Network Visualization to Support Exploration of Supreme Court Decision Patterns

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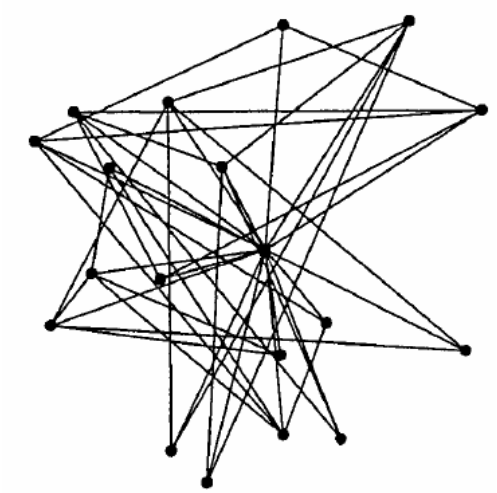
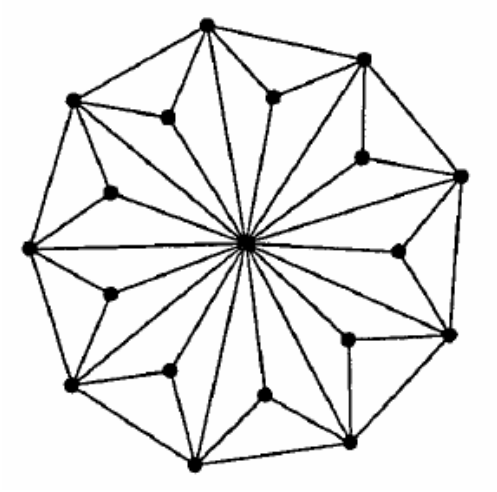
Outline

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

Graph Drawing Aesthetics



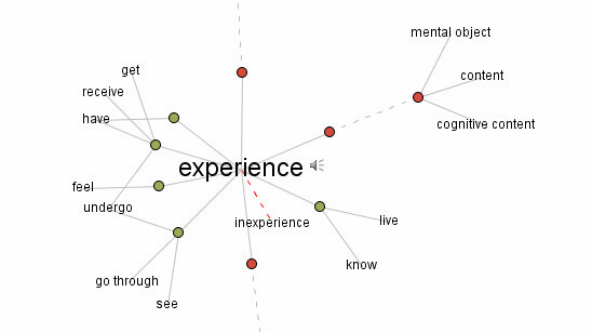


- Minimize link crossings
- Draw links as straight as possible
- Maximize minimum angle
- Maximize symmetry
- Minimize longest link
- Minimize drawing area
- Centralize high-degree nodes
- Distribute nodes evenly
- Maximize convexity (of polygons)
- Keep multi-link paths as straight as possible
- …

