer Science Department
Hilary Hutchinson
Google
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www.cs.umd.edu/hcil/KidsSearch

It is not uncommon for young people to begin to go online with a parent or sibling by the age of three or four. They move from their home computers to their school's computing facilities to their mobile phones, searching for online games, information for school assignments, and random facts they are curious about because of the world around them. Today's children are the first generation of what are being called "digital natives" [1]. As a result, it is important to explore how children search the Internet with today's ubiquitous keyword interfaces.

Research in the area of children's searching has revealed a number of difficulties children regularly experience. Children have challenges formulating search terms, preferring to search using natural language [4]. They also do not develop typing and spelling abilities until ages 11-13 [2]. Once children are more adept at typing and spelling, they are able to focus on their query formulation. With the difficulties children have typing, spelling, and formulating queries, it is not surprising that they are also confused when interpreting results presented by search engines [2].

THE STUDY

To address these issues, we designed an initial study to investigate how children interact with search engines and to answer some of the research questions that arose from the literature. The purpose of this study was to begin to gather initial qualitative data, pinpoint trends in children's behaviors, and to further develop our methods for future larger studies [3].

The participants in our study were randomly selected from a convenience sample of suburban Maryland and included 12 children and their parents. There were four children of each age. These specific ages were chosen to allow us to compare developmental differences in children of different ages.

When conducting data collection, we scheduled in-home interviews with families. By interviewing children using their home computer, we were able to observe interactions with the computer they were most familiar with and comfortable using. We interviewed the children while they performed searches. We also interviewed parents to gain insight into contextual factors surrounding children's typical searching behavior.

Study participant searching during her interview

Our qualitative data analysis began with a full team meeting to discuss general trends in the data, which included video of child interviews, audio of parent interviews, and handwritten notes. Two members of our team then sorted and categorized the data into general codes, which were confirmed and revised by two other member of the team. All codes were allowed to evolve naturally from the data, as we did not begin this research with preconceived notions of what we would find.

OUR FINDINGS

The trends emerging from this analysis revealed several major categories for further description. We discovered that children are Google converts, with 10 out 12 participants using Google. However, few of these children could describe features of Google beyond the entry of text into the text box.

Children in our study also displayed difficulty typing and spelling. All of the 7 year olds and most of the 9 year olds used the "hunt and peck" typing method, with two 11 year olds displaying the full QWERTY typing method. Most of the children had spelling errors during their searching, sometimes severe enough that Google's *did you mean* feature was unable to assist. We discovered that children do not look at the screen as they type their query, but almost all of them look at the screen before submitting the query, although they do not change what they have typed.

Most of our participants displayed or reported frustration during the interview. Younger children were frustrated by their inability to type or spell and older children were frustrated by the perceived inability to find results. The children typed their queries into the webpage text box most often, with less than half of the queries using the tool bar textboxes in the browsers.

Our most complex search question required children to build a search by finding one piece of information before progressing to the next step of search. None of the participants were able to complete this type of query, and only one 9 year old boy was able to approach the search in the correct way.

The participants displayed difficulty in using the results pages returned by the search engines. Out of 58 total queries entered by the participants, only twice did the child venture past the first page of results. While using the results, the children clicked on the first returned page most often.

Finally, we asked both children and parents to describe their ideal searching tool. Parents and children had overlap in their responses, both caring about safety, good results, and having multiple forms of input available. Children were uniquely concerned with the speed of search tools, while parents were uniquely concerned with the developmental appropriateness of the tool.

LESSONS LEARNED

Based on this initial study, we suggest the following when designing future search tools for children. Due to the way children use the screen when typing, we feel that auto-complete features offered should appear after long delays, to allow the child to shift his or her gaze from the keyboard to the screen. Additionally, placing a screen into the keyboard might allow children to interact more fully with the search interface. Children sit lower in front of computer screens than adults, so shifting the text box to the bottom rather than the top of the screen may also aid in their ability to see what they enter. The results pages posed a problem for the participants in this study as well. We propose either a single results page or a new way of visualizing multiple pages of results. For the single results page, it would be necessary to have fewer links and no scrolling required. Alternately, offering visualizations to the child showing that there are many pages of results available could lead the child to better use of the results, and could also be used to indicate that the results need to be filtered. Aging the interface is important, but children do not want to feel as though they are using a dumbed-down version of adult tools. Results could be designed to present a child searcher with pages at appropriate reading levels.

Future work in this area includes a mixed-methods study of 120 children and their parents that will ask more specific questions based on some of the trends we have found in this study. Currently we have collected data for this new study from 60 children and their parents and many of our results are confirmed: all of the children in the current study use Google, typing difficulties are more pronounced at younger ages, children are still experiencing difficulty with the complex query, and few children use more than the first results page. We look forward to further analysis to determine differences across gender and socioeconomic status. We are also interested to see how children compare to novice adult users in future work.

ACKNOWLEDGEMENTS

We would like to thank the parents and children participating in this study and NSF and Google for financial support.

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Notes

Interactive Task of the TREC Legal Track: Theory Meets Practice

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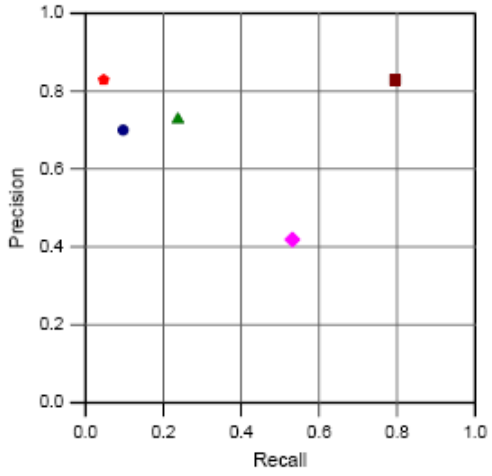
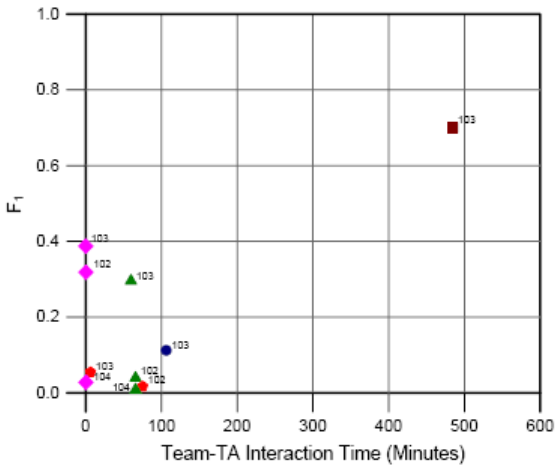
The retrieval of digital evidence responsive to discovery requests in civil litigation, known in the United States as "e-discovery," presents several important and understudied conditions and challenges. Among the most important of these are (i) that the definition of responsiveness that governs the search effort can be learned and made explicit through effective interaction with the responding party, (ii) that the governing definition of responsiveness is generally complex, deriving both from considerations of subject-matter relevance and from considerations of litigation strategy, and (iii) that the result of the search effort is a set (rather than a ranked list) of documents, and sometimes a quite large set, that is turned over to the requesting party and that the responding party certifies to be an accurate and complete response to the request. This talk describes the design of an "Interactive Task" for the Text Retrieval Conference's Legal Track that had the evaluation of the effectiveness of e-discovery applications at the "responsive review" task as its goal. Notable features of the 2008 Interactive Task were high-fidelity human-system task modeling, authority control for the definition of "responsiveness," and relatively deep sampling for estimation of two types of errors: false alarms and misses (expressed as "precision" and "recall").

ADDITIONAL RESOURCES

TREC Legal Track: http://trec-legal.umiacs.umd.edu

General e-discovery: www.law.pitt.edu/DESI3_Workshop



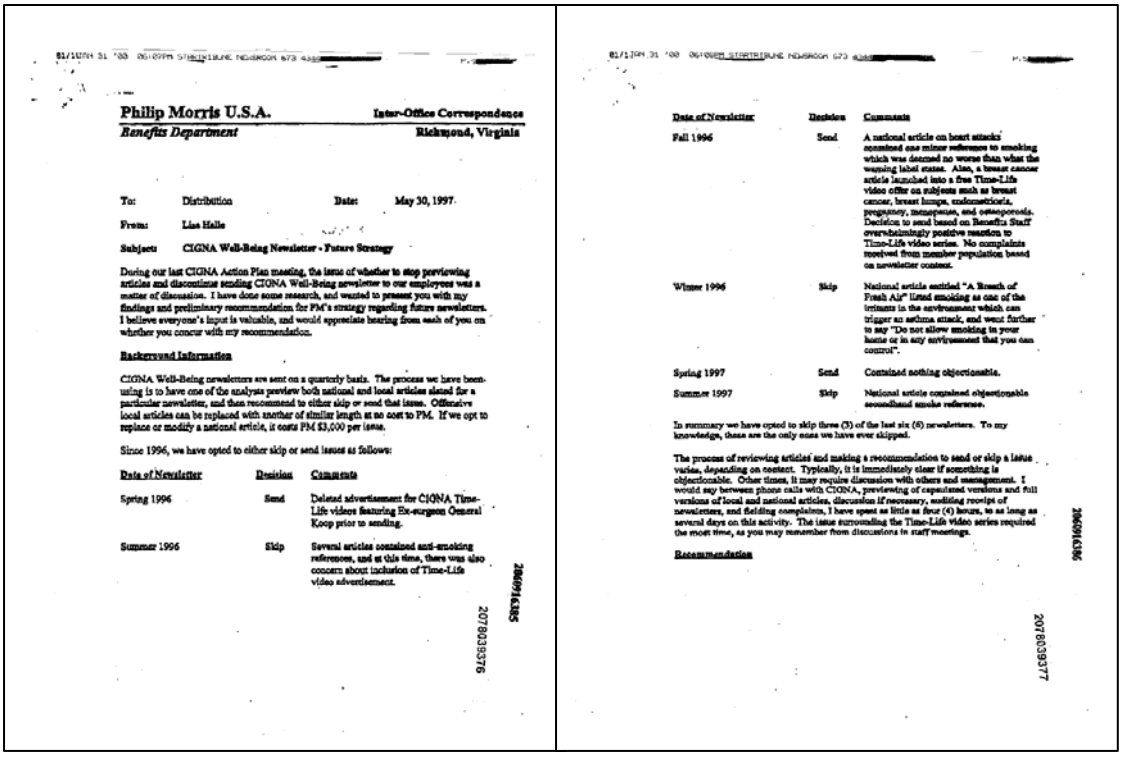


… **Plaintiff, Jenny Jessen, purchased Smokin' common stock** …
… Defendant Jesse Winston ("Winston") was Chairman and Chief Executive Officer ("CEO") …
… Defendant Winston had a duty to disseminate accurate and truthful information promptly with respect to the Company's financial condition …
… On April 15, 1995, **the Company announced record sales** for the quarter ended March 31, 1995 ("1Q95"). In the press release issued that day, **Defendant Winston credited the Company's "We're Smokin!" advertising campaign for driving demand**. …
… defendants had failed to disclose the following facts which they knew at the time …:
… During 1995, at least **fifteen employees filed formal complaints** with the Company's Human Resources department alleging that they had **suffered retaliation** as a result of taking leave under the **Family Medical Leave Act** of 1993 ("FMLA"). Specifically, the employees alleged that they had either **been demoted or not received promised promotions shortly after returning from FMLA leave.**
… On June 27, 1996, the Company issued a press release announcing that it would likely be forced to restate quarterly and annual results … The press release also disclosed the FMLA complaints and announced that it was **creating a reserve to $50 million** to pay such claims …
… Following this announcement, the price of the Company's **stock dropped dramatically** on exceptionally heavy trading volume, closing at $73, down $23 …
… **As a result of defendants' false and misleading statements as detailed above, the financial results of Smokin' were artificially and materially inflated** …
… WHEREFORE, **Plaintiff prays for relief and judgment**, as follows:
… Awarding compensatory damages in favor of Plaintiff …
… Awarding Plaintiff and the Class their reasonable costs and expenses incurred in this action, including **counsel fees** and expert fees …

Figure 1 – Excerpts from a complaint

All documents concerning the Company's FMLA policies, practices and procedures.

Figure 2 – A "production request"



Philip Morris U.S.A. Inter-Office Correspondence
Benefits Department Richmond, Virginia

To: Distribution Date: May 30, 1997
From: Lisa Halle
Subject: CIGNA Well-Being Newsletter - Future Strategy

During our last CIGNA Action Plan meeting, the issue of whether to stop previewing articles and discontinue sending CIGNA Well-Being newsletter to our employees was a matter of discussion. I have done some research, and wanted to present you with my findings and preliminary recommendation for PM's strategy regarding future newsletters. I believe everyone's input is valuable, and would appreciate hearing from each of you on whether you concur with my recommendation.

Background Information

CIGNA Well-Being newsletters are sent on a quarterly basis. The process we have been using is to have one of the analysts preview both national and local articles slated for a particular newsletter, and then recommend to either skip or send that issue. Offensive local articles can be replaced with another of similar length at no cost to PM. If we opt to replace or modify a national article, it costs PM $3,000 per issue.

Since 1996, we have opted to either skip or send issues as follows:

Date of Newsletter	Decision	Comments
Spring 1996	Send	Deleted advertisement for CIGNA Time-Life videos featuring Ex-surgeon General Koop prior to sending.
Summer 1996	Skip	Several articles contained anti-smoking references, and at this time, there was also concern about inclusion of Time-Life video advertisement.

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Date of Newsletter	Decision	Comments
Fall 1996	Send	A national article on heart attacks contained one minor reference to smoking which was deemed no worse than what the warning label states. Also, a breast cancer article launched into a free Time-Life video offer on subjects such as breast cancer, breast lumps, endometriosis, pregnancy, menopause, and osteoporosis. Decision to send based on Benefits Staff overwhelmingly positive reaction to Time-Life video series. No complaints received from member population based on newsletter content.
Winter 1996	Skip	National article entitled "A Breach of Fresh Air" listed smoking as one of the irritants in the environment which can trigger an asthma attack, and went further to say "Do not allow smoking in your home or in any environment that you can control".
Spring 1997	Send	Contained nothing objectionable.
Summer 1997	Skip	National article contained objectionable secondhand smoke references.

In summary we have opted to skip three (3) of the last six (6) newsletters. To my knowledge, these are the only ones we have ever skipped.

The process of reviewing articles and making a recommendation to send or skip a issue varies, depending on content. Typically, it is immediately clear if something is objectionable. Other times, it may require discussion with others and management. I would say between phone calls with CIGNA, previewing of capsulized versions and full versions of local and national articles, discussion if necessary, auditing receipt of newsletters, and fielding complaints, I have spent as little as four (4) hours, to as long as several days on this activity. The issue surrounding the Time-Life video series required the most time, as you may remember from discussions in staff meetings.

Recommendation

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2078039377

Figure 3 – One of about 7 million documents

Notes

Temporal Data Analysis and Electronic Health Records

Ben Shneiderman*, Catherine Plaisant, Taowei David Wang*, Krist Wongsuphasawat*

*Department of Computer Science, HCIL

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An increasing number of temporal categorical databases are being assembled. For example millions of Electronic Health Records are being recorded by healthcare organizations, logs of traffic accidents are kept by transportation agencies, student records are maintained by academic institutes and the activities of suspicious individuals are being kept by law enforcement agencies. We are working on several projects which aim at improving the use of those databases by researchers and analysts who want to specific complex queries, explore patterns, make hypotheses about recurrent sequences of events or find similar records.

Lifelines2: Interactive exploration of multiple records Align, Rank, Filter and Group

Our previous work on Lifelines (www.cs.umd.edu/lifelines) has shown that a timeline visualization for personal histories can provide benefits over a tabular view, but many tasks involve temporal comparisons across multiple records relative to important events called sentinel events (e.g. a first heart attack). We explored strategies in supporting query specification, efficient search and comprehensible visualization in our Lifelines2 project [1, 2].

Interactive visual exploration can complement query formulation [3] by providing operations to align, rank and filter the results. Display of patient histories aligned on sentinel events enables users to spot precursor, co-occurring, and after-effect events. A controlled study demonstrated the benefits of providing alignment (with a 61% speed improvement for complex tasks). A qualitative study and interviews with medical professionals demonstrated that the interface can be learned quickly and seems to address their needs.

