Microsoft Research
Faculty Summit 2010

NodeXL – Social Network Analysis in Excel

Natasa Milic-Frayling, Microsoft Research
Ben Shneiderman, Univ. of Maryland
Marc A. Smith, Connected Action
Interface Design Issues

- Input devices & strategies
  - Keyboards, pointing devices, voice
  - Direct manipulation
  - Menus, forms, commands
- Output devices & formats
  - Screens, windows, color, sound
  - Text, tables, graphics
  - Instructions, messages, help
- Collaboration & Social Media
- Help, tutorials, training
- Search
- Visualization
1) E-commerce & National Priorities
   • Customer loyalty, community formation
   • Disaster response, community safety
   • Health, energy, education, e-government

2) Develop Theories of Social Participation
   • How do social media networks evolve?
   • How can participation be increased?

3) Provide Technology Infrastructure
   • Scalable, reliable, universal, manageable
   • Protect privacy, stop attacks, resolve conflicts
Vision: Social Participation

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Informal Gathering
College Park, MD, April 2009

Article: Science March 2009

Early Steps

National Initiative for Social Participation

Goal: to promote democratically oriented research support and educational opportunities for technology-mediated social participation, especially as related to national priorities

Dwight, May 2009

BEN SHNEIDERMAN

A National Initiative for Social Participation

THE TRANSFORMATIVE POWER OF THE INTERNET IS MORE THAN ACCESS TO INFORMATION: it is increasingly about contributing, collaborating, and participating. Metaphors based on information highways are giving way to community visions that capture the remarkable enthusiasm for user-generated content and social media. At the same time, President Obama is calling for civic service and personal responsibility to rebuild America. Combining these ideas could promote the shift from playful, discretionary internet usage to larger, more serious projects aligned with national priorities such as health care, community safety, education, and innovation.

The good news is that there are many promising social action networks, but these nascent explorations could be greatly accelerated by an organized research program. This program would systematically study the emerging phenomena, determine the sources of success or failure, and disseminate best practices. The payoffs are large enough to warrant an intensive national effort akin to NASA's space program or the National Institutes of Health.

Health discussion groups have long been one of the Internet's success stories. Now, clever entrepreneurs are exploring new social participation ideas with projects such as the www.PatientLikeMe.com Web site, where users offer their medical experiences in the hope of learning about treatment outcomes from one another. At the same time, these users are building a remarkable resource for medical research and discovery. Physicians have already discussed 30,000 cases at www.sermo.com, where they can offer insights on innovative treatments as well as detect unusual disease patterns. Large corporations also recognize the opportunities and are investing money to study distributed decision-making at the Massachusetts Health Venture at Glaxo Health.

Innovation itself is getting recharged by getting social. Open-source software projects are now taken seriously by big companies who claim greater reliability for programs that have been tested and run by millions of users. Open innovation is gaining similar credibility as corporate research directors who post their problems on www.Innovative.com get hundreds of serious solutions from diverse creative types. Wouldn't we all love seeing more recharging of serious solutions from diverse creative types? However, we can do this directly, now, with our education and research communities.

Additional Contributions:

Ben Shneiderman, Univ. of Maryland
Ivan Poyle, PARC
Jenny Pieper, Univ. of Maryland
Ben Bederson, Univ. of Maryland
David Harris, Univ. of Maryland
Harry Hix, Tennessee, USA

Organized by:

BEN SHNEIDERMAN

http://iparticipate.wikispaces.com
## Technology Mediated Social Participation

**U.S. National Science Foundation sponsored workshops**

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All around us, technology-mediated social participation has been harnessed for remarkable social benefits. New thrusts in basic research and engineering are likely to move beyond existing socio-technical media to produce new participatory systems spanning people, computation, communication and action. These developments could produce profound transformations in health care, community safety, disaster response, life-long learning, business innovation, energy sustainability, environmental protection, and other spheres of important national priorities.

### Workshop Information

The west-coast workshop will be held on December 10-11, 2009, at the Palo Alto Research Center (PARC), Palo Alto, California.

[www.tmsp.umd.edu](http://www.tmsp.umd.edu)
International Efforts

Community Informatics Research Network

Page stewards: Aldo de Moor, Larry Stillman

About the CIRN Living Knowledge Base

European Commission Joint Research Centre Institute for Prospective Technological Studies

CHINESE ACADEMY OF SCIENCES

intlsocialparticipation.net
911.gov

- Residents report information
- Professionals disseminate instructions
- Resident-to-Resident assistance


www.cs.umd.edu/hcil/911gov
911.gov

- Residents report information
- Professionals disseminate instructions
- Resident-to-Resident assistance

www.cs.umd.edu/hcil/911gov

Shneiderman & Preece, Science (Feb. 16, 2007)

Amber Alert

www.ncmec.org

www.missingkids.com
Disaster Response & Community Safety

911.gov
• Residents report information
• Professionals disseminate instructions
• Resident-to-Resident assistance

Shneiderman & Preece, Science (Feb. 16, 2007)
www.cs.umd.edu/hcil/911gov
Welcome to Microsoft HealthVault

Take charge of your family's health and make more informed health decisions for yourself and your loved ones. Learn more

HealthVault lets you:
- Organize your health information, with everything in one place
- Simplify your life; enter health info once, use it in many ways
- Gain insight with data that helps you make informed decisions

Create a free HealthVault account

Already have an account? Sign in.
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Find Patients Just Like You

Do you have a life-changing condition? Learn from the real-world experiences of other patients like you.