Source: [9] Davidson & Harel

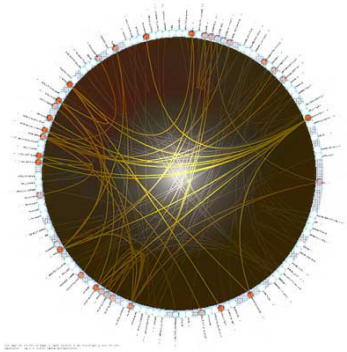
Node Placement Methods

Force-directed



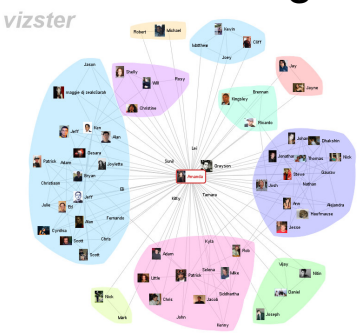
Visual Thesaurus

Circular



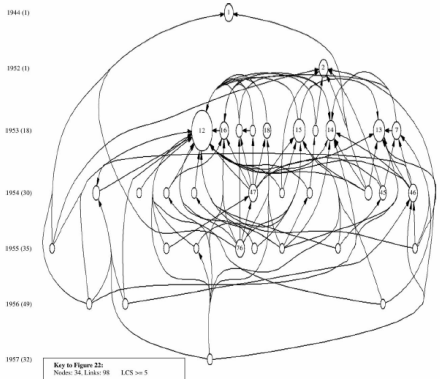
Schemaball

Clustering



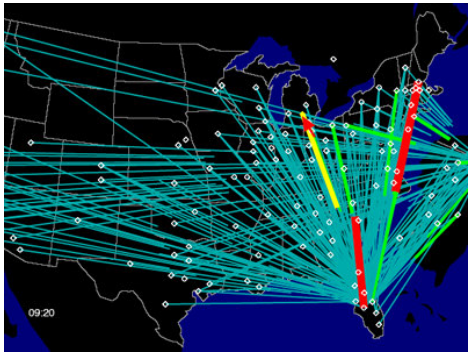
Vizster

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

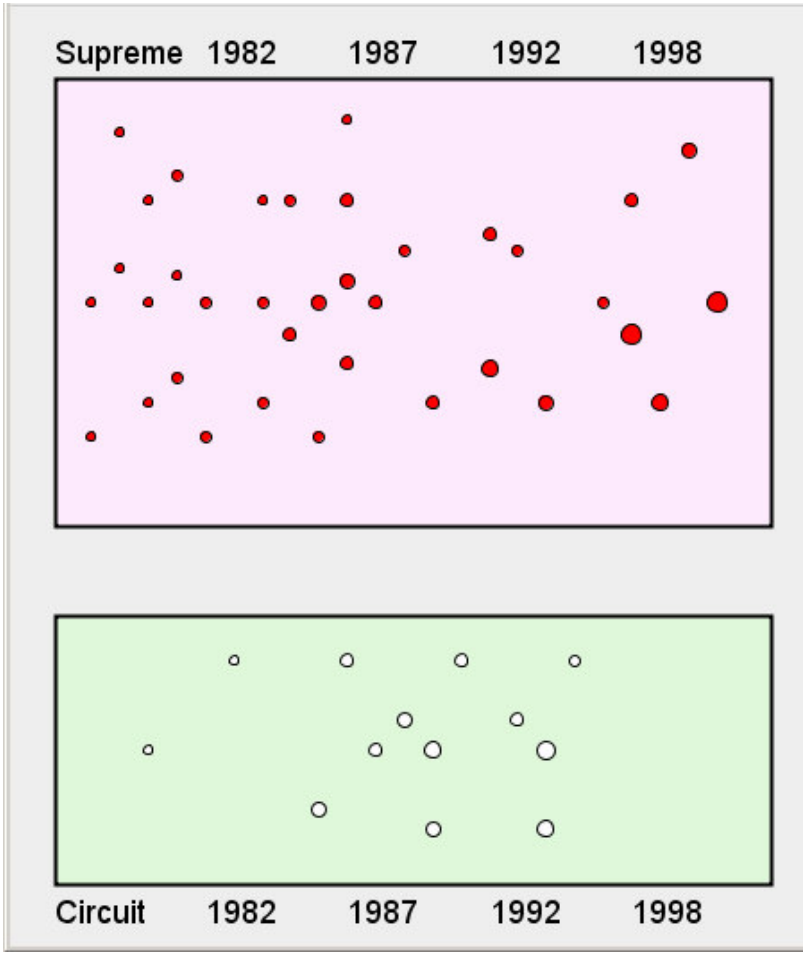
- Complete dataset (refined version):
  - 2345 court cases; 14,388 citations
- Subsets analyzed:
  - 1) Supreme & Circuit Court cases cited more than 45 times:
    - 49 cases (36S+13C); 368 links
  - 2) All Supreme cases, Circuit cited > 15, District cited > 2
    - 287 cases (52S+112C+123D); 2032 links