For more information and video demonstrations see: www.cs.umd.edu/hcil/lifelines2

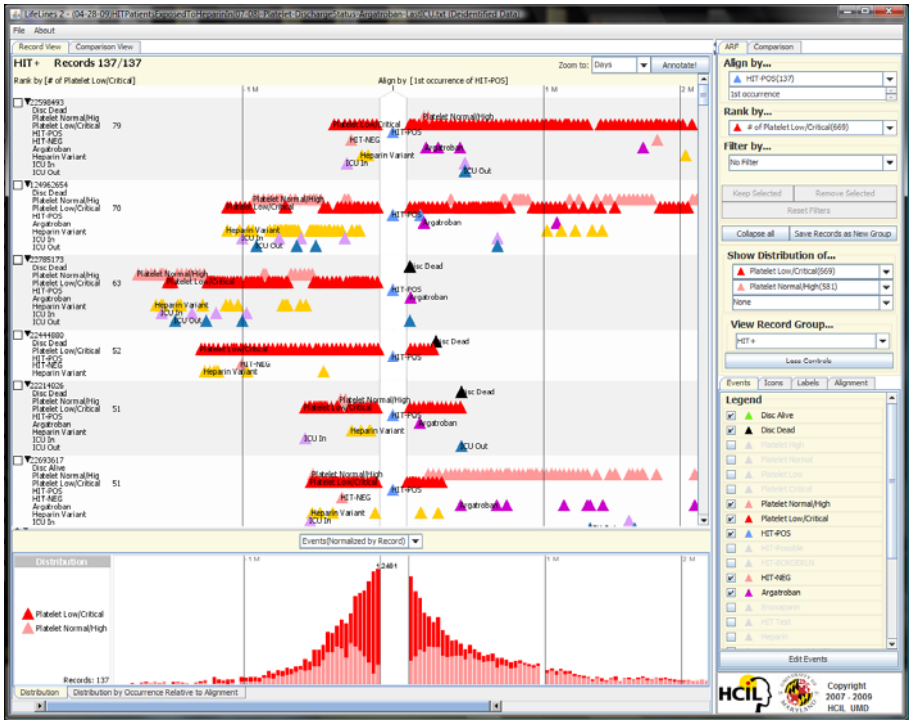

Figure 1. Lifelines2 allows the exploration of multiple records, which can be aligned, ranked and filtered. Temporal summaries allow comparisons of aggregate data across groups of records.

Similan: Finding similar records

It can often be helpful to find records that are similar to the record of a particular patient of interest. A major challenge is how to define a similarity measure that captures the searcher's intent. Many methods for computing a similarity measure between time series have been proposed, but temporal categorical records are different and require fresh thinking. In the Similan project [4] we propose a temporal categorical similarity measure, called the M&M measure, which is based on the concept of aligning records by sentinel events, then matching events between two records. The M&M measure is calculated as a combination of the time differences between pairs of events and number of mismatches.

For more information:
www.cs.umd.edu/hcil/similan

Acknowledgements

This work was conducted in collaboration with the Washington Hospital Center (in particular Mark Smith, David Roseman, Greg Marchand and Vikram Mukherjee). We also thank Shawn Murphy from Massachusetts General Hospital.

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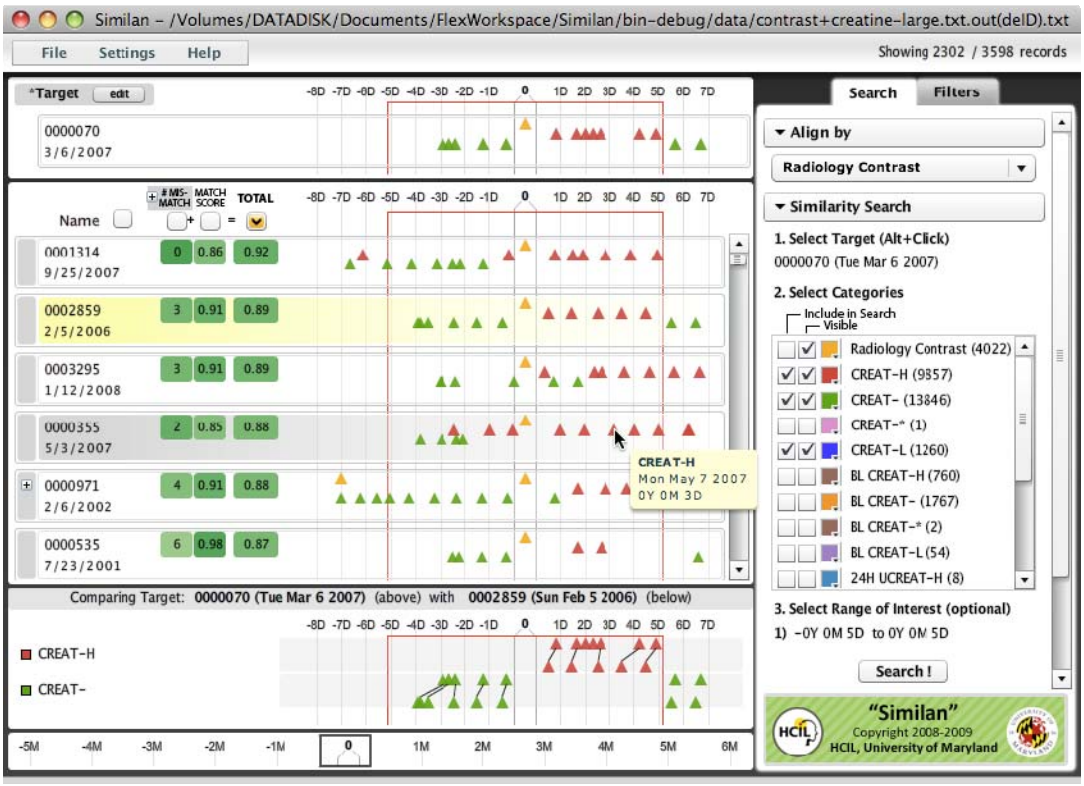

Figure 2: Similan allows users to specify a Target record and find close match

Notes

SESSION IV: Visual Interfaces – 2:15pm
Session chair: *Kari Kraus, Assistant Professor, Maryland's iSchool*

Intergenerational Stories on iPhones
Alex Quinn, Ben Bederson, Allison Druin

Readability Metrics for Network Visualization
Cody Dunne, Ben Shneiderman

Enhancing Air Traffic Control Displays with Perceptual Cues
Tim Clausner, Evan Palmer, Chris Brown, Phil Kellman

Evaluation of Visual Analytics: The Role of Contests
Catherine Plaisant

Creating Stories Together With iPhone

Alexander J. Quinn[1], Benjamin B. Bederson[1], Allison Druin[2]
Department of Computer Science[1]
College of Information Studies[2]
Contact: aq@cs.umd.edu

Children's education and development depends not only on formal schooling but also on informal education experiences in the home and in the community. When family troubles, natural disasters, world conflict, and poverty afflict children, access to schools may become more difficult and such informal education becomes even more crucial.

Storytelling and story making can be a powerful educational tool in any context. It enables children to develop literacy, practice creativity, and share ideas with others. When young people have more contact with adults in their periphery, they show increased interested in learning. Thus, creating stories with older adults can be a valuable form of informal education for children.

We have been developing a mobile application to support children working with elders to create stories or edit existing classic stories found in the International Children's Digital Library. Using a mobile device makes sense because it provides a persistent way to keep and carry the stories, but it allows for story creation in any context and at any time, without the constraints of a desktop computer.

Recent mobile phones provide affordances that further enhance the story authoring process beyond what would be possible with paper and pens, and with a degree of ease and flexibility that makes the benefits far outweigh the costs of using the technology. We chose to develop for the iPhone platform because the large screen is well suited for reading and composing stories with illustrations, the touch interface enables the creation of direct manipulation, and it provides facilities for input and output of sounds and photographs. The device has a built-in microphone, speaker, and camera, and processing power to handle the media smoothly.

We have been working together with an intergenerational design group composed of children and elders from their families (i.e. grandparents, older family friends, etc.). They have worked with us since the earliest stages of the project, giving guidance on what would best facilitate story creation and issues specific to those age groups. They have tried prototypes at every stage and given valuable feedback.

In particular, the design group has shown continued interest in incorporating rich media such as photographs and sounds into the stories. However, they have also made clear that such media does not replace the text of the story.

Figure 1 – Participants in the intergenerational design team work on a story and discuss the interface.

Initially, we were concerned that the older adults might be averse to trying new technology or that the type might be too small to read comfortably. However, they taught us that if there is a strong human relationship, such as that of a child and a grandparent, the technology becomes more approachable and they are able work through it together.

The current version of the application allows the pair to start with an existing book and change the text or paint on the illustrations using the finger. It also allows them to add new text, photographs, or sound clips. Photographs can be imported from an existing photo album or taken from the web.

Figure 2 – ICDL Story Editor interface

Making a workable interface for sound was challenging, primarily because some sort of visual feedback is needed for an editing task. If they record a 3 minute dialog and then want to change a single sentence, how can they find their place in the sound to edit? To address this, we opted to support many small sound clips on a single page. While reading, tapping on a speaker icon plays the sound that was recorded when the story was made. These can be used for sound effects, dialog, or simply reading parts of the story.

Moving forward, we anticipate conducting a formal evaluation of the application and how it facilitates creative composition and even collaboration. Because of the small size of the device, there is the potential for either the child or the elder to keep control of the device for most of the time. We would like to explore what factors influence this balance and what can be done to improve the ultimate benefits of the story making activity.

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2. Bederson, B. B., Quinn, A., Druin, A.. Designing the Reading Experience for Scanned Multi-lingual Picture Books on Mobile Phones. *Joint Conference on Digital Libraries (JCDL)*. In Press (2009).

Notes

Readability Metrics for Network Visualization

Cody Dunne, Ben Shneiderman
HCIL, Department of Computer Science
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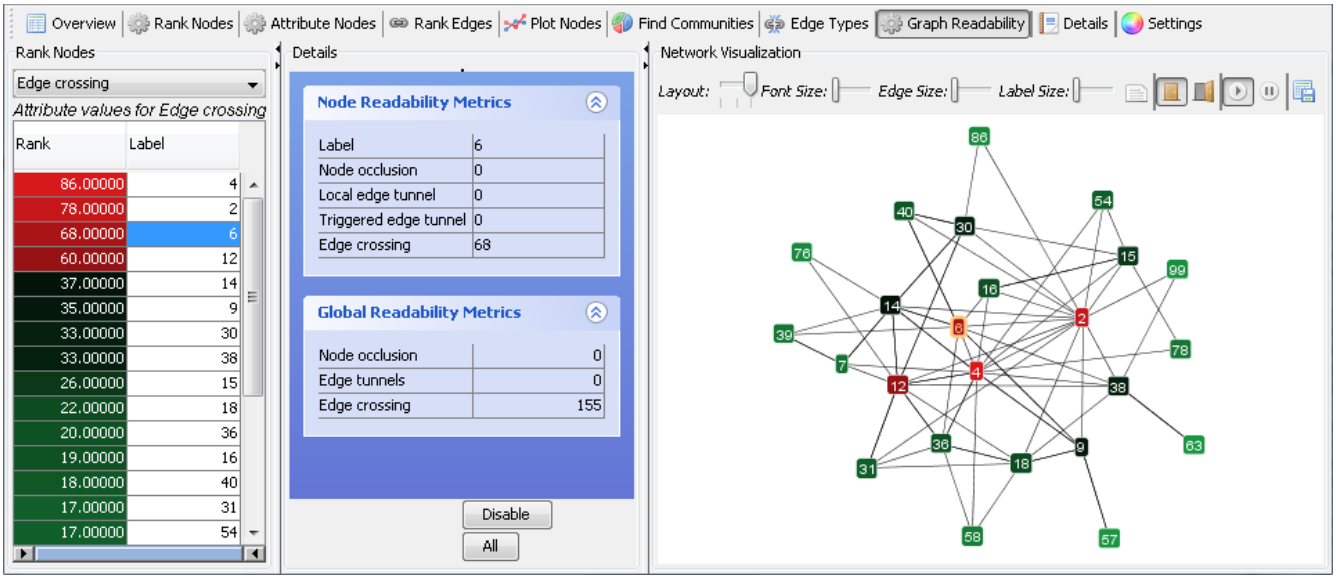
www.cs.umd.edu/hcil/socialaction



Graphs have long been common data structures in Computer Science, but have only recently exploded into popular culture with publishers like the New York Times now frequently including elaborate and interesting graphs with their articles. Online communities like Facebook, MySpace, Twitter, Flickr, mailing lists, and Usenet (to name only a handful) enjoyed enormous growth over the last few years and provide incredibly rich datasets of interpersonal relationships, which social scientists are now fervently exploring. Conventional visualization tools like bar and pie charts are often inadequate when faced with these varied and oftentimes immense datasets. www.visualcomplexity.com provides many beautiful alternative visualizations for these data, but one enduring visualization in particular models relationships using a node-edge diagram, where nodes in the graph represent actors in a community and the edges indicate relationships between individual actors. This graph is called a *social network* and the resulting graph drawing is called a *sociogram*.

Sociograms have only recently been established as tools for network analysis, but have already been put to great effect. Fisher et al (2006) successfully used sociograms to detect common social roles in online discussion newsgroups such as answer person and discussion person, and Adamic & Glance (2005) applied sociograms to the study of relationships between political blogs during the 2004 U.S. Presidential Election, showing the division between liberal and conservative communities as well as their internal interactions.

There is a huge array of possible sociograms for any given social network, many of which can be misleading or incomprehensible. Drawings of relational structures like social networks are only useful to the degree they "effectively convey information to the people that use them" (Battista et al (1998)). What's more, there is no "best" layout for a social network as different layouts can highlight different features of the network being studied. In fact, the spatial layout of nodes in the sociogram can have a profound impact on the detection of communities in the network and the perceived importance of individual actors. Hence, significant thought must be given to properly drawing graphs so that network analysts will be able to understand and effectively communicate data like clusters in the network, the bridges between them, and the importance of individual actors.

As manual layout of nodes in the sociogram is incredibly time consuming to do well, a lot of effort has been put into developing automated graph layout algorithms. There are many that can be used for sociograms, including variants of the spring embedder such as the popular Fruchterman-Reingold force-directed algorithm and more scalable gravitational N-Body approaches such as used by Prefuse. The results of applying these algorithms can vary greatly depending on the size and topology of the network, and the layouts they generate are dependent on the algorithm used. Each attempts to find an optimal layout of the graph, often according to a set of *readability metrics*, which are measures of how understandable the graph drawing is, such as the number of edge crossings or occluded nodes in the drawing. While optimizing readability metrics, or readability metrics, does not guarantee the resulting drawing is understandable, it has been shown to promote many common analysis tasks. Traditionally these readability metrics have been called aesthetic criteria. We choose to call them readability metrics instead because of the ambiguity implied by the word "aesthetic". We are not concerned as much with how visually pleasing a particular graph drawing is; instead we are interested in how well it communicates the underlying data. However, many graph drawing algorithms create visually appealing visualizations, and some of the most informative visualizations are also the most beautiful.

Although each automated graph layout algorithm attempts to produce an understandable graph, the particular readability metrics it optimizes intentionally or indirectly may not be the correct ones for what the users are trying to demonstrate. Additionally, as the optimization of many readability metrics is NP-hard, these techniques often produce suboptimal graph drawings. The International Symposium on Graph Drawing has met annually for 16 years working to improve automated graph layout algorithms and readability metrics, among other things, but we believe that state of the art automated layout algorithms alone are insufficient to consistently produce understandable graph drawings.

Instead of focusing on a purely automated graph layout, we propose raising user awareness of the importance of readability metrics for their graph drawings and providing users with computer-assisted layout manipulation tools. Taking up where the automated layout leaves off, these tools would give users real-time feedback as to how their movement of nodes affect the readability metrics and potentially even provide local placement suggestions for the readability metrics users wish to optimize. This functionality could take a form similar to the "snap-to-grid" feature of many modern graphics applications, optionally pulling the dragged nodes to local maxima. We believe that this approach will provide users, and network analysts in particular, tools and guidelines that will allow them to create more understandable graph drawings that more accurately highlight features like communities within social networks.

We do not yet have a complete set of requirements for highly readable graph drawings, but we believe that many currently published graphs could be substantially improved with a few modest refinements. While no set of requirements can fully capture all effective graph drawings, we believe that applying readability metrics will improve most graph authors' output. A simple interim set of guidelines for editors and network analysts might be to aspire to these four principles that we playfully call *NetViz Nirvana*:

- Every node is visible
- Every node's degree is countable
- Every edge can be followed from source to destination
- Clusters and outliers are identifiable

This name NetViz Nirvana is meant to be in harmony with and complement the widely cited principles in the Information-Visualization Mantra: overview first, zoom and filter, then details-on-demand. These principles will need refinement to deal with large graphs where node aggregation, edge bundles, and cluster markers may be necessary to allow users to make scalable comparisons.

This talk delves into the creation of readability metrics for graph drawings and a software tool for network analysts that incorporate the idea of communication-minded visualization: "visualization designed to support communication and collaborative analysis". Three readability metrics are outlined in detail along with an overview of additional ones. We then describe the integration of our readability metric framework into *SocialAction*, a tool that allows ranking by the attributes of nodes and edges and provides multiple coordinated views to help users systematically explore various statistical measures for social network analysis. We leave the implementation of the "snap-to-grid" feature as future work.

