Network Visualization to Support Exploration of Supreme Court Decision Patterns

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Outline

• Graph Drawing Aesthetics
• Node Placement Methods
• Exploring Court Cases
• Semantic Substrate Approach
• Demo
• Conclusion
• Credits & Information
Graph Drawing Aesthetics

- Minimize link crossings
- Draw links as straight as possible
- Maximize minimum angle
- Maximize symmetry
- Minimize longest link
- Minimize drawing area
- Centralize high-degree nodes
- Distribute nodes evenly
- Maximize convexity (of polygons)
- Keep multi-link paths as straight as possible
- …

Source: [9] Davidson & Harel
Node Placement Methods

**Force-directed**
- Visual Thesaurus

**Circular**
- Schemaball

**Clustering**
- Vizster

**Temporal**
- Historiographic mapping

**Geographical Map**
- SeeNet

**Our approach**
- Place nodes based on node attributes
- Create an artificial map for the data: “Semantic Substrate”
- Prototype tool: NVSS
Exploring Court Cases

• One type of court case:
  – regulatory takings cases

• Federal Courts
  – Supreme Court
  – Circuit Courts
    • 1st-11th Circuit, DC Circuit, Federal Circuit
  – District Courts
    • Under the jurisdiction of circuit courts
Data Set Characteristics

• Complete dataset (refined version):
  – 2345 court cases; 14,388 citations

• Subsets analyzed:
  – 1) Supreme & Circuit Court cases cited more than 45 times:
    • 49 cases (36S+13C); 368 links
  – 2) All Supreme cases, Circuit cited > 15, District cited > 2
    • 287 cases (52S+112C+123D); 2032 links
Semantic Substrate Approach

Place nodes according to node attributes

Example:
• Court cases
• Grouped into Supreme and Circuit Court cases
• Placed from left to right in increasing time
Semantic Substrates in NVSS

• Using node attributes:
  – Group nodes into regions
  – Place nodes within regions

• Provide control on visibility of links
Filtering on time attribute

- Choose a region
  (ex: check “Circuit”)
- Restrict time
  (ex: 1991-1993)
- Examine outgoing links from the subset of nodes
NVSS Demo

Network Visualization by Semantic Substrates
Conclusion

• Semantic substrates promise
  – Increased understanding and better insight due to:
    • Instant perception of groups
    • Comprehensible layout
    • Rapid exploration of link patterns with filters

• Future Work:
  – Better support for substrate creation
  – Enhanced filtering mechanism
  – New approaches for displaying links
  – Scalability
  – Evaluation via case studies
Credits & Information

- Researchers
  - Aleks Aris
  - Prof. Ben Shneiderman

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- Collaborators
  - Prof. Wayne McIntosh
  - Stephen Simon
  - Ken Cousins
  - Cite-It team members

For more information:
http://www.cs.umd.edu/hcil/nvss

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