Semantic Substrate Approach

Place nodes according to node attributes

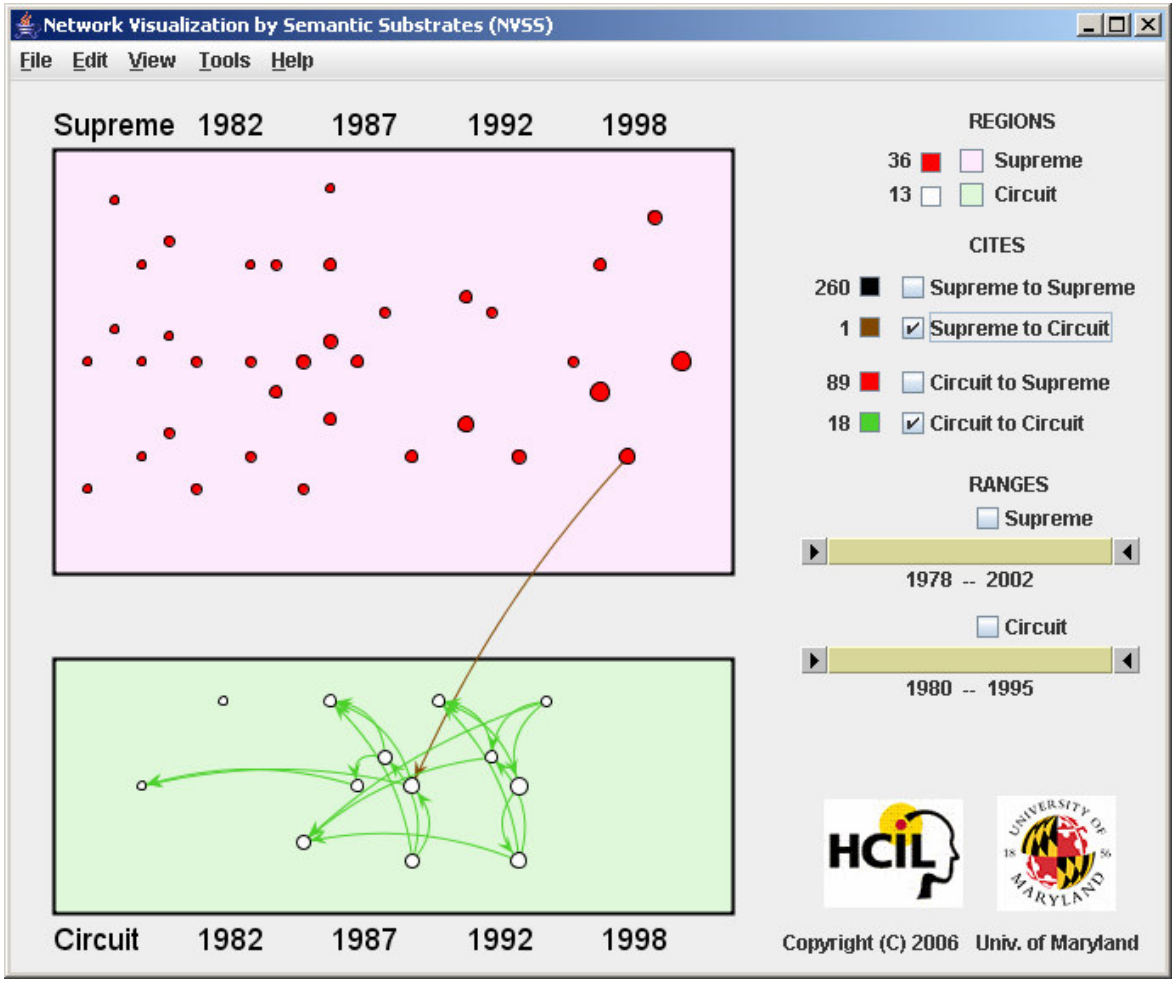
Example:

- Court cases
- Grouped into Supreme and Circuit Court cases
- Placed from left to right in increasing time