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Notes

Enhancing Air Traffic Displays with Perceptual Cues

(Guided by Principles of Conceptualization in Language and Perception)

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University of Maryland Center for Advanced Study of Language

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Philip J. Kellman
Department of Psychology, UCLA

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Air traffic displays use 2D planview projections of aircraft positions that depict latitude and longitude graphically but depict altitude alphanumerically. Comprehending the 3D position of aircraft requires attention to both graphical and alphanumeric information. We studied perceptual cues for representing altitude graphically in the context of visual search experiments.

Background (Experiment 1)

Palmer, Clausner, and Kellman (2008) designed static displays representing aircraft altitude as icons whose size and contrast (i.e., grayscale) varied with altitude in correspondence with ecological depth cues. Largest/darkest icons represented highest altitude and smallest/lightest icons represented lowest altitude. This assignment of perceptual cues to altitude is consistent with depth perception from an overhead viewing perspective, because objects closer to an observer naturally appear larger and darker than farther objects. Student participants performed visual search for aircraft conflicts (potential collisions). Performance improved dramatically when displays contained size and contrast cues for altitude, relative to no-cue displays (only alphanumeric altitude). Conflict detection improved equivalent to processing five more aircraft, compared to baseline performance.

What conceptual principles explain these results? Performance may have improved because perceptual cues were depth-consistent, or because they were aligned with conceptual metaphors. The metaphor MORE IS UP is a correspondence between vertical space and magnitude. The magnitude of nearly any quality can be expressed in language about vertical space or plotted on the vertical axis of a graph. Conceptualizing display symbols that have

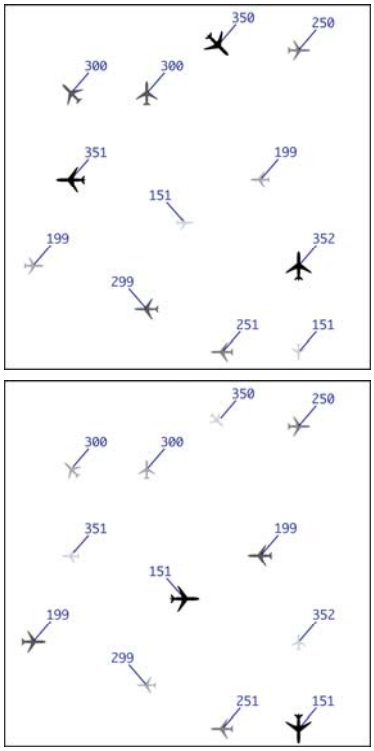

Figure 1–Size and contrast cues for altitude enhanced search for potential conflicts compared with no-cues (alphanumeric only). **Top:** Performance was best when cues are depth-consistent *and* match a MORE IS UP metaphor, imagined from above. **Bottom:** Depth-inconsistent cues or MORE IS DOWN metaphors yielded inferior performance, regardless of imagined vantage point.

more size and contrast as meaning higher altitude may have helped participants apprehend altitude information.

Experiment 2: Depth and Metaphor Principles

We explored perceptual cues that were consistent or inconsistent with depth and metaphors by varying imagined vantage points. Each participant was instructed as they looked head up or head down at a physical 3D model. Participants then viewed displays (Figure 1) looking straight ahead at a fronto-parallel display and imagined the perspective in which they had been trained. Interestingly, search performance varied with imagined vantage point. The from-above, depth-consistent condition was better than the from-below, depth-inconsistent condition, even though these displays were physically identical (e.g., Figure 1, top); displays matched a MORE IS UP metaphor. Displays that matched a MORE IS DOWN metaphor yielded inferior performance (e.g., Figure 1, bottom), regardless of imagined perspective. Principles of depth-consistency *and* metaphor are required to explain these results.

We further explored our hypothesis that magnitude of spatial altitude can be visualized as perceptual cues, using color and shape cues.

Experiment 3: Color and Contrast Cues

We directly compared the effectiveness of equiluminant color cues (Figure 2, left) with grayscale encoding of altitude. The method employed visual search and imagined vantage points as in Experiment 2. Color cues yielded better conflict detection than contrast cues. However, contrast cues invoked a from-above vantage point effect, but color cues did not. The latter result suggests that contrast cues invoke depth and metaphor processes, which if not invoked by color cues may diminish their effectiveness in more complex displays (e.g., aircraft changing altitude, or color weather patterns).

Experiment 4: Size and Shape Cues

We directly compared the effectiveness of shape cues (Figure 2, right) with size cues. Shape cues yielded better performance than size cues, and neither encoding induced an effect of vantage point. Results of Experiments 3 and 4 together may suggest that color or shape invokes discrete conceptualization of altitude, whereas contrast encoding may invoke continuous conceptualization of altitude.

Conclusions

Enhancing detection of conflicts in displays that encode altitude using perceptual cues is due to more than display properties. Perceptual cues of size and contrast may have invoked both depth processing *and* conceptual metaphors. Contrast cues in particular interacted with imagined perspective. Some perceptual encodings (i.e., size, contrast, color, or shape) may be more natural than others, but a fuller understanding is required to explain and predict the performance of specific cues in terms of the cognitive processes used to interpret them.

In future research we anticipate testing the effects of display placement above or below the observer, designing displays of moving aircraft that change altitude, and testing more complex and realistic displays.

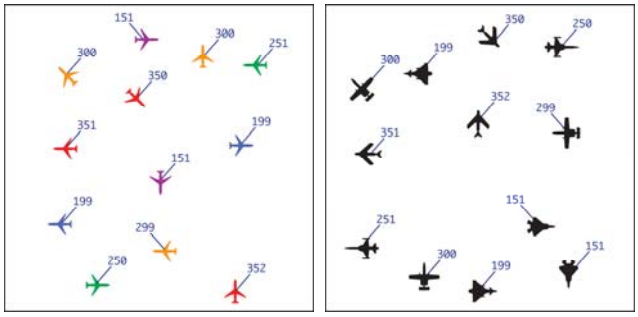

Figure 2–Perceptual cues for visualizing altitude.

Left: Color cues. **Right:** Shape cues

ACKNOWLEGEMENTS

Partial funding for Experiment 1 was provided by Raytheon Company to T.C. Clausner, and from the US Office of Naval Research MURI Program to P. J. Kellman.

The altitude encoding schemes of air traffic control displays described herein are the property of Raytheon Company (US patent #7,408,552; European patent #1474789).

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Notes

Evaluation of Visual Analytics: The Role of Contests

Catherine Plaisant, Swetha Reddy

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Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces. It is difficult to assess the effectiveness of highly interactive systems that combine analytical reasoning, visual representations, human computer interactions, complex algorithms and collaboration tools, and are used by professional analysts for investigations that can take days or months. These systems are not suited for traditional evaluation methods such as controlled experiments or amenable to simple metrics such as precision and recall. Access to realistic data or professional analysts is often limited due to the use of highly confidential data (e.g. in intelligence, business or financial analysis). Thorough evaluations need input from visualization experts, human-computer interaction experts and domain analysts.

The VAST Challenges

In the past 3 years, an important step was taken toward increasing awareness of visual analytics problems and evaluation methods with the organization of successful competitions [1, 2]. Synthetic datasets with embedded ground truth and analytics problems with known solutions [3] were made available, and participants have several months to analyze the data. Their answers and a description of the process they used are evaluated using both quantitative accuracy ratings and subjective ratings from experts and professional analysts. Awards are given to the teams whose tools received the best reviews.

The last challenge (VAST 2008 Challenge) was restructured to encourage more participation by providing four mini-challenges in addition to a Grand Challenge which combined the data from all 4 mini-challenges. Teams from 28 organizations submitted 73 entries to the mini challenges and Grand Challenge. Thirteen came from student teams. The scenario concerned a fictitious, controversial socio-political movement. Participants were provided with an excerpt from the movement's manifesto and the following four data sets, one for each mini-challenge:

- cell phone records over a 10 day period
- a chronicle of migrant boat journeys with passenger lists, launch and landing sites and landing/interdiction status
- a catalog of wiki edits to a page discussing the movement
- geospatial data of an evacuation from a building in which a bomb exploded.

The National Visualization and Analytics Center (NVAC) Threat Stream Generator project team at Pacific Northwest National Laboratory developed the data sets. Each set was embedded with non-trivially discoverable ground truth [5].

The success of the competitions and the growing need for evaluating complex interactive systems warrants the development of cyberinfrastructure services that facilitate the gathering of datasets, support for the online management and judging of analytic challenge and the self-assessment by researchers developing visual analytics tools.

Acknowledgements

This work is conducted in collaboration with Georges Grinstein, (Univ. of Massachusetts Lowell) and Jean Scholtz and Mark Whiting from the Pacific Northwest National Laboratory. We thank the National Science Foundation for the partial support of our research.

Current VAST 2009 Challenge:
www.cs.umd.edu/hcil/VASTchallenge09

SEMVAST project
www.cs.umd.edu/hcil/semvast

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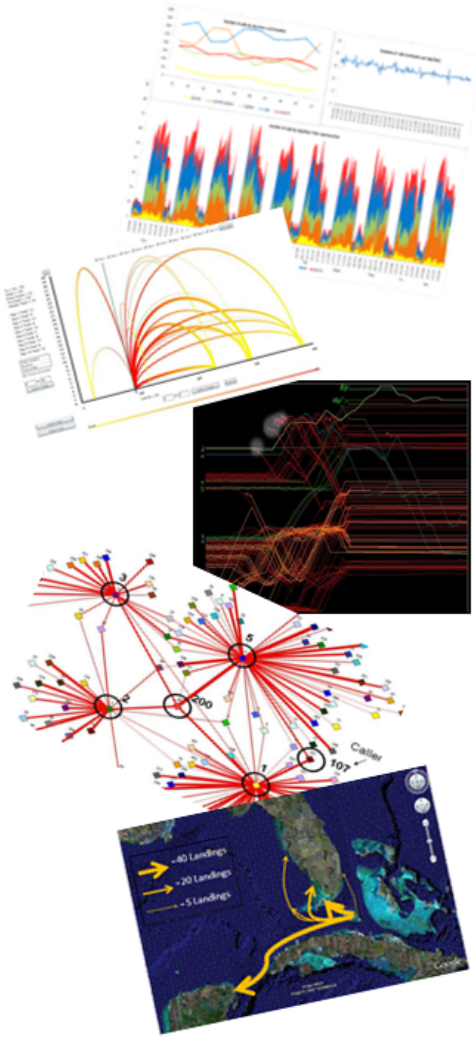
Visual Analytics Challenge

A submission category of the IEEE VAST 2009 Symposium



If you think you can analyze JUST ONE of these data sets

- **a social network**
- suspicious **badge** and **internet traffic**
- security **video**

Then we have DATA and REPRESENTATIVE TASKS for YOU!
You can submit a **Mini-Challenge** entry for any of these tasks.

If you can pull all that data together and analyze the overall situation THEN you can submit to the **Grand Challenge**.

Entries will be judged on the ACCURACY of the answer (compared to our ground truth scenario) and the SUBJECTIVE RATINGS given by Visual Analytics peer reviewers and by professional analysts.

- The most deserving entries receive awards, have their two-page summary PUBLISHED in the PROCEEDINGS of the VAST 2009 Symposium and may participate in a panel at the Conference.
- ALL submitted entries have their two-page summary, answers and descriptive materials PUBLISHED on an archival website at NIST (National Institute of Standards and Technology).
- Teams submitting an entry are invited to a Challenge WORKSHOP to discuss the results of the Challenge, compare their experiences, and influence next year's Challenge.

Important Dates

June 20
Submissions due
August 1
Results announced
October 10 - 16
Challenge Workshop and VAST 2009 Symposium

VAST Challenge Chairs

Georges Grinstein
U. of Massachusetts, Lowell
Catherine Plaisant
University of Maryland
Jean Scholtz
Pacific Northwest National Lab
Mark Whiting
Pacific Northwest National Lab

www.cs.umd.edu/hcil/VASTchallenge09

Notes

Technical Report Abstracts

2009, 2008

HCIL Papers and Technical Reports 2009, 2008

For a complete listing of our papers and technical reports, please refer to our website, www.cs.umd.edu/hcil. Our papers and technical reports are available on-line in several formats, including HTML, PDF, Postscript, and text only.

2009

Bederson, B., Quinn, A., Druin, A. (May 2009)
Designing the Reading Experience for Scanned Multi-lingual Picture Books on Mobile Phones
HCIL-2009-16

This paper reports on an adaption of the existing PopoutText and ClearText display techniques to mobile phones. It explains the design rationale for a freely available iPhone application to read books from the International Children's Digital Library. Through a combination of applied image processing, a zoomable user interface, and a process of working with children to develop the detailed design, we present an interface that supports clear reading of scanned picture books in multiple languages on a mobile phone.

Druin, A., Bederson, B., Quinn, A. (May 2009)
Designing Intergenerational Mobile Storytelling
HCIL-2009-15

Informal educational experiences with grandparents and other older adults can be an important component of children's education, especially in circumstances where high quality educational services and facilities are not readily available. Mobile devices offer unique capabilities to support such interactions. We report on an ongoing participatory design project with an intergenerational design group to create mobile applications for reading and editing books, or even creating all new stories on an Apple iPhone.

Wang, T., Deshpande, A., Shneiderman, B. (May 2009)
A Temporal Pattern Search Algorithm for Personal History Event Visualization
HCIL-2009-14

We present Temporal Pattern Search (TSS), a novel algorithm for searching for temporal patterns of events (and absence of events). The traditional method of searching for such patterns uses an automaton-based approach over a single array of events, sorted by time stamps. Instead, TSS operates on a set of arrays, where each array contains all events of the same type, sorted by time stamps. TSS searches for a particular item in the pattern using a binary search over an array for each event type. Although it is considerably more expensive per item, it allows TSS to skip many unnecessary events from the input of events. We show that TSS's running time is bounded by O(m2n lg(n)), where m is the number of items in a search pattern, and n is the number of events in the input. We also show that although the asymptotic running time of TSS is inferior to that of a non-deterministic finite automaton (NFA) approach (O(mn)), under our experimental conditions, TSS consistently outperforms NFA. Since the experimental conditions we describe here subsume the conditions under which users would typically use TSS (i.e. within an interactive visualization), we argue that TSS is the appropriate design choice for us. Furthermore, TSS and the strategy to split input data into several sorted arrays is generalizable to other applications.

Dunne, C., Shneiderman, B. (May 2009)
Improving Graph Drawing Readability by Incorporating Readability Metrics: A Software Tool for Network Analysts
HCIL-2009-13

Designing graph drawings that effectively communicate the underlying network is challenging as for every network there are many potential unintelligible or even misleading drawings. Automated graph layout algorithms have helped, but frequently generate ineffective drawings. In order to build awareness of effective graph drawing strategies, we detail readability metrics on a [0,1] continuous scale for node occlusion, edge crossing, edge crossing angle, and edge tunneling and summarize many more. Additionally, we define new node & edge readability metrics to provide more localized identification of where improvement is needed. These are implemented in SocialAction, a tool for social network analysis, in order to direct users towards poor areas of the drawing and provide real-time readability metric feedback as users manipulate it. These contributions are aimed at heightening the awareness of network analysts that the images they share or publish could be of higher quality, so that readers could extract relevant information.

Vuillemot, R., Clement, T., Plaisant, C., Kumar, A. (April 2009)
What's Being Said Near "Martha"? Exploring Name Entities in Literary Text Collections
HCIL-2009-12

A common task in literary analysis is to study characters in a novel or collection. When dealing with large documents or collections automatic entity extraction, text analysis and effective user interfaces might facilitate the exploration of the topics discussed or the vocabulary used in the neighborhood of the characters. Using our interface, called POSvis, the scholar uses word clouds and self-organizing graphs to review the vocabulary in the vicinity of one or more entities, to filter by part of speech, and to explore the network of other characters in that vicinity. Visualizations show word usages within an analysis window (i.e. a book chapter), which can be compared with a reference window (i.e. the whole book). We describe the interface and report on an early case study with a humanities scholar.

Smith, M., Shneiderman, B., Milic-Frayling, N., Rodrigues, E., Barash, V., Dunne, C., Capone, T., Perer, A., Gleave, E. (April 2009)
Analyzing (Social Media) Networks with NodeXL
Proc. Communities & Technologies Conference, Springer (June 2009).
HCIL-2009-11

We present NodeXL, an extendible toolkit for network overview, discovery and exploration implemented as an add-in to the Microsoft Excel 2007 spreadsheet software. We demonstrate NodeXL data analysis and visualization features with a social media data sample drawn from an enterprise intranet social network. A sequence of NodeXL operations from data import to computation of network statistics and refinement of network visualization through sorting, filtering, and clustering functions is described. These operations reveal sociologically relevant differences in the patterns of interconnection among employee participants in the social media space. The tool and method can be broadly applied.

