Network Visualization: Successful Case Studies

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Human-Computer Interaction Lab &
Dept of Computer Science
State-of-the-art network visualization
Node Placement Methods

- Node-link diagrams
  - Force-directed layout
  - Geographical map
  - Circular layout
  - Temporal layout
  - Clustering
  - Layouts based on node attributes
- Matrix-based
- Tabular textual
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- Tabular textual
1) NVSS: Semantic Substrates

- Group nodes into regions
  According to an attribute
  Categorical, ordinal, or binned numerical

- In each region:
  Place nodes according to other attribute(s)

- Give users control of link visibility
Force Directed Layout

36  Supreme & 13  Circuit Court decisions
268  Citations on Regulatory Takings 1978-2002
Network Visualization by Semantic Substrates

NVSS 1.0
Filtering links by source-target
Filtering links by time attribute (1)
Network Visualization by Semantic Substrates

- Meaningful layout of nodes
- User controlled visibility of links
- Cross refs in 11 Circuit Courts (green) + few refs to District Court cases

www.cs.umd.edu/hcil/nvss
Network Visualization by Semantic Substrates

NVSS 2.0

with Substrate Designer
2) SocialAction: Integrating Statistics & Visualization

Senate 2007: 180 out of 310 Votes in Common
Social Action: 2007 Senate Votes

290 out of 310 Votes in Common
Social Action: HealthCare Directors
Social Action: PubMed related refs
SocialAction: Overview of Global Jihad Network
Filtering by Betweenness ("Gatekeepers")
Details on Demand (Mohamed Atta)

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Network Visualization:

[Image of a network visualization with nodes labeled and connected by lines.]

[HCIL logo]
Evaluation Method

Ethnographic Observational Situated

- Multi-Dimensional
- In-depth
- Long-term
- Case studies
Evaluation Methods

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Domain Experts & Communities Doing Their Own Work for Weeks & Months
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MILCs

Shneiderman & Plaisant, *BeLIV workshop*, 2006
MILC example

- Evaluate NVSS

- Focused on semantic substrate layouts
- 2 case studies, 2-16 months (political scientists, bio-diversity researcher)
- Identified guidelines for substrate design, gave researchers new language for discourse, clarified benefits & limitations of semantic substrates

Aris & Shneiderman, *Info Vis J*, 2007
MILC example

- Evaluate SocialAction

- Focused on integrating 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

Perer & Shneiderman, CHI2008
Case Study Methodology

1) Interview (1 hr)
2) Training (2 hr)
3) Early Use (2-4 weeks)
4) Mature Use (2-4 weeks)
5) Outcome (1 hr)
Take Away Messages

New visualization strategies:
+ Network Visualization by Semantic Substrates
+ SocialAction

New evaluation method:
+ Multidimensional In-Depth Long-term Case Studies

www.cs.umd.edu/hcil/nvss
www.cs.umd.edu/hcil/socialaction

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