Join Now! (It's free)

See how PatientsLikeMe can help you take control of your health:

- Share your health profile
- Find patients like you
- Learn from others

“[I] saw my neuro for the first time since joining PatientsLikeMe. Time spent and experience gained on this site armed me with info and made me feel that I had a network quietly supporting me...and it sure felt good.”

– Multiple Sclerosis Community Member
Welcome to Microsoft HealthVault

Take charge of your family’s health and make more informed health decisions for yourself and your loved ones. Learn more.

HealthVault lets you...

- Organize your health information, with everything in one place
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See how PatientsLikeMe can help you take control of your health:

- Share your health profile
- Find patients like you
- Learn from others

Learn how you can reduce your home energy usage and start saving today.

Where do I spend?
Find out where your energy is going and how you compare to others.

How can I save?
Vision: Social Participation

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   • Customer loyalty, community formation
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Network Theories: Evolution models

• Random, preferential attachment,...
• Monotonic, bursty,...
• Power law for degree (hubs & indexes)
• Small-world property
• Forest fire, spreading activation,...
• Matures, decays, fragments, ...

Kumar, Novak & Tomkins, KDD2006  
Leskovec, Faloutsos & Kleinberg, TKDD2007
Network Theories: Social science

- Relationships & roles
- Strong & weak ties
- Motivations: egoism, altruism, collectivism, principlism
- Collective intelligence & action
- Leadership & governance
- Social information foraging

Moreno, 1938; Granovetter, 1971; Burt, 1987; Ostrom, 1992; Wellman, 1993; Batson, Ahmad & Tseng, 2002; Malone, Laubacher & Dellarocas, 2009; Pirolli, 2009
Network Theories: Stages of participation

Wikipedia, Discussion & Reporting

- Reader
- First-time Contributor
  (Legitimate Peripheral Participation)
- Returning Contributor
- Frequent Contributor

Preece, Nonnecke & Andrews, CHB2004
Forte & Bruckman, SIGGROUP2005; Hanson, 2008
Vassileva, 2002, 2005; Ling et al., JCMC 2005; Rashid et al., CHI2006
From Reader to Leader:
Motivating Technology-Mediated Social Participation

Preece & Shneiderman, AIS Trans. Human-Computer Interaction 1 (1), 2009
aisel.aisnet.org/thci/vol1/iss1/5/
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   • Scalable, reliable, universal, manageable
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• Mobile, Desktop, Web, Cloud
• 100% uptime, 100% secure
• Giga-collabs, Tera-contribs
• Universal accessibility & usability
• Trust, empathy, responsibility, privacy
• Leaders can manage usage
• Designers can continuously improve
Footprints of Human Activity

• Footprints in sand as Caesarea
Discovery Process: Systematic Yet Flexible

1. **Own the problem & define the schedule**
2. **Data cleaning & conditioning**
3. **Handle missing & uncertain data**
4. **Extract subsets & link to related information**
• Integrates statistics & visualization

• 4 case studies, 4-8 weeks (journalist, bibliometrician, terrorist analyst & organizational analyst)

• Identified desired features, gave strong positive feedback about benefits of integration

www.cs.umd.edu/hcil/socialaction
NodeXL: Network Overview for Discovery & Exploration in Excel

www.codeplex.com/nodexl
NodeXL: Network Overview for Discovery & Exploration in Excel

www.codeplex.com/nodexl
NodeXL:
Network Overview for Discovery & Exploration in Excel
I. Getting Started with Analyzing Social Media Networks
   1. Introduction to Social Media and Social Networks
   3. Social Network Analysis

II. NodeXL Tutorial: Learning by Doing
   4. Layout, Visual Design & Labeling
   5. Calculating & Visualizing Network Metrics
   6. Preparing Data & Filtering
   7. Clustering & Grouping

III. Social Media Network Analysis Case Studies
   8. Email
   9. Threaded Networks
  10. Twitter
  11. Facebook
  12. WWW
  13. Flickr
  14. YouTube
  15. Wiki Networks
Challenge: Requires Partitioning

• **Easy**: Only need locally connected vertices
e.g. Vertex Degree, Eigenvector centrality

• **Relatively Hard**: Need local & some global graph knowledge
e.g. Fruchterman-Reingold layout

• **Hard**: Need global graph knowledge at each node
e.g. all pairs shortest paths -> betweenness centrality

Udayan Khurana
### Implement and Measure Performance for Fruchterman-Reingold Layout Algorithm

<table>
<thead>
<tr>
<th>GPU</th>
<th>GeForce GTX 285, 1476 MHz, 240 cores</th>
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<tbody>
<tr>
<td>Host CPU</td>
<td>3 GHz, Intel(R) Core(TM)2 Duo</td>
</tr>
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</table>

<table>
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<th>#Edges</th>
<th>F-R run time (seconds)</th>
<th>CUDA F-R run time (seconds)</th>
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</tbody>
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John Locke  
Max Scharrenbroich  
Puneet Sharma

Graphs from STANFORD’S SNAP Library (http://snap.stanford.edu/).
Researchers who want to
- create open tools
- generate & host open data
- support open scholarship

Map, measure & understand social media

Support tool projects to collection, analyze & visualize social media data.
NodeXL
www.codeplex.com/nodexl

Analyzing Social Media Networks with NodeXL
www.elsevier.com/wps/find/bookdescription.cws_home/723354/description

Social Media Research Foundation
www.smrfoundation.org
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Social Media Research Foundation

www.smrfoundation.org

THANKS !!! to Microsoft External Research