Costello, L., Grinstein, G., Plaisant, C., Scholtz, J. (April 2009)
Advancing User-Centered Evaluation of Visual Analytic Environments through Contests
To appear in *Information Visualization*.
HCIL-2009-10

In this paper the authors describe the Visual Analytics Science and Technology (VAST) Symposium contests run in 2006 and 2007 and the VAST 2008 and 2009 challenges. These contests were designed to provide researchers with a better understanding of the tasks and data that face potential end users. Access to these end users is limited due to time constraints and the classified nature of the tasks and data. In that respect, the contests serve as an intermediary, with the metrics and feedback serving as measures of utility to the end users. The authors summarize the lessons learned and the future directions for VAST Challenges.

Wang, T., Plaisant, C., Shneiderman, B., Spring, N., Roseman, D., Marchand, G., Mukherjee, V., Smith, M. (April 2009)
Temporal Summaries: Supporting Temporal Categorical Searching, Aggregation and Comparison
HCIL-2009-09

When analyzing thousands of event histories, analysts often want to see the events as an aggregate to detect insights and generate new hypotheses about the data. An analysis tool must emphasize both the prevalence and the temporal ordering of these events. Additionally, the analysis tool must also support flexible comparisons to allow analysts to gather visual evidence. In a previsous work, we introduced align, rank, and filter (ARF) to accentuate temporal ordering. In this paper, we present temporal summaries, an interactive visualization technique that highlights the prevalence of event occurrences. Temporal summaries dynamically aggregate events in multiple granularities (year, month, week, day, hour, etc.) for the purpose of spotting trends over time and comparing several groups of records. They provide affordances for analysts to perform temporal range filters. We demonstrate the applicability of this approach in two extensive case studies with analysts who applied temporal summaries to search, filter, and look for patterns in electronic health records and academic records.

Wongsuphasawat, K., Shneiderman, B. (April 2009)
Finding Comparable Temporal Categorical Records: A Similarity Measure with an Interactive Visualization
HCIL-2009-08

An increasing number of temporal categorical databases are being collected by various institutions: Electronic Health Records with millions of records of patient histories in healthcare organizations, tremendous traffic incident logs in transportation systems, or massive student records in academic institutes. Finding similar records within these large-scale databases is a challenging problem. A major challenge is how to define a similarity measure that captures the searchers intent. Many methods for computing a similarity measure between time series have been proposed, but temporal categorical record is different and requires fresh thinking. We then propose a temporal categorical similarity measure, called the M&M measure, which is based on the concept of aligning records by sentinel events, then matching events between two records. The M&M measure is calculated as a combination of the time differences between pairs of events and number of mismatches. To accommodate customization of parameters in the M&M measure and results interpretation, we implement Similan, an interactive search and visualization tool for temporal categorical records. A usability study with 8 participants demonstrates that Similan was easy to learn, but users had more difficulty understanding the M&M measure. Users had strong opinions that Similan could help them find similar records in temporal categorical databases. In response to feedback from the study, we also develop a new prototype. A pilot study suggests that while binned timeline in original interface is simpler and more readable, the continuous timeline in the new interface is better for showing fine-grain information.

Hu, C., Rose, A., Bederson, B. (March 2009)
Locating Text in Scanned Books
To be published at JCDL 2009
HCIL-2009-07

Text location in scanned documents is important for selection, search, and other interactions with visual presentations of scanned books. In this paper, we describe a work flow to extract and verify text locations using commercial software, along with free software products and human proofing. Our method uses Adobe Acrobat's OCR functionality, but can be easily adapted to other OCR software products. To help mid-sized digital libraries, we are making our solution available as open source software.

Bederson, B., Quinn, A., Druin, A. (March 2009)
Designing the Reading Experience for Scanned Multi-lingual Picture Books on Mobile Phones
To be published at JCDL 2009
HCIL-2009-06

This paper reports on an adaption of the existing PopoutText and ClearText display techniques to mobile phones. It explains the design rationale for a freely available iPhone application to read books from the International Children's Digital Library. Through a combination of applied image processing, a zoomable user interface, and a process of working with children to develop the detailed design, we present an interface that supports clear reading of scanned picture books in multiple languages on a mobile phone.

Chen, R., Rose, A., Bederson, B. (March 2009)
How People Read Books Online: Mining and Visualizing Web Logs for Use Information
HCIL-2009-05

This paper explores how people read books online. Instead of observing individuals, we analyze usage of an online digital library of children's books (the International Children's Digital Library). We go beyond typical webpage-centric analysis to focus on book reading in an attempt to understand how people read books from websites. We propose a definition of reading a book (in comparison to others who visit the website), and report a number of observations about the use of the library in question.

Druin, A., Foss, E., Hatley, L., Golub, E., Guha, M., Fails, J., Hutchinson, H. (February 2009)
How Children Search the Internet with Keyword Interfaces
HCIL-2009-04

Children are among the most frequent users of the Internet, yet searching and browsing the web can present many challenges. Studies over the past two decades on how children search were conducted with finite and pre-determined content found in CD-ROM applications, online digital libraries, and web directories. However, with the current popularity of the open Internet and keyword-based interfaces for searching it, more critical analysis of the challenges children face today is needed. This paper presents the findings of our initial study to understand how children ages 7, 9, and 11 search the Internet using keyword interfaces in the home. Our research has revealed that although today's children have been exposed to computers for most of their lives, spelling, typing, query formulation, and deciphering results are all still potential barriers to finding the information they need.

Tarkan, S., Sazawal, V., Druin, A., Foss, E., Golub, E., Hatley, L., Khatri, T., Massey, S., Walsh, G., Torres, G. (January 2009)
Designing a Novice Programming Environment with Children
HCIL-2009-03

When children learn how to program, they gain problem- solving skills useful to them all throughout life. How can we attract more children in K-8 to learn about program- ming and be excited about it? To answer this question, we worked with a group of children aged 7-12 as our design partners. By partnering with the children, we were able to discover approaches to the topic that might appeal to our target audience. Using the children's input from one design partnering session, we designed a prototype tangible pro- gramming experience based upon the theme of cooking. The children evaluated this prototype and gave us additional de- sign ideas in a second session. We plan to use the children's design ideas to guide our future work.

Druin, A., Bederson, B., Rose, A., Weeks, A. (January 2009)
From New Zealand to Mongolia: Co-Designing and Deploying a Digital Library for the World's Children
This article in currently "In Press" and will be published in a special issue of: Children, Youth and Environments (http://www.colorado.edu/journals/cye/): Children in Technological Environments: Interaction, Development, and Design, Editors: N.G. Freier & P. H. Kahn
HCIL-2009-02

The Internet has led to an explosion of users throughout the world. Low-cost computing options are now emerging for developing countries that are changing the world's educational landscape. Given these conditions, there is a critical need to understand the obstacles and opportunities in designing and deploying technologies for children worldwide. This paper discusses seven years of strategies and methods learned in co-designing and deploying the International Children's Digital Library (www.childrenslibrary.org) with children in multiple countries. Our experience with iterative international co-design, and developing world deployment shows that acquiring site-specific knowledge is critical to adapting methods needed to be successful. In the case of co-design, a combination of face-to-face and email collaboration is important to building on-going partnership relationships. With deployment activities, it is important to be prepared for the unexpected managing complex technologies in rural settings is very difficult. Therefore, the more site-specific knowledge that can be acquired the more likely there will be a successful outcome.

Lin, J., Bahety, A., Konda, S., Mahindrakar, S. (January 2009)
Low-Latency, High-Throughput Access to Static Global Resources within the Hadoop Framework
HCIL-2009-01

Hadoop is an open source implementation of Google's MapReduce programming model that has recently gained popularity as a practical approach to distributed information processing. This work explores the use of memcached, an open-source distributed in-memory object caching system, to provide low-latency, high-throughput access to static global resources in Hadoop. Such a capability is essential to a large class of MapReduce algorithms that require, for example, querying language model probabilities, accessing model parameters in iterative algorithms, or performing joins across relational datasets. Experimental results on a simple demonstration application illustrate that memcached provides a feasible general-purpose solution for rapidly accessing global key-value pairs from within Hadoop programs. Our proposed architecture exhibits the desirable scaling characteristic of linear increase in throughput with respect to cluster size. To our knowledge, this application of memcached in Hadoop is novel. Although considerable opportunities for increased performance remain, this work enables implementation of algorithms that do not have satisfactory solutions at scale today.

2008

Golbeck, J. (December 2008)
Weaving a Web of Trust
Science, Vol 321, September 19, 2008.
HCIL-2008-41

Increasingly, people are studying social and collaborative Web technologies for use in science (1, 2). However, issues such as privacy, confidentiality, and trust arise around the use of these technologies. Science is crucially based on knowing provenance who produced what, how and where and on the Web, trusting scientific information is becoming more difficult for both scientists and the general public. User-generated content, even from professionals, can be opinionated (both informed and uninformed), inaccurate, and deceiving. With an overwhelming amount of information of questionable origin and reliability, finding trusted information created by trusted people is the new challenge. The use of social trust relationships for this task is both practical and necessary as the Web evolves.

Golbeck, J., Rothstein, M. (December 2008)
Linking Social Networks on the Web with FOAF
HCIL-2008-40

One of the core goals of the Semantic Web is to store data in distributed locations, and use ontologies and reasoning to aggregate it. Social networking is a large movement on the web, and social networking data using the Friend of a Friend (FOAF) vocabulary makes up a significant portion of all data on the Semantic Web. Many traditional webbased social networks share their members information in FOAF format. While this is by far the largest source of FOAF online, there is no information about whether the social network models from each network overlap to create a larger unified social network model, or whether they are simply isolated components. In this paper, we present a study of the intersection of FOAF data found in many online social networks. Using the semantics of the FOAF ontology and applying Semantic Web reasoning techniques, we show that a significant percentage of profiles can be merged from multiple networks. We present results on how this affects network structure and what it says about relationships and individual behavior. Finally, we discuss the implications this has for using web-based social networking data to create intelligent user interfaces and social software.

Golbeck, J. (December 2008)
Trust and Nuanced Profile Similarity in Online Social Networks
HCIL-2008-39

Online communities, where users maintain lists of friends and express their preferences for items like movies, music, or books, are very popular. The web-based nature of this information makes it ideal for use in a variety of intelligent systems that can take advantage of the users social and personal data . For those systems to be effective, however, it is important to understand the relationship between social and personal preferences. In this work we investigate features of profile similarity and how those relate to the way users determine trust. Through a controlled study, we isolate several profile features beyond overall similarity that affect how much subjects trust a hypothetical users. We then use data from FilmTrust, a real social network where users rate movies, and show that the profile features discovered in the experiment allow us to more accurately predict trust than when using only overall similarity. In this paper, we present these experimental results and discuss the potential implications for social networking and intelligent systems.

Hendler, J., Golbeck, J. (December 2008)
Metcalfe's Law, Web 2.0, and the Semantic Web
HCIL-2008-38

The power of the Web is enhanced through the network effect produced as resources link to each other with the value determined by Metcalfe's law. In Web 2.0 applications, much of that effect is delivered through social linkages realized via social networks online. Unfortunately, the associated semantics for Web 2.0 applications, delivered through tagging, is generally minimally hierarchical and sparsely linked. The Semantic Web suffers from the opposite problem. Semantic information, delivered through ontologies of varying amounts of expressivity, is linked to other terms (within or between resources) creating a link space in the semantic realm. However, the use of the Semantic Web has yet to fully realize the social schemes that provide the network of users. In this article, we discuss putting these together, with linked semantics coupled to linked social networks, to deliver a much greater effect.

Golbeck, J., Halaschek-Wiener, C. (December 2008)
Trust-Based Revision for Expressive Web Syndication
HCIL-2008-37

Interest in web-based syndication systems has been growing as information streams onto the web at an increasing rate. Technologies, like the standard Semantic Web languages RDF and OWL, make it possible to create expressive representations of the content of publications and subscriptions in a syndication framework. Because these languages are based in description logics, this representation allows the application to reasoning to make more precise matching of user interests with published information. A challenge to this approach is that the consistency of the underlying knowledge base must be maintained for these techniques to work. With the frequent addition of information from new publications, it is likely that inconsistencies will arise. There are many potential mechanisms for choosing which inconsistent information to discard from the KB to regain consistency; in the case of news syndication, we argue keeping the most trusted information is important for generating the most valuable matches. Thus, in this article, we present algorithms for belief-base revision, and specifically look at the user s trust in the information sources as a metric for deciding what to keep in the KB and what to remove.

Golbeck, J. (December 200)
The Dynamics ofWeb-based Social Networks: Membership, Relationships, and Change
HCIL-2008-36

Social networks on the web are growing dramatically in size and number. The huge popularity of sites like MySpace, Facebook, and others has drawn in hundreds of millions of users, and the attention of scientists and the media. The public accessibility of web-based social networks offers great promise for researchers interested in studying the behavior of users and how to integrate social information into applications. However, to do that effectively, it is necessary to understand how networks grow and change. Over a two-year period we have collected data on every social network we could identify, and we also gathered daily information on thirteen networks over a forty-seven day period. In this article, we present the first comprehensive survey of web-based social networks, followed by an analysis of membership and relationship dynamics within them. From our analysis of these data, we present several conclusions on how users behave in social networks, and what network features correlate with that behavior.

Aris, A., Shneiderman, B., Qazvinian, V., Radev, D. (December 2008)
Visual Overviews for Discovering Key Papers and Influences Across Research Fronts
HCIL-2008-35

Gaining a rapid overview of an emerging scientific topic, sometimes called research fronts, is an increasingly common task due to the growing amount of interdisciplinary collaboration occurring across fields. Visual overviews that show temporal patterns of paper publication and citation links among papers can help researchers and analysts to see the rate of growth of topics, identify key papers, and understand influences across sub-disciplines. This paper applies a novel network visualization tool based on meaningful layouts of nodes to present research fronts and show citation links that indicate influences across research fronts. The two-dimensional layouts with multiple regions and user control of link visibility enable rapid exploration. We assess the value of our tool for this application by conducting a case study with six domain experts over a four-month period. The main benefits were being able (1) to easily identify key papers and see the increasing number of papers within a research front and (2) to quickly see the strength and direction of influence across related research fronts.

Grinstein, G., Plaisant, C., Laskowski, S., O'Connell, T., Scholtz, J., Whiting, M. (November 2008)
VAST 2008 Challenge: Introducing mini-challenges
VAST 2008 Challenge: Introducing mini-challenges, *VAST '08. IEEE Symposium on Visual Analytics Science and Technology* (2008)195-196
HCIL-2008-34

Visual analytics experts realize that one effective way to push the field forward and to develop metrics for measuring the performance of various visual analytics components is to hold an annual competition. The VAST 2008 Challenge is the third year that such a competition was held in conjunction with the IEEE Visual Analytics Science and Technology (VAST) symposium. The authors restructured the contest format used in 2006 and 2007 to reduce the barriers to participation and offered four minichallenges and a Grand Challenge. Mini Challenge participants were to use visual analytic tools to explore one of four heterogeneous data collections to analyze specific activities of a fictitious, controversial movement. Questions asked in the Grand Challenge required the participants to synthesize data from all four data sets. In this paper we give a brief overview of the data sets, the tasks, the participation, the judging, and the results.

Clement, T., Plaisant, C., Vuillemot, R. (November 2008)
The Story of One: Humanity scholarship with visualization and text analysis
to appear in *Proc. of the Digital Humanities Conference (DH 2009)*
HCIL-2008-33

Most critiques of The Making of Americas (Paris 1925) by Gertrude Stein contend that the text deconstructs the role narrative plays in determining identity by using indeterminacy to challenge readerly subjectivity. The current perception of Making as a postmodern text relies on the notion that there is a tension created by frustrated expectations that result from the text s progressive disbandment of story and plot as the narrative unweaves into seemingly chaotic, meaningless rounds of repetitive words and phrases. Yet, a new perspective that is facilitated by digital tools and based on the highly structured nature of the text suggests that these instabilities can be resolved by the same seemingly nonsensical, non-narrative structures. Seeing the manner in which the structure of the text makes meaning in conversation with narrative alleviates perceived instabilities in the discourse. The discourse about identity formation is engaged not dissolved in indeterminacy to the extent that the reader can read the composition.