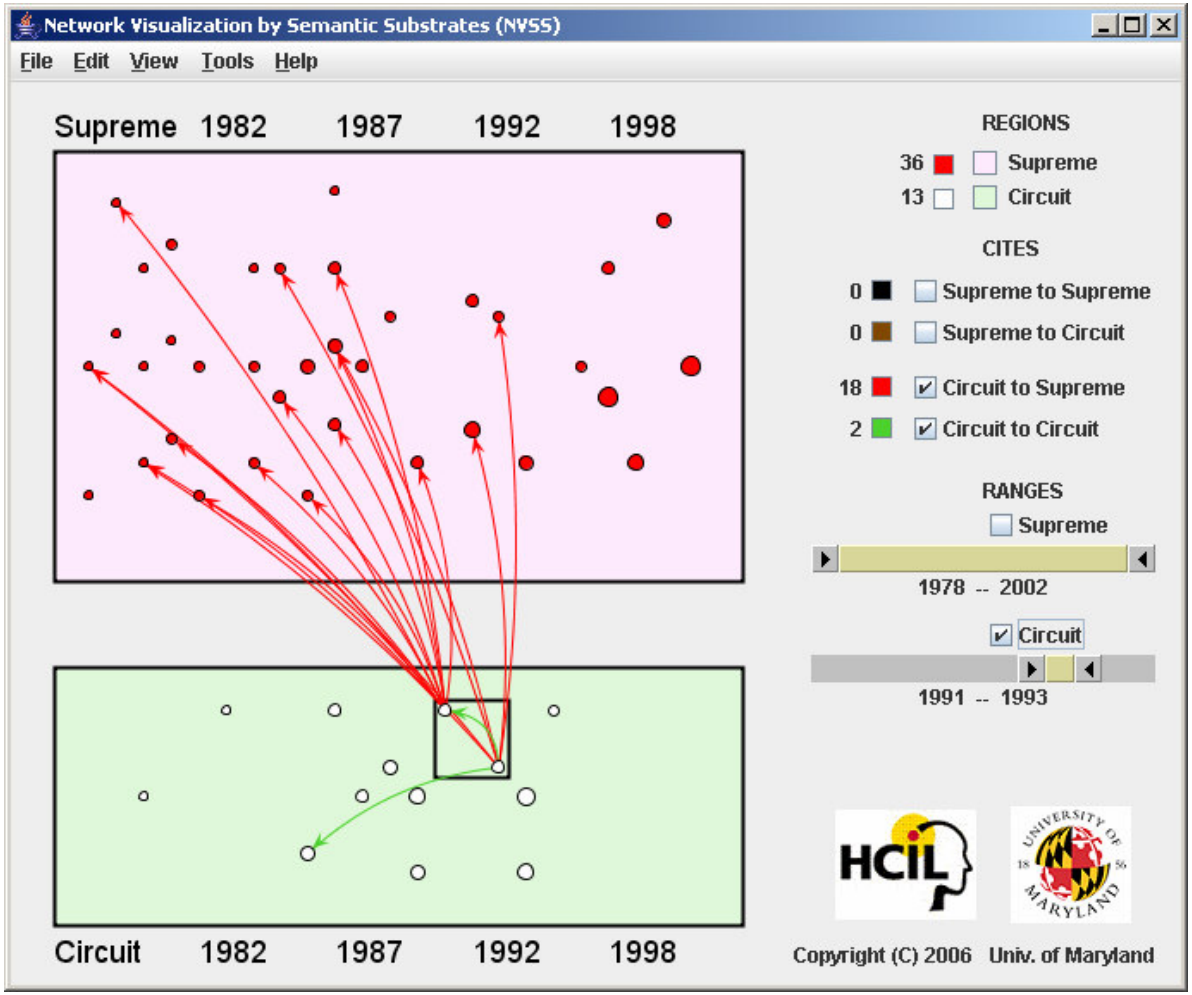
Semantic Substrates in NVSS

- 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 **V**isualization by **S**emantic **S**ubstrates

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
- Partial funding provided by
  - U.S. National Science Foundation

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

For more information:

http://www.cs.umd.edu/hcil/**nvss**