Jong, C., Rajkumar, P., Siddiquie, B., Clement, T., Plaisant, C., Shneiderman, B. (November 2008)
Interactive Exploration of Versions across Multiple Documents
to appear in *Proc. of the Digital Humanities Conference (DH 2009)*
HCIL-2008-32

The need to compare two or more documents arises in a variety of situations. Some instances include detection of plagiarism in academic settings and comparing versions of computer programs. Extensive research has been performed on comparing documents based on their content (Si et al., 1997; Brin et al., 1995) and there also exist several tools such as windiff to visually compare a pair of documents. However, little work has been done on providing an effective visual interface to facilitate the comparison of more than two documents simultaneously. Versioning Machine (Schreibman et al., 2003) is a web-based interface that provides the facility to view multiple versions of a document, along with the changes across versions. Motivated by Versioning machine (VM), we build a tool MultiVersioner that facilitates viewing multiple versions of multiple documents at once, and provides the user with a rich set of information regarding their comparison. The primary user during the development of MultiVersioner was Tanya Clement, a doctoral candidate in English at the University of Maryland, who researches the works of experimental poets.

Hutchinson, H., Druin, A., Bederson, B. (November 2008)
Supporting Elementary-Age Children's Searching and Browsing: Design and Evaluation Using the International Children's Digital Library
HCIL-2008-31

Elementary-age children (ages 6-11) are among the largest user groups of computers and the Internet. Therefore, it is important to design searching and browsing tools that support them. However, many interfaces for children do not consider their skills and preferences. Children are capable of creating Boolean queries using category browsers, but have difficulty with the hierarchies used in many category browsing interfaces because different branches of the hierarchy must be navigated sequentially and top-level categories are often too abstract for them to understand. Based on previous research, we believed using a flat category structure, where only leaf-level categories are available and can be viewed simultaneously, might better support children. However, this design introduces many more items on the screen and the need for paging or scrolling, all potential usability problems. To evaluate these tradeoffs, we conducted two studies with children searching and browsing using two types of category browsers in the International Children's Digital Library. Our results suggest that a flat, simultaneous interface provides advantages over a hierarchical, sequential interface for children in both Boolean searching and casual browsing. These results add to our understanding of children's searching and browsing skills and preferences and also suggest guidelines for other children's interface designers.

Lieberman, M., Taheri, S., Guo, H., Mir-Rashed, F., Yahav, I., Aris, A., Shneiderman, B. (October 2008)
Visual Exploration Across Biomedical Databases
HCIL-2008-30

Though biomedical research often draws on knowledge from a wide variety of fields, few visualization methods for biomedical data incorporate meaningful cross-database exploration. A new approach is offered for visualizing and exploring a query-based subset of multiple heterogeneous biomedical databases. Databases are modeled as an entity-relation graph containing nodes (database records) and links (relationships between records). Users specify a keyword search string retrieve an initial set of nodes, and then explore intra- and interdatabase links. Results are visualized with user-defined semantic substrates to take advantage of the rich

set of attributes usually present in biomedical data. Comments from domain experts indicate that this visualization method is potentially advantageous for biomedical knowledge exploration.

Aris, A. (August 2008)
Visualizing and Exploring Networks Using Semantic Substrates
Ph.D. Dissertation from the Department of Computer Science
HCIL-2008-29

Visualizing and exploring network data has been a challenging problem for HCI (Human-Computer Interaction) Information Visualization researchers due to the complexity of representing networks (graphs). Research in this area has concentrated on improving the visual organization of nodes and links according to graph drawing aesthetics criteria, such as minimizing link crossings and the longest link length. Semantic substrates offer a different approach by which node locations represent node attributes. Users define semantic substrates for a given dataset according to the dataset characteristics and the questions, needs, and tasks of users. The substrates are typically 2-5 non-overlapping rectangular regions that meaningfully lay out the nodes of the network, based on the node attributes. Link visibility filters are provided to enable users to limit link visibility to those within or across regions. The reduced clutter and visibility of only selected links are designed to help users find meaningful relationships. This dissertation presents 5 detailed case studies (3 long-term and 2 short-term) that report on sessions with professional users working on their own datasets using successive versions of the NVSS (Network Visualization by Semantic Substrates, http://www.cs.umd.edu/hcil/nvss) software tool. Applications include legal precedent (with court cases citing one another), food-web (predator-prey relationships) data, scholarly paper citations, and U. S. Senate voting patterns. These case studies, which had networks of up to 4,296 nodes and 16,385 links, helped refine NVSS and the semantic substrate approach, as well as understand its limitations. The case study approach enabled users to gain insights and form hypotheses about their data, while providing guidance for NVSS revisions. The proposed guidelines for semantic substrate definitions are potentially applicable to other datasets such as social networks, business networks, and email communication. NVSS appears to be an effective tool because it offers a user-controlled and understandable method of exploring networks. The main contributions of this dissertation include the extensive exploration of semantic substrates, implementation of software to define substrates, guidelines to design good substrates, and case studies to illustrate the applicability of the approach to various domains and its benefits.

Lin, J. (July 2008)
Scalable Language Processing Algorithms for the Masses: A Case Study in Computing Word Co-occurrence Matrices with MapReduce
Proceedings of the 2008 Conference on Empirical Methods in Natural Language Processing (EMNLP 2008), pages 419-428, October 2008, Honolulu, Hawaii.
HCIL-2008-28

This paper explores the challenge of scaling up language processing algorithms to increasingly large datasets. While cluster computing has been available in industrial environments for several years, academic researchers have fallen behind in their ability to work on large datasets. We discuss two challenges contributing to this problem: lack of a suitable programming model for managing concurrency and difficulty in obtaining access to hardware. Hadoop, an open-source implementation of Google s MapReduce framework, provides a compelling solution to both issues. Its simple programming model hides systemlevel details from the developer, and its ability to run on commodity hardware puts cluster computing within reach of many academic research groups. This paper illustrates these points with a case study on building word cooccurrence matrices from large corpora. We conclude with an analysis of an alternative computing model based on renting instead of buying computer clusters.

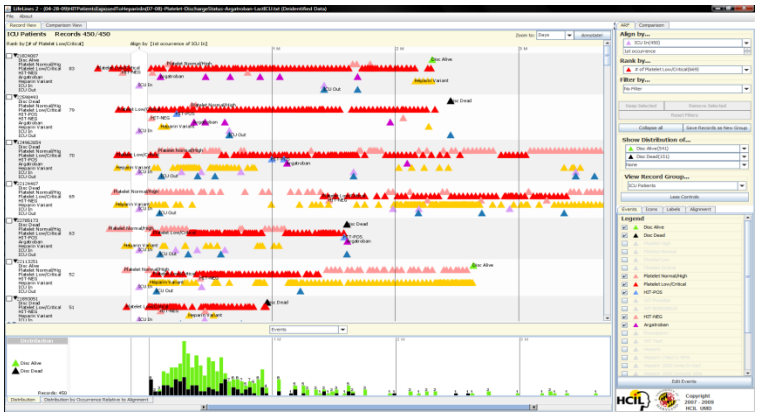
Shneiderman, B. (June 2008)
Extreme Visualization: Squeezing a Billion Records into a Million Pixels
Proc. ACM SIGMOD 2008 Conference, ACM, New York (June 2008).
HCIL-2008-27

Database searches are usually performed with query languages and form fill in templates, with results displayed in tabular lists. However, excitement is building around dynamic queries sliders and other graphical selectors for query specification, with results displayed by information visualization techniques. These filtering techniques have proven to be effective for many tasks in which visual presentations enable discovery of relationships, clusters, outliers, gaps, and other patterns. Scaling visual presentations from millions to billions of records will require collaborative research efforts in information visualization and database management to enable rapid aggregation, meaningful coordinated windows, and effective summary graphics. This paper describes current and proposed solutions (atomic, aggregated, and density plots) that facilitate sense-making for interactive visual exploration of billion record data sets.

Posters

Lifelines2: Search, Group, and Comparison of Personal Records

Taowei David Wang, Catherine Plaisant, Ben Shneiderman



Align, Rank Filter, and Summarize (450 records).

Creating three groups of patients of successively more serious conditions (357, 93, 63 records).

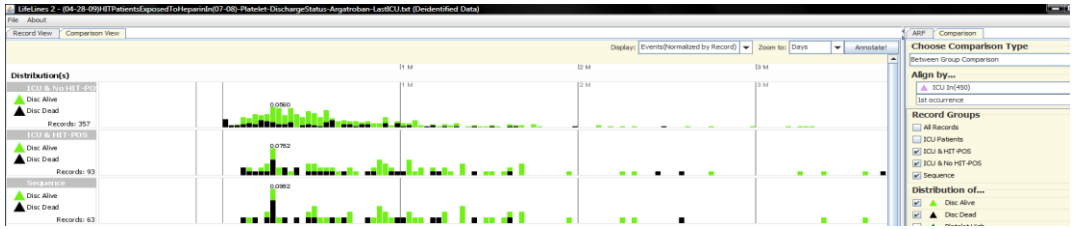
Overview

The goal of Lifelines2 is to support hypothesis generation about event relationships across multiple records. We designed the interface to expose temporal characteristics about data, and highlight the prevalence of these characteristics.

Lifelines2 supports visualization of records of temporal categorical data without duration (point events) such as medical diagnoses, treatments, etc..

Users use **Align**, **Rank**, **Filter**, **Summarize** in Lifelines2 for exploratory visual analysis.

Users can also **Group** patients that share a similar temporal characteristics and later on compare the different groups in summary form.



Comparison of the three groups in summary

Scenario: Heparin-Induced Thrombocytopenia (HIT)

Usage of the drug heparin may cause the patient's platelet count to sharply drop. Physicians are interested in how many of such patients occur in ICU, and whether they stay in the hospital longer. We create three groups of patients of worsening conditions via different filters, and compare these three groups of patients on their hospital discharge patterns aligning by their first ICU admission. We see that patients with HIT tend to stay in the hospital longer.

Adoption and Impact

Our technologies are, and have been, experimentally adopted in real systems (Washington Hospital Center's Amalga and Harvard Medical School's i2b2 system). We are working to evaluate their success.

Disclaimer

All data shown here are de-identified to comply with HIPAA regulations.

Special thanks to: **Washington Hospital Center, and Harvard Medical School – Partners HealthCare**

www.cs.umd.edu/hcil/lifelines2

Health Information Wants (HIW) in the Internet Age

Bo Xie

COLLEGE OF INFORMATION STUDIES

Aim

- To investigate older adults' preferences for health information and participation in decision-making

Background

- Patients are increasingly expected to stay informed and play a more active role in their own health care

Research Design & Methods

- In-depth individual & focus group interviews
- Participants: A total of 20 older adults (age 60+)
- Time: Summer 2007
- Data analysis: Guided by grounded theory

Results

- Identified the concept of *health information wants* (HIW): i.e., Health information that one would like to have and use to make important health decisions that may or may not be directly related to diagnosis or standard treatment
- Developed the HIW framework, which encompasses four types of HIW that have varying properties and positions on the decision-making spectrum (Figure 1)
- While Internet use has not changed these older adults' reliance on medical professionals for diagnostic or standard treatment decisions, it has created new opportunities for them to obtain necessary information to make a broader range of health-related decisions

Conclusion

- Both the Internet and the perpetuating influence of the provider-dependent model are at play in the patient-provider relationships of these older adults

Less participation in diagnostic/ standard treatment decision making ← Health Information Wants (HIWs) → More participation in diagnostic/ standard treatment decision making

	Type 1: Basic	Type 2: Advanced	Type 3: Complementary	Type 4: Provider
What	Very basic information	As detailed as possible information	Information about complementary/ lifestyle treatments	Information about provider
Why	To know what to expect; to cope with the stress	To understand and monitor doctors' decisions	To complement standard treatments	To select provider, diagnosis, treatment
Perception of patient-provider relationship	Complete trust of doctors' expertise and authority	Confident that one may be able to help doctors to better help oneself	Understands that doctors are not trained to be experts in every area	Acknowledges that some doctors are not as competent as others
Why not go to doctors for this information	Not urgent or critical to have this information	Busy doctors, technical language	Most doctors are not experts in this area	A third-party information source might be more objective
Role (potential) of the Internet	Sets expectations /enables better coping in a more timely fashion	Provides medical knowledge in less technical language	Provides information to complement that from doctors	Provides information to enable patients' provider-shopping

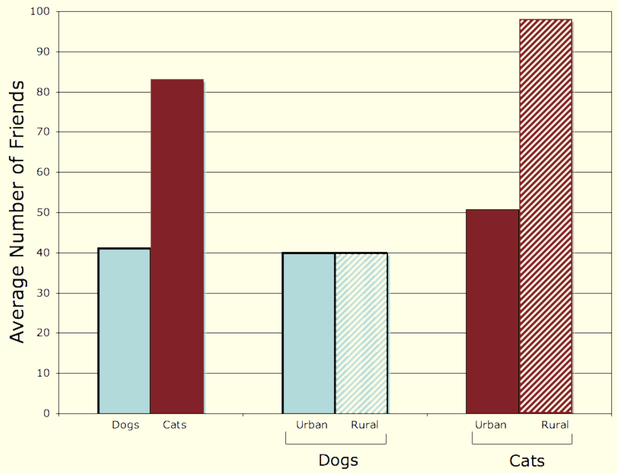
Figure 1: The Health Information Wants (HIW) Theoretical Framework

Citation: Xie, B. (in press). Older adults' health information wants in the Internet age: Implications for patient-provider relationships. *Journal of Health Communication*.

Acknowledgements: This research was supported by a General Research Board Faculty Summer Research Grant from the University of Maryland. The College of Information Studies at the University of Maryland provided supplemental funding.

On the Internet Everybody knows you're a Dog

There are many **physical and psychological benefits** that come from **interacting with pets**. Understanding how pet owners interact through their animals **online** can lead to better support of their needs.



Cats have significantly **more friends** than dogs.

Rural cats have **more friends** than urban cats.

No difference between urban and rural **dogs**.

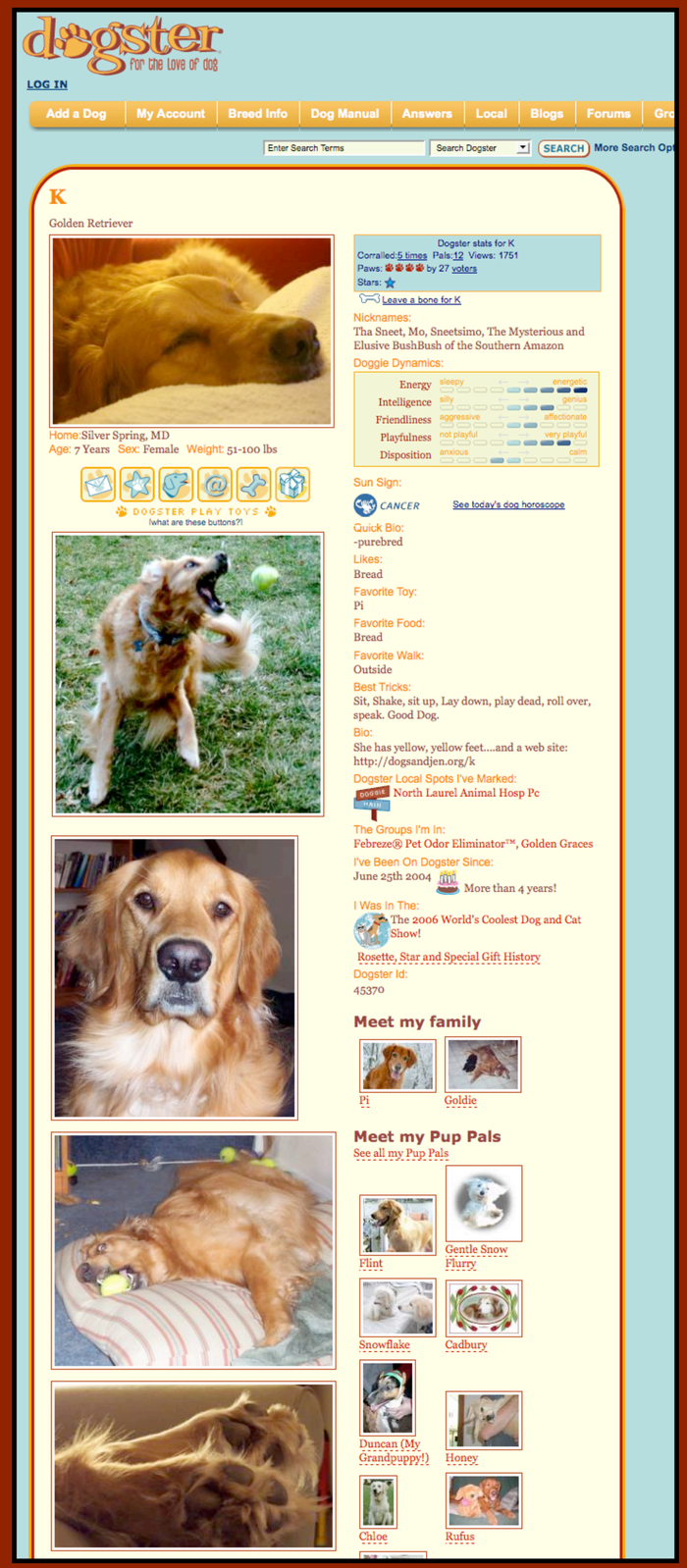
HYPOTHESIS: Pets who are more isolated in the real world make more friends online.

Dogs make friends within the **same breed** significantly more than cats.

Cat and Dog owners create friendships differently in pet-oriented social networks.

Jennifer Golbeck Human-Computer Interaction Lab University of Maryland, College Park

The Human-Pet Relationship in Online Social Networks

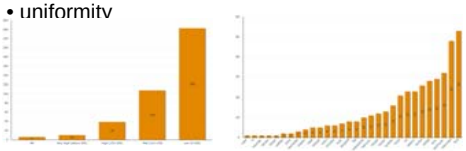


Ranking Criteria for Categorical Data:
Visualizing patterns and outliers

Darya Filippova, and Ben Shneiderman {dfilippo, ben}@cs.umd.edu

1 One-dimensional rankings

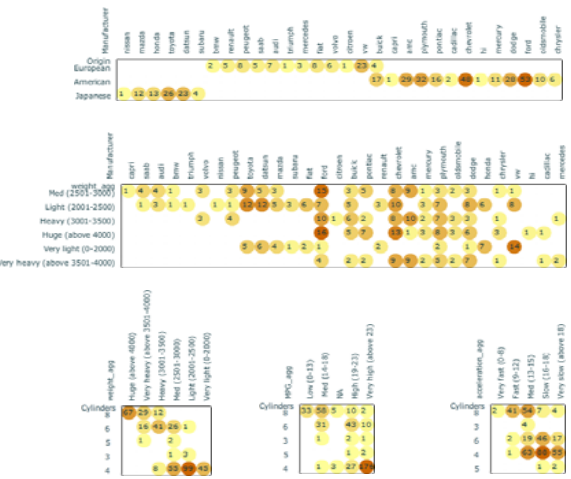
User scan rank the one-dimensional relationships by:
- unique count
- variance
- uniformity



By comparing histograms with various properties users get an overview of the dataset.

2 Two-dimensional rankings

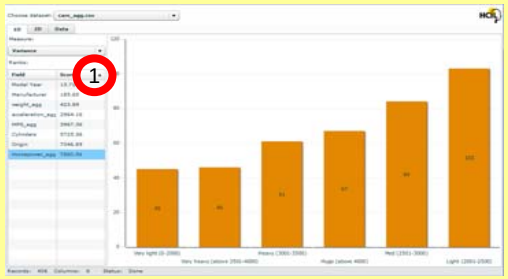
Users can rank two-dimensional relationships by:
- variance
- crossover count
- space filled
- empty space
- outlier count
- uniformity



Above: matrices that have a low crossover count have clustered well.

Overview

Analyzing multivariate datasets requires users to understand distributions of single variables and at least the two-way relationships between the variables. Lower-dimension projection techniques may assist users in finding interesting combinations. To explore the 2D relationships in a systematic way, we suggest ranking such relationships according to some measure of interestingness.

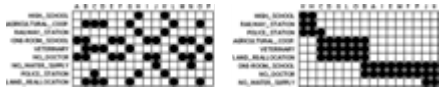


CateRank

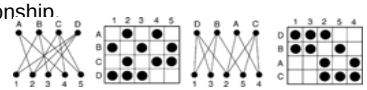
We propose CateRank – a tool for analyzing categorical datasets which visualizes one-dimensional relationships as histograms and uses a reorderable matrix described by Siirtola for two-dimensional relationships. CateRank implements several metrics based on the histogram and matrix properties that enable users to discover relationships between categorical variables. User controls support filtering to remove extreme and uninteresting values.

Try it at: www.cs.umd.edu/~dfilippo/caterank

3 Reorderable matrix



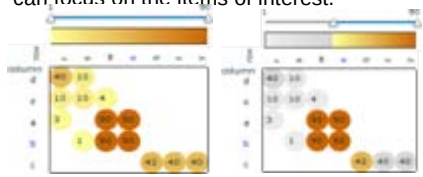
Reordering matrix rows and columns can reveal clusters of values within a two-dimensional relationship.



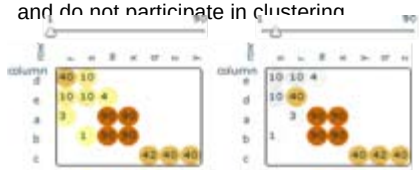
The matrix can be converted to a bipartite graph, and we can apply effective heuristics for reordering the graph's nodes which will correspond to reordering the matrix's rows and columns. Minimizing the number of crossovers in the bipartite graph builds clusters in the corresponding matrix.

4 Filtering

Users can narrow the range of data items they are looking at by using the range slider. The items outside the range become grayed out so that users can focus on the items of interest.



Users can specify what values should be ignored when reordering the matrix. Toggling the cutoff slider starts the reordering algorithm on the matrix; all values below the slider's value are treated as zeros and do not participate in clustering.



Designing for Organizational Values

Kenneth R. Fleischmann, William A. Wallace, and Justin M. Grimes

COLLEGE OF INFORMATION STUDIES

Objective:

- Compare the values of modeling in three different organizational cultures

Background:

- Different types of organizations have different types of organizational cultures
- The culture of an organization and the values of its members mutually shape each other
- There is a need for research that systematically examines values in different organizations (and types of organizations) where modeling occurs

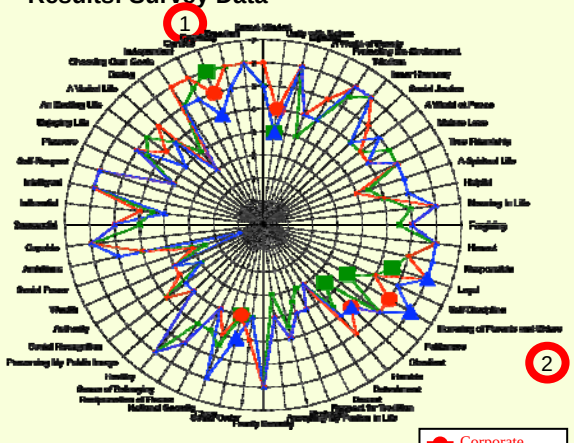
Data Collection:

- Online survey conducted with 76 modelers from three different types of research laboratories including Schwartz Values Survey (SVS)
- Interviews were conducted with 40 of the 76 survey participants from all three sites

Data Analysis:

- Interview transcripts were coded using SVS
- Survey self-reported SVS scores and interview SVS counts were compared to determine if there were any statistically significant differences among the three sites, using Kruskal-Wallis H, and then any value differences among the three sites were then evaluated pair-wise using Mann-Whitney U
- Statistically significant differences according to both non-parametric tests are represented on the radar plots by larger dots

Results: Survey Data



Results: Interview Data

1 Creativity

"The technical problem was very interesting."
"I do this for intellectual stimulation."
[not mentioned]

2 Honoring of Parents and Elders

[Modelers honor managers.]
[Students honor faculty.]
[New employees honor "the old guys."]

3 Equality

"If you take things like equity as a value, you're actually trying to build it into your model, trying to find a way to represent it in your model."

4 Responsible

"After I corrected my mistake...it may not have been the best news, but it [was] a better model."
"We go to conferences and talk about models, nobody stops and asks questions about whether it's a good thing or a bad thing."
"Certainly you want to be careful and honest about how you report your data."

Implications of the Research:

- Differences in organizations lead to different values, which in turn lead to different priorities and designs
- Computational modelers may not be aware of the role that values and organizational differences play in the design of models
- Computational modelers and other IT designers need additional opportunities for ethics education

This material is based upon research funded by the National Science Foundation under Grants 0521834, 0646404, 0731817, and 0731818

GeoStories:
Supporting Mobile Storytelling for Children

Sonia Franckel, **Allison Druin, Evan Golub, Alex Quinn, Elizabeth Bonsignore, Elizabeth Foss, Greg Walsh, Leshell Hatley, Mona Leigh, Jerry Fails**

1 Why tell stories?

Storytelling of all sorts is the primary form through which we understand and impose order on our experience. – Cassell & Ryokai, 2001

Storytelling is essential to child development. Through stories, we:

- develop creativity
- practice various language constructs
- create a "safe-haven " to try out new ideas
- explore cultures

2 Mobile Technology and Fantasy Play

Mobile devices can be used have a more tangible storytelling experience, previously only possible by embedding technology. Mobile devices optimize:

- portability
- fast user interaction (touch screen)
- audio-visual content
- fun!

This way, storytelling can blend seamlessly into play.


3 Geographic Positioning

Children make strong associations with tangible objects. By using geographic positioning on the stories, children can form these same connections between a story and a place. Children can view stories while at the place where they were written or about a place they would like to see. This further peaks their curiosity about the world around them and new cultures.

Overview

Research shows that children need an outlet to express themselves on a platform larger than just those they encounter in their daily lives. They need a way to tell their stories to children worldwide, and read stories of children from other cultures. In addition to a creative outlet, this would give them a chance to learn about other cultures.

In this project, we explored the types of stories children would want to [illegible] best way to tell them.

Scenario

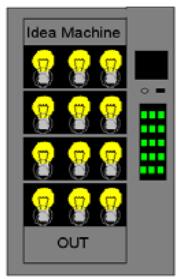
Consider this scenario: A child goes on a family vacation to the beach. During the trip, she builds a sand castle and eats a the local restaurant Sally's Chicken Hut. She has her favorite dish – chicken tenders. While it may seem trivial, sharing this story cannot wait until the end of the vacation when access to a computer returns. It has to happen immediately with audio-visual content. Most importantly, the act of story-telling has to be fun enough that the child will want to do it even during vacation.



4 Audio

During design sessions with children ages 7--11, we found that audio provided an excellent stimulus for both prompting stories and telling them. Often children complained, "I know what I want to say but I don't know how to say it." The children loved ranking sound effects as story starters and then using them to create their own stories.

5 Design and Prototype





How Children Search the Internet

**Allison Druin, Elizabeth Foss, Leshell Hatley,
Evan Golub, Mona Leigh Guha, Jerry Fails, and Hilary Hutchinson**

UNIVERSITY OF MARYLAND 18 56
COLLEGE OF INFORMATION STUDIES

1 THE NEED

Children face challenges when searching the Internet with keyword-based interfaces. However, this type of interface is the most frequently used. Understanding what challenges occur and in what contexts can lead to more appropriate technologies for young people.

Complex Queries

2 METHODS

- Qualitative Approaches
- In-Home Data Collection
- Interviews & Observations
- Frequency Analysis
- Thematic Clustering

3 PARTICIPANTS

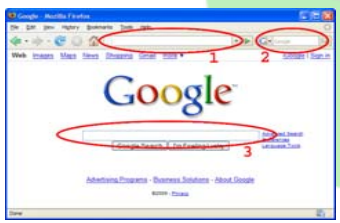
7, 9, 11 Year Olds and Their Parents

4 CHALLENGES

- Interaction between keyboard and screen
- Knowledge and use of keyword interfaces (i.e. Google)
- Typing and spelling approaches
- Place of query entry
- Deciphering result pages
- Complex queries

Typing and spelling

Auto-Complete



Place of query entry

Interaction between keyboard and screen

5 FUTURE DESIGN

- Diverse Input Methods
- Alternative Auto-complete Algorithms
- Redesign Results Page
- Age-Appropriate Interface

Sponsored by:
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Online Communities in Disaster Response and Relief

A Study of a Chinese Online Forum in the 2008 Sichuan Earthquake

Yan Qu, Philip Fei Wu, and Xiaoqing Wang[1]

COLLEGE OF INFORMATION STUDIES

Research Question

- General question: ***How do online communities response to major disasters?***
- Specific question: ***How do an online community in a discussion forum as part of a large socio-technical system react to major disasters?***
- Even more specific question: ***How did one of China's largest online community on the Tianya discussion forum response to the 2008 Sichuan Earthquake.***

The Tianya Online Forum

- Launched in March 1999 and partnered with Google China
- 20 million registered users by early 2007
- More than 1.5 million page views per day
- Cover a wide range of topics and issues

Research Approach

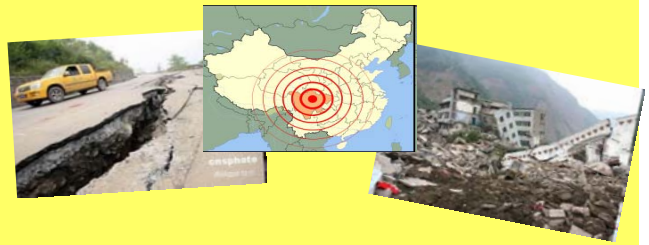
- Examination of discussion threads on a popular Chinese discussion forum (tianya.cn) during the first week after the 2008 Sichuan Earthquake (May 12 ~ 19, 2008)

  A random sampling of 2,266 threads (5%) out of 46,280 threads from two subforums on Tianya: MiscTalk and Earthquake from May 12 to 19.

- Development of a message classification scheme revealing different roles of the online forum in disaster response.

2008 Sichuan Earthquake

- Epicenter: Wenchuan, Sichuan province, China
- Time: May, 12th, 14:28 local time
- Magnitude 8.0
- 69,181 known deaths and 18,498 people missing
- Hundreds of thousands injured and millions homeless



Netizens' Reaction in a Large Socio-Tech System

290 million network users; 60 million IM users; 50 million bloggers

Findings - Four Major Roles that Tianya Played in the Disaster Response

Information-Related Roles

- Part of the communication network
- Online forum as information sources
- Information gathering and integration

Figure 4: A map mashup on Tianya showing user-reported earthquake locations (The epicenter is marked by the red alert sign)

Within 10 minutes after the quake, 56 threads reported feeling of earthquake from 22 different cities in China.

Within the first hour, about 350 threads on earthquake were created in the MiscTalk board. The longest thread contained 535 reports on the earthquake from 105 cities in China.

Opinion-Related Roles

- Criticizing, appraising, neutral, eeking opinions
- Shaping public opinions
- Provide feedback to both individuals and the government
- Collaborative sensemaking and norm building

Action-Related Roles

- The online forum facilitated relief activities by providing a communication channel and helping coordination's

Emotion-Related Roles

- A place to express personal feelings
- The scale of the community, the loosely connected social network, the lack of certain system functions hinder the effective emotional support among community members

Conclusion

- Enhanced by ICT, online communities play various important roles in disaster response, particularly the sharing and integration of information and opinions.
- Carefully design a socio-tech system, we can harness the power of community participation in disaster response.

[1] School of Business, University of Maryland

Designing a Novice Programming Environment with Children

Sureyya Tarkan, Vibha Sazawal, Allison Druin, Evan Golub, Elizabeth Foss,
Leshell Hatley, Tejas Khatri, Sheri Massey, Greg Walsh, Germana Torres

University of Maryland Human-Computer Interaction Laboratory (HCIL) and
University of Maryland Department of Computer Science, College Park, MD, USA

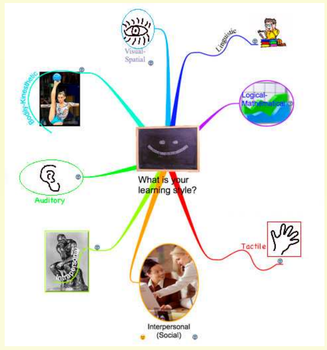
The Challenge: Attract Children to Programming

- **Why?** Programming allows children to *explore* creative topics and *learn* problem-solving skills.

- **How?** With tangible programming, children can easily *work together* and *move around*.

Goals

- We want to reach children with *kinaesthetic*, *auditory*, and *social learning* styles.
- We need a tangible programming system that is *fun*, *complete*, and *age-appropriate* in complexity.



Previous Work: Tangible Programming Systems

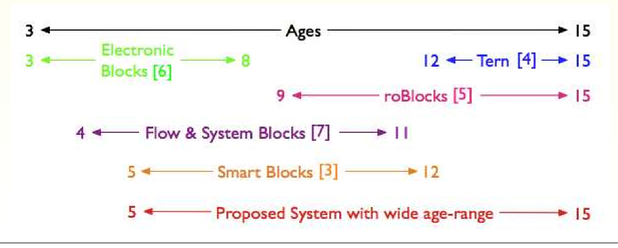
Electronic Blocks [6]

- Limited capability
- Simple
- Self-contained blocks

Tern [4]

- Full-featured
- Complex
- Passive puzzle pieces

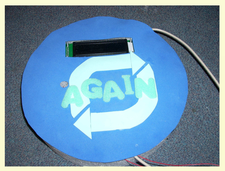
Contribution



Design Partnering: Design Sessions

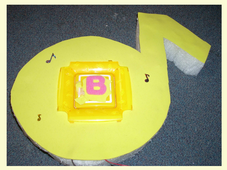
- Design partnering [2] refers to a design process in which children actively help *create* the design.
- The *Kidsteam* project is a vehicle for design partnering at the University of Maryland.
- In our two 2-hour design sessions, there were 4 or more *children* (aged 7-12) and 6 or more *adults*.
- To demonstrate our goals, we began by presenting a prototype for *collaborative* music programming made by Tarkan.

Collaborative Music Programming



Loop

Eraser



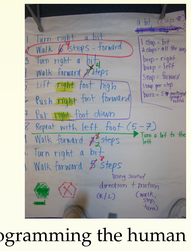
Note B

Trumpet

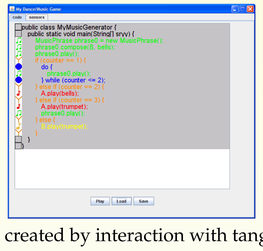
- Analog sensors embedded in styrofoam
- Pressing tangibles makes sound and code

Computer

Kidsteam Session I

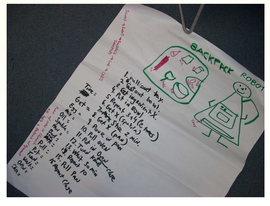


Programming the human robot



Code created by interaction with tangibles

1. Kidsteam *programmed* a human robot for the obstacle course.
2. Children *re-implementated* the same program with sound-based instructions.
3. We *introduced* our tangible objects & programmatically created a song.
4. *Feedback:* What would children like to tangibly program?
   - A computer game
   - A robotic dog
   - A robotic chef
5. *Debrief decision:* programmatic cooking idea
   - it is the most *concrete*, and
   - there are no *gender* differences



Robotic chef idea

Kidsteam Session II: Early Feedback on Cooking Idea

- Musically-themed tangibles reappropriated as cooking objects
- System supported iteration, deletion, and audio-tutorial
- Wizard-of-oz execution
- Sounds, Alice [1] simulation of cooking, and Java-like code as output

Session Outcomes

Alice [1] simulation

```
Heat(syrup)
Heat(milk)

for (int i = 0; i < 4; i++) {
    Pour(syrup)
    Pour(milk)
    Mix
}
```

Intended hot chocolate program

- Children *successfully* guided the simulated chef to prepare four cups of hot chocolate.
- *Loops:* Children and adults together wrote a new program on paper considering more mugs.

Conclusion: Additional Design Ideas by Children

- Technical improvements
- More flexibility in choices
- Iteration with START and STOP tangible objects
- *Debrief result:* A cooking-based novice tangible programming system

One idea per sticky note

References

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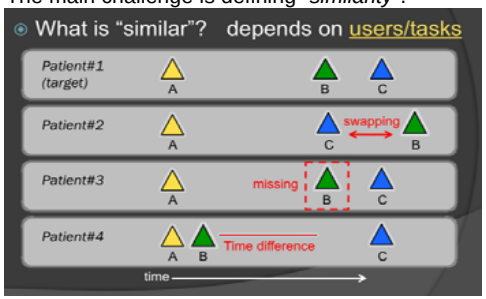
Similan
Finding Similar Temporal Categorical Records

Krist Wongsuphasawat, Catherine Plaisant, and Ben Shneiderman
{kristw, plaisant, ben}@cs.umd.edu

Electronics Health Records (EHRs) are being collected by leading health organizations. Challenges arise when a practitioner seeks records of patients with similar symptoms to the target patient in order to guide their treatment**.**

The initial goal of this project is to enable discovery and exploration of similar records in temporal categorical datasets.
The main challenge is defining *"similarity"*.



We designed a customizable similarity measure and built "*Similan*", an interactive tool for finding similar records from temporal categorical data. Similan allows users to define a target record and customize parameters in the similarity measure. It provides visualization techniques to help users understand and explore the search results.

Similarity-based is more flexible that rule-based searching because it allows uncertainty. In rule-based searching, users need to have detailed knowledge of the record they are looking for in order to formulate queries. Too specific queries can result in an empty set of answers, frustrating users. In contrast, similarity-based searching displays all the records, ranked by similarity.

Although this project was first motivated by EHRs, applications of Similan go well beyond the medical domain, for example, traffic incident logs in transportation systems or student records in academic institutions.

1. Align by Sentinel Category
Similan adapts idea from LifeLines2 by allowing users to align temporal categorical events by a sentinel event.

2. Customize search parameters
Users can select range of temporal interest (red box) and select event categories to include in the search.

3. Define Target
Users can select any record from the database as a target record

or create a custom target record by placing events on the timeline.

4. Rank-by-Similarity
Users can sort the records by similarity score. Higher scores represent higher similarity to the target record.The scores are displayed on the color-coded grid on the left.

5. Show Comparison
The comparison panel uses lines to show similarity and difference between the target (above) and selected (below) record. Events are separated by category.

6. Filter Search Results
Similan allows users to filter the search results by the similarity score or number of events.

Please visit www.cs.umd.edu/hcil/similan for more information

University of Maryland, Human-Computer Interaction Lab www.cs.umd.edu/hcil

TangiFun

Tangible Education System for Teaching Recursion

Eylul Dogruel

What is TangiFun?

TangiFun is a new interactive system to teach functional programming basics, especially recursion.

Our target users are people novice at programming, especially those who think visually.

Goals:

- Teaching functional programming, in a fun and intuitive way.

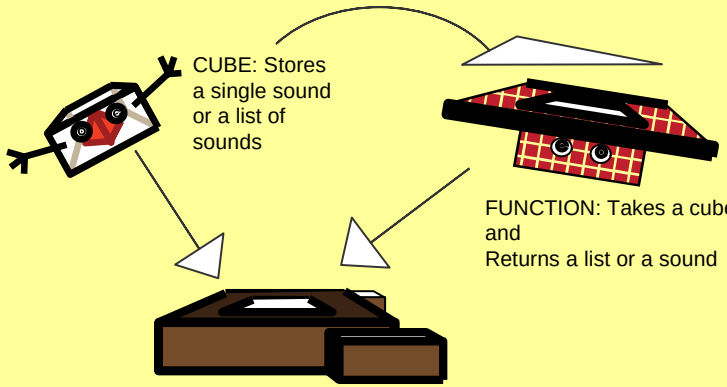
- Minimal knowledge necessary. No knowledge of math, or even writing or English* Colors and shapes are used to express meaning instead.

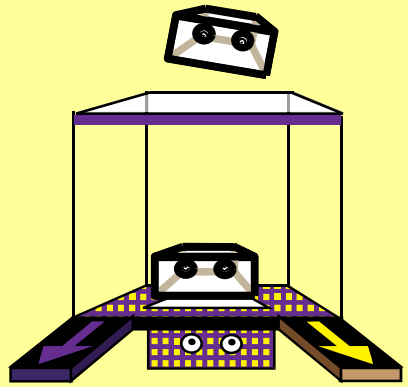
- A design that aims to describe the concepts. The structure of the program is the program.

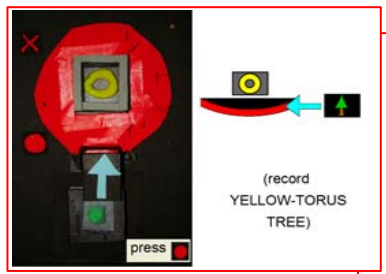
- A context away from the single screen and keyboard. 3-D shapes, tangible pieces, colored lights for debugging and a lesson system that unlocks more pieces as the student progresses.

***within the pieces/code**

Syntax:







Instructions for the student

Colors

Green
List

Blue
single sound

Red
Error

Purple/Yellow
If/Else

A line of code written inTangiFun

Wii Can Do It
Using Co-Design for Creating an Instructional Game

Greg Walsh, Human-Computer Interaction Lab, University of Maryland, USA

Session 1

Participants played *Wii Sports* to experience motion-sensing controllers. Afterwards, the group discussed their likes and dislikes of the Wii. Some had trouble with using the controller on menus.

Session 2

Inter-generational teams built low-tech prototypes of their motion-controlled, instructional game ideas. Arts and crafts materials were used to build the prototypes.

Need

There are many **children** for whom learning is difficult if they need to remain still. The **Nintendo Wii**, with its **motion-controlled** sensors, can support learning experiences that enable children to be **physically active learners**.

Goal

The goal was to **design** an **instructional game** that leveraged the Nintendo Wii's motion controls to teach about U.S. National Parks.

Lessons Learned

Thus far in the design process, we learned the following four approaches to design with Wii controllers: Children very much enjoy choosing avatars, but easier menu controls need to be developed. Wii **experiences are very social**, so the interface and content should engage multiple audiences. **Time travel** seems a **compelling** way for children to learn about history and **social studies** issues. The Wii controller enables movement for users that doesn't have to be about sports, but adventure and missions to solve.

Future Work

The next step is to create a low-tech prototype in the form of storyboards. An interactive prototype will then be built.

Session 3

Participants combined their individual ideas into one game. In this picture, participants are designing the motion-controlled, instructional game's reward system.

Final Game

The final game design involves time-travel, problem solving, and righting wrongs within the space-time continuum. This picture shows low-tech versions of virtual Lewis, Clark, and Sacajawea.

Funded through the College of Information Studies, University of Maryland

Mobile Collaboration for Young Children

Jerry Alan Fails, Allison Druin and Mona Leigh Guha www.cs.umd.edu/hcil/mobilecollaboration/

Overview

Social interaction and **collaboration** are essential to the emotional and cognitive development of **young children**. **Mobile devices** can support the learning experience as children can create artifacts in various contexts. The proposed research incorporates collaboration, constructionism, children, stories and mobile technologies; specifically investigating developmentally appropriate interfaces to support mobile collaboration for young children (ages 6-10).

Mobile device limitations can be overcome by bringing people and devices together.

Research Questions

1. How do collaborative mobile technologies affect children's collaboration?
2. What are the appropriate interfaces for co-present mobile collaboration with children?
3. What are the appropriate interfaces for switching between different modes of collaboration and varying levels of creation/consumption?

Desktop vs. Mobile Collaboration

Procedure

Children (ages 6-10) will read and create a collaborative story in pairs using three different **collaborative configurations** (independent, space sharing and content splitting) and each platform (traditional desktop computers and mobile devices).

Children will be able to switch between the collaborative configurations.

Data Collection & Analysis

Notes, guided interviews, interaction logs and video will be used to investigate:

- For which tasks are certain configurations are used and/or preferred?
- How do the children collaborate with each platform using each collaborative configuration?
  - How were teams able to accomplish the reading/creating story task?
  - How do team members negotiate and exchange information?
  - For what types of tasks do children work co-located versus separate?
- Which platform is preferred in which situations?

Special thanks to those who have helped with this project at different stages:
Gene Chipman, Kevin McGehee, Juliette Taillandier, Shaili Desai and Bobby Owolabi

Collaborative Configurations

Mockups below use page from Ciconia Ciconia (White Stork) by Andrea Petrlik published 2003, Kašmir Promet – Croatia, Available in the International Children's Digital Library (ICDL)

Independent

Same page on each device

Different pages on each device

Space Sharing

Spread across devices (zoomed in)

Two page view (zoomed out)

Content Splitting

For more information contact Jerry at fails@cs.umd.edu.

University of Maryland, Human-Computer Interaction Lab www.cs.umd.edu/hcil

Creating Stories Together on iPhone

Intergenerational participatory design of a mobile story authoring application

Alexander J. Quinn, Benjamin B. Bederson, Allison Druin

Co-designing with a group of children and older adults…

Technologists in the lab have been meeting with a group of children and their elders (grandparents, older family friends, etc.) to discuss and decide on details of the interface for the new mobile application.

…to develop a mobile application for editing and authoring stories.

Start with either a blank book or an existing book from the International Children's Digital Library (ICDL).

Add photographs, text, sound clips, and drawings. Make changes to the original book content. Arrange the page freely.

Supported by:
National Science Foundation (#0839222)

Thanks to:
Design group participants

Opening new avenues for children to learn from the elders around them…

Storytelling with adults promotes literacy development and facilitates the exchange of ideas. As children become increasingly detached from the older generations, activities such as storytelling have the potential to foster stronger connections between older and younger people.

…while making rich stories to share with friends and family near and far.

Story authoring with a mobile device offers unique opportunities to capture and integrate sights and sounds in the environment, to keep the stories in a portable format, and to transmit them to friends and family residing outside the immediate vicinity.

HCIL In The Press

Human-Computer Interaction Laboratory
University of Maryland, College Park, MD 20742-3255
www.cs.umd.edu/hcil

HCIL In The Press

2009, April, Research by Matt Kirschenbaum and Doug Reside at MITH involving antiquarian computing and the preservation of digital creative work was written up as a front page story in the *Chronicle of Higher Education.*

2009, February, The HCIL was reviewed in *APICS Magazine*.

2009, January, Ben Shneiderman's research was covered in *Nature*: Social networking: Crisis communication.

2009, January, Ben Shneiderman's research, Science 2.0 was covered in Breakthroughs in *Urbanite Magazine*.

2008, The International Children's Digital Library is in the News: In an article on the *U.S. Department of State website*: Kids Help Design International Children's Digital Library.

2008, Jen Golbeck is in the news for her social network research in *Ars Technica* and *Science*.

2008, August, Ben Shneiderman was interviewed in a *New York Times* article on information visualization.

2008 July, Ben Shneiderman talks to the *New York Time*s about small screen displays.

2008, June, An HCIL research project by François Guimbretière and Nick Chen was featured in *Slashdo*t.

2008, May, Ben Shneiderman interviewed in *Ambidextrous Magazine*.

2008, Ben Shneiderman Receives *2008 Board of Visitors Award* from the College of Computer, Mathematical and Physical Sciences at the Univ. of Maryland Pictured on May 16, 2008, Board Chair Raj Khera presents the Award, while Dean Stephen Halperin and Prof. James Yorke applaud.

2008, May, Ben Shneiderman's research is featured in *New Scientist*, Emergency 2.0 coming to a website near you.

2008, April*, Semanticweb.com*, features Jennifer Goldbeck in the two-part Young Guns series.

2008, April, The six secrets to mobile computing success, A report on Prof. Ben Bederson speaking at *Web 2.0 Expo* in San Francisco.

2008, April, *MIT Technology Review*, features Allison Druin in the article: An Unexpected Director.

2008, April*, Diamondback Online* features Allison Druin, Director of the HCIL, in: A Lab with Big Ideas.

2008, March, *Ars technica* features Ben Shneiderman.

2008, March, Ben Shneiderman featured in *Science Daily*, Human-Computer Interaction Redefines Science on Science 2.0.

2008, March, *Physorg:* Move over Galileo, it's Science 2.0 featuring Ben Shneiderman.

2008, March, Ben Shneiderman talks about Science 2.0 in *Indo-Asian News Service:* Global innovator calls for new approach to science.

2008, March, Ben Shneiderman featured on the radio show, *Canadian Broadcasting: As it Happens*.

2008, March, Brandon Keim writes about Ben Shneiderman's work on Science 2.0 in, A Journalist's Journey Through Science 2.0 on *wired.com*.

2008, March, Ben Shneiderman was featured in *wired.com* in an article title: The Internet Is Changing the Scientific Method on.

2008, March, Ben Shneiderman talks about Science 2.0 in *Science Magazine*.

2008, March, Ben Shneiderman was featured in *Between the Columns*, on the University of Maryland's website.

2008, February, WYPR Maryland Morning, Baltimore, MD 10 minute radio interview about usability of voting systems with Ben Bederson.

2008, January, KCSN News with Jessica Caldera. Short radio interview with Ben Bederson about usability of voting systems**.**

2008, January, Ben Bederson interviewed in *TechnologyReview.com* , "Voting with (Little) Confidence".

2008, January, Ben Bederson interviewed in *ScienceDaily.com,* "Touch Screen Voting A Hit; Critics Miss Mark on Security, Study Says".

2008, January, Ben Bederson featured in ScienceDaily.com "Touch Screen Voting A Hit; Critics Miss Mark on Security, Study Says."

2008, January, Ben Bederson interviewed in *Newsweek*, "Like a Super Hero: Humans weren't made

for scrolling and searching. We were made for zooming".

2008, January, Ben Bederson interviewed in *GovernmentExecutive.com* by Gautham Nagesh "Voters confused by e-voting machines, study finds".

2008, January, Ben Bederson interviewd on WAMU Kojo Nnamdi Show,Washington, DC Thirty minute segment on "Technology User Frustrations - Spotlight on Cellphones".

2008, January, Ben Bederson interviewd on *KUOW, The Conversation,* Seattle, WA The guest on an hour-long call-in talk show on the future of cellphones.

2008, January, Ben Bederson, HCIL faculty, shared his thoughts on the future of mobile technologies on *Seattle Public Radio, KUOW* and it was summarized in Seattlepi.com.

2007, December, The HCIL has a tradition of celebrating the important work of the lab. Now the world can celebrate with Ben Shneiderman as he turns 60, with a special issue of the International Journal of Human-Computer Interaction. This unique publication, highlights the contribtions of a man who was there to start the field of HCI." Allison Druin, HCIL Director

2007, December, Ben Shneiderman and Adam Perer's research on social networks, Social Action, was featured in *Slate Magazine*.

2007, October, Jimmy Lin's research on Cloud Computing was featured in the *Washington Post* and *NY Times*.

2007, September, HCIL in *Knoxnews.com* blog, "Covering Digital Culture."

2007, September, HCIL was featured in the *Orlando Sentinel.*

2007, September, Cynthia Parr was interviewed about her ecological semantic web work in the *NY Times*.

2007, July, Ben Shneiderman interviewed for User Experience Pioneers.

2007, June, Ben Shneiderman supports web design guidelines in *Government Computer News*.

2007, June, The Cyber Psychologist is in! Kent Norman was featured on *Channel 4 NBC News* discussing the issues surrounding dangerous Internet stunts. He also held an Online chat the following day, June 6, 2007.

2007, June, The Computer Guy & Gal on *WAMU's Kojo Nnamdi Show* : Ben Bederson and Allison Druin talked with Kojo about everything from why people are taking laptops out of schools, to Microsoft's new surface computer.

2007, May, The "Poets on Poets" section of HCIL faculty Neil Fraistat's Website Romantic Circles was recently featured on the *CBS radio network's Weekend Roundup program.*

2007, April, Campus Emergency Preparedness in the news: Jenny Preece talked with Fox 5 News. Allison Druin talked with *WAMU's* Kojo Nnamdi.

2007, April, HCIL Faculty on the *Kojo Nnamdi Show* Ben Bederson and Allison Druin joined the Tech Tuesday team to talk about tech trends.

2007, March, HCIL faculty Ben Bederson's new company, ZenZui, is making zoomable interfaces for mobile, and showed up in the *Wall Street Journal, Business Week, USA Today, and PC World.*

2007, Spring, Ben Shneiderman drums up press for his new project, 911.gov Proposal for Community Response Grids, appears in *Science, BBC, New Scientist, MIT Technology Review, Discovery Channel, Nature, World Changing, Online Spin, PC World Ars Technica: The Art of Technology, ZD-NET Government, Computerworld, Newsweek International WUSA – TV9.*

2007, February, HCIL/MITH Faculty receive prestigious *Mellon Foundation Award* Matthew Kirschenbaum, Catherine Plaisant and Martha Nell Smith will lead research on a humanities text-mining project called MONK.

2007, January, The International Children's Digital Library is in the news,Thanks to its new partnership with the One Laptop Per Child Foundation ($100 computer project). This includes: *Washington Post.com, ABC News, CBS News, Forbes.com.*

2006, December, UMD Kids Team goes to the White House! Two of our design partners joined the President and First Lady for the Christmas Pagent of Peace to honor our Kidsteam design work on the National Park Junior Ranger program's Webrangers..

2006, December, The Computer Guy & Gal on the *Kojo Nnamdi Show*, Ben Bederson and Allison Druin talked with Kojo on the best new children's tech for the holiday season.

2006, May, *WAMU Kojo Nnamdi Show*, Ben Bederson discusses broadband at home on "Computer Guy – life in the fast lane."

2006, April, *Business Intelligent Network*, Ben Shneiderman and Timesearcher are featured in, "The Surest Path to Visual Discovery."

2006, April, *Pittsburgh Post-Gazette,* Ben Bederson is quoted in, "Experts See Computers Getting Bigger and Smaller at the same time."

2006, March, *Spotfire Webcast,* Ben Shneiderman presents a Spotfire webcast: The Thrill of Discovery – Accelerating Information Exploration.

2006, March, *Baltimore Sun*, Ben Bederson and PhotoMesa are featured in, "PhotoMesa a nifty way to organize photographs."

2006, February, *WAMU Kojo Nnamdi Show*, Ben Bederson is interviewed regarding "Wiki Sites."

2006, February, *Baltimore Sun*, Ben Bederson is quoted in "Spreading the e-word," an article about Sony's new ebook reader e-paper.

2006, January, *Information Week*, Ben Shneiderman profiled with five questions and a portrait.

2006, January, *Washington Business Journal*, Ben Bederson is interviewed in, "What was I doing again?" an article about computer distractions.

2005, November, *c|net News.com*, ICDL is featured in "The 'millenials' usher in a new era," an article about the future of children learning online.

2005, September, *Chicago Parent,* ICDL is highlighted in "Screen time = reading time," an article about children reading books on the computer.

2005, September, *Delphos Herald,* ICDL is mentioned in an article titled "Site Seeing," which highlighted Kid's literature on the internet.

2005, June, *Data Visualization,* Ben Bederson and Ben Shneiderman are mentioned in an article that highlights TimeSearcher.

2005, May, *Associated Press* quotes Ben Shneiderman on social tagging of photos and web pages.

2005, May, *Good Morning America,* Kent Norman talks about Computer RageSpot.

2005, May, *The Washington Post*, Kent Norman talks about Computer Rage.
2005, May, *Rochester Democrat and Chronicle*, Kent Norman is featured in an article about Computer Rage.

2005, May, *America News*, Kent Norman talks about Computer Rage.

2005, April, Ben Bederson's research with Microsoft on the use of PDA's and cellphones is mentioned in *EE Times.* This article was also picked up by *Information Week*.

2005, April, *San Francisco Chronicle*, Kent Norman highlighted in an article about Computer Glitches.

2005, April, *Belo Capitol Bureau,* Kent Norman is interviewed on Computer Rage.

2005, March, Ben Bederson's work is described in *folha equilibrio (Brazil)*, in an article about computer-based distraction.

2005, March, Ben Bederson is interviewed on *Radio City (Ecuador)*, a BBC Affiliate.

2005, March, Ben Bederson is quoted regarding E-Attention Deficit Disorder in *The Statesman (India)*.

2005, March, *MSNBC.com,* Kent Norman talks about Computer Rage.

2005, February, Allison Druin's projects on online books are highlighted in the *Washington Times.*

2005, February, Ben Bederson was quoted on computer distractions in the *North Carolina State Technician*.

2005, February, *The Washington Times*, Kent Norman interviewed in "Fist-clenching anger: Releasing the Steam without Boiling over."

2005, February, *Bloomberg Radio* interviewed Ben Bederson regarding attention and interruptions on the computer.

2005, February, Ben Bederson addresses computer user distractions in the *New York Times.*

2005, February, Allison Druin is featured in *Technology Review.*

2005, February, Allison Druin is featured in *School Library Journal*.

2005, January, *W*USA Channel 9 News*, Kent Norman interviewed about Computer Rage.

2005, January, *San Angelo Standard-Times*, Kent Norman interviewed about Computer Rage.

2004, December, *Baltimore Sun*, Kent Norman featured in "High-tech gifts elevate post-holiday stress."

2004, December, *W*USA Channel 9 News*, Kent Norman interviewed on Computer Rage.

2004, December, *SlashDot.com*, Kent Norman interviewed in "Rage Against the Machines."

2004, December, *WAMU Kojo Nnamdi Show*, Kent Norman was a guest on "Technology Frustrations."

2004, December, *National Public Radio*, Kent Norman is interviewed on Future Tense on the subject of Computer Rage.

2004, November, Allison Druin and Ben Bederson explain email and instant messaging to children on *Maryland Public Television*.

2004, October, *Wired Magazine,* Describes Ben Shneiderman's work on photo annotation.

2004, October, Review of Ben Shneiderman's Leonardo's Laptop in *IEEE-USA: Today's Engineer*.

2004, July, Business Week Online mentions Ben Shneiderman in relation to personal medical devices.

2004, June, Allison Druin was mentioned in *Information Outlook.*

2004, June, Allison Druin participated in a live online discussion on *WashingtonPost.com* regarding the Interaction Design and Children Conference.

2004, June, Allison Druin is mentioned in *Outlook,* on the Interaction Design and Children Conference.

2004, June, Allison Druin is featured in *School Library Journal*.

2004, Spring, Allison Druin's research was mentioned in *Maryland Research*.

2004, May, Allison Druin was highlighted in *Usability News* on Interaction Design and Children.

2004, May, Ben Shneiderman addresses increased attention to usability in a *Federal Computer Week* article.

2004, May, Allison Druin and Ben Bederson were highlighted in the High Tech Education section of the *Baltimore Sun*.

2004, April, *The Gazette* profiles Ben Bederson's work with novel interfaces, including DateLens.

2004, April, Ben Bederson weighs in on internet social networking tool Orkut in *TechWeb* .

2004, January, PDAStreet.com profiles DateLens, a unique calendar interface developed by Ben Bederson.

2004, January Bederson was quoted in an article that mentioned NoteLens and the HCIL in the *New York Times.*

2003, December, Ben Shneiderman was a guest on a *Government Computer News* online forum.

2003, December, A *Baltimore Sun* article on electronic voting cites a study conducted by Ben Bederson.

2003, October, London's *Independent* raves about Treemap and PhotoMesa, tools developed by researchers in the Human-Computer Interaction Lab.

2003, September, Allison Druin was nominated by President Bush to be a member of the National Commission on Libraries and Information Science.

2003, July, *The Indian Express* quotes Doug Oard in an article about a DARPA program to develop rapidly deployable machine translation tools.

2003, April, Ben Shneiderman was quoted in the *Baltimore Sun* and in the *Technology Review*.

2003, March, Ben Bederson was quoted in the *Washington Post*.

2002, December *Baltimore Sun*, "Two study intricacies of voting machines."

2002, November, NPR, International Children's Digital Library featured. All Things Considered, "Library for Kids Goes Online."

2002 October, Association of Computing Machinery interviewed Ben Shneiderman about his new book, Leonardo's Laptop.

2002 September, ComputerSweden reports on Ben Bederson's zooming interface.

2002 July, Ben Bederson highlighted at the Microsoft Research Faculty Summit. DateLens demonstrated during Bill Gates' Keynote Speech

2002 May/June, *Interactions,* "A Photo History of SIGCHI: Evolution of Design from Personal to Public", p.17-23.

2002 Winter, *User Experience*, "Usability for Children is Making Great Strides", Vol. 1, No. 1, p. 20-21.

2002 May, *Internet Archive*, "The International Children's Digital Library: An Executive Summary"

2002 May 12, *WashingtonPost.com*, "Debugging Maryland Balloting"

2002 May 9, *Washtech.com*," A Visual Rather Than Verbal Future"

2002 May 9, *WashingtonPost.com*: Live Online, "Human Computer Interaction Lab at the University of Maryland*:* With Dr. Ben Shneiderman, Dr. Ben Bederson and Allison Druin, HCIL Faculty"

2002 May, *OutlookOnline*, "University Researchers Show Technology's Future"

2001 Fall, *System Solutions* newsletter, "Hendler and Shneiderman debate at ASIS meeting", http://www.isr.umd.edu/ISR/publications/newsletter/ssfa01/Shneiderman-HendlerDebate2.html

2001 November, *acm.org*, Ben Shneiderman's Testimony to House Committee on National Identification Card Systems, http://www.acm.org/usacm/National.htm

2001 October 25, *The New York Times on the Web*, "Inventing a Way to Index 50,000 Memories of the Holocaust"

2001 August, *Convergent Magazine.com*, "Shapers of Our Future 2001"

2001 August, *java.sun.com* features PhotoMesa, "View with a Zoom: Browse and Zoom Digital Images in One Application"

2001 July, *ComputerWorld*, "Treemaps Bloom"

2001 June, *Baltimore Business Journal*, "Maryland children create high tech toy"

2001 June, *WashingtonPost*, "Educational Software Now A Tough Game"

2001 June, *ComputerWorld*, "Software for the 4th Dimension"

2001 May 15, *Outlook*, "Human-Computer Interaction"

2001 May 9, *Computer Sweden*, "Children are the World's Best Program Testers"

2001 May 1, *Outlook*, "Inventions of the Year Announced, Research and Technology Transfer Celebrated"

2001 Spring, *Maryland Research*, "Child's Play: New robot helps kids with disabilities"

2001 April 25, *Fox5 News*, "Look Into The Future ", Report on Latest Hi-Tech Developments, Ben Shneiderman and HCIL mentioned.

2001 April 19, *The Diamondback*, "Program Gives Kids Power of Emotion with the Help of Robotics: Campus research team, started in 1998, is comprised of four students and 9 children"

2001 April 12, *Computerworld Online*, "Experts: Computers slouching toward usability", Quotes by Ben Shneiderman

2001 March/April, *Interactions*, "Cuu: Bridging the Digital Divide with Universal Usability", Ben Shneiderman, p. 11.

2001 March/April, *Interactions*, "Universal Usability Statements: Marking the Trail for All Users", Harry Hochheiser and Ben Shneiderman, p.16

2001 March 31, *The Seattle Times*, "People-friendly computers are researchers' goal", Quote by Ben Shneiderman.

2001 January 15, *U.S. News and World Report*, "Overwhelmed by Tech" Ben Shneiderman and HCIL mentioned on page 34.

2000 December, *Discover Magazine*, "Future Tech: Do children know a better computer when they see it?"

2000 November 11, *Fox 5 News*, "Is Technology Good for Children?"

2000 November 27, *National Public Radio*, *Morning Edition*, "Radio Diary-Allison Druin at the University of Maryland"

2000 November, *Family PC Magazine*, "Wired 2 Play: The Right Interactive Toys Can Help Your Kids Learn and Provide Hours of Fun"

2000 September 24, *RKO Radio*, "Interview: The Ruth Kozlack Show"

2000 August, *University of Maryland, College of Education's Research Partners*, "When children want to know: Enlisting young children in the development of digital libraries makes good sense and good tools"

2000 June 24, *Ohio Blade*, "Tykes are High-tech Experts: Kids Help Design Tomorrow's Toys"

2000 June 20, *Pittsburgh Post-Gazette*, "Children help scientists, engineers design the toys of tomorrow"
2000 May, *Communications of the ACM*, "Pushing Human-Computer Interaction Research to Empower Every Citizen: Universal Usability", Ben Shneiderman, Vol. 43, No. 5, p. 85-91.

2000 April 13, *The Guardian*, "Not Just a Pretty Page"

2000 April 12-18, *San Francisco Weekly*, "Hal? A Stanford Professor Studies How Your Computer is Manipulating You"

2000 April 9, *The Washington Post Magazine*, "The Gee-Whiz Aspect." Quotes by Ben Shneiderman and Kent Norman on technology in the classroom.

2000 March-April, *ACM Interactions*, Interview with Ben Shneiderman and Allison Druin by Elizabeth Dykstra-Erikson, p. 59-65.

2000 March 31, *The Chronicle of Higher Education*, "David Nobel's Battle to Defend the 'Sacred Space' of the Classroom"

2000 February 7, *USA Today*, "Jaw-Dropping Tech Toys Coming to a Child Near You"

2000 January 20, *The Spirit*, “Issues in Education-For Kids, A Wild Web World: Sites Attract Youngsters as Experts Debate where Children should go Online”

2000 January 11, *Les Echos*, “En 2030, le Médicament Informatisé s’Sutoadministrera”

1999 November 9, *University of Maryland Outlook*, “The Power of Pictures: Local Elementary Students Help Design Visually Based Computer Technology for Children,” p. 3.

1999 September, *Sun Microsystems* , interview with Ben Bederson by for their Java website: http://java.sun.com/features/1999/09/bederson.html

1999 August 26, *Dagens Nyheter*, “Datorerna ska lära av barnen” (Sweden's largest Daily Newspaper)

1999 August 24, *Fox News Online*, “PC Behavior: Acting out online”

1999 August 16, *New York Post*, “The Millenium Countdown-Warming Up to Robo-Fido”

1999 June 4, *Channel 8 News*, “Child Experts Help Invent the Future,” Professor Allison Druin.

1999 May 24, *WJFK Radio*, “Interview: What is the Future of Children’s Technology,” Professor Allison Druin.

1999 May 24, *WMAL Radio*, “Interview: New Technologies for Children,” Professor Allison Druin.

1999 May 21, *Pittsburgh Post-Gazette*, “Interactive Barney: Good or Evil—Conference Attendees Worry About Where Computerized ‘Character’ Toys are Going Next,” Professor Allison Druin.

1999 March, *Scientific American*. A profile of Ben Shneiderman appeared summarizing some of his recent accomplishments and ideas. By Tim Beardsley, p. 35.

1998 January 28, *Maryland State of Mind.* This Maryland Public Television segment highlighted HCIL Professor Allison Druin's work with children.

1998 December 30, *New York Newsday*, “Kid Tech: Lab Turn to Experts on Toy Design”, Professor Allison Druin.

1998 December 21, *Baltimore Sun*. An article about HCIL Professors Allison Druin and Ben Bederson’s work with children.

1998 December 2, *The Chapel Hill Herald*, “Expert to Discuss Human-Computer Interactions,” p. 9.

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Directions to Demos 3:30pm – 4:45pm
@ HCIL Lab, 2117 Hornbake Bldg, South Wing