Network Derived Educational Visualizations of the Work of the United States Supreme Court

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NetSci: International Workshop and Conference on Network Science
Bloomington, Indiana
May 24, 2006
Research Questions

1. How can network graphing and information visualization techniques improve the understanding of the work of the United States Supreme Court?

2. What visualizations make the knowledge of experts quickly available to novices?
Part I: Ideological Landscape of the Justices

Learning Objective: Students will understand the voting associations of the Justices of the Supreme Court and the ideological divide suggested by these associations.

Audience: (1) Law Students, (2) Political Science Students, (3) All Non-Experts of the work of the Supreme Court.

Similar Work:

9 Justices of the Supreme Court
1993-2004 Terms

1st time in history the same 9 justices have served an entire decade together.

1972 = Year Appointed
47 = Age On Start Date
80 = Age On Sept. 3, 2005
Mean Age On Sept. 3, 2005 = 71
By Whom Appointed

Richard M. Nixon
1969-1974
Republican

Gerald R. Ford
1974-1977
Republican

James E. Carter
1977-1981
Democrat

Ronald Reagan
1981-1989
Republican

George H.W. Bush
1989-1993
Republican

William J. Clinton
1993-2001
Democrat

1972
1975
1981
1986
1988
1990
1991
1993
1994

Rehnquist
Stevens
O'Connor
Scalia
Kennedy
Souter
Thomas
Ginsburg
Breyer

NIXON
FORD
REAGAN
REAGAN
REAGAN
H.W. BUSH
H.W. BUSH
CLINTON
CLINTON

- Appointed by a Republican
- Appointed by a Democrat
Representation of O’Connor as a Swing Vote

New York Times Representational Device:

- Justices listed in linear fashion along a political spectrum (progressive to conservative)
- Justices in losing voting block are grayed-out.

“Roberts would replace the late Chief Justice William Rehnquist, who had been the court’s conservative anchor for 33 years.”

“The next nominee would seek to succeed retiring Justice Sandra Day O’Connor, who often has been the swing vote on the nine-member court.”

Source: New York Times, July 2, 2005

Frequency of Voting Blocks in 5-4 Cases
(1994 - 2003 Supreme Court Terms)

Total 5 to 4 Cases = 175

Contrast: 292 / 823 (36%) are unanimous

Source: Statistics harvested from the Harvard Law Review

(Out of 823 total)
Agreement between pairs of justices by percentage in non-unanimous cases, 1994 to 2003 terms.

### TABLE I (continued)
#### (B2) VOTING ALIGNMENTS — NON-UNANIMOUS CASES

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**July 2, 2005 New York Times**

**Agreement Among Supreme Court Justices**

Percentage of times that justices agreed in non-unanimous cases from the 1994-95 term through the 2003-04 term.

Justice Sandra Day O'Connor was near the center of the court and was a swing vote on abortion and a host of other social issues.

Justices Antonin Scalia and John Paul Stevens were the least likely to be on the same side of a case, agreeing in only 14 percent of cases. Justices Scalia and Clarence Thomas had the highest agreement rate at 79 percent.

Sources: Legal Affairs, Harvard Law Review

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**The New York Times**
Fully Connected Graph
Layout with Spring Force Algorithm

Voting frequencies represented as the edge weight between nodes and presented visually as a graph. (Rendered with Pajek using a stochastic, spring force algorithm.)
2nd Opinion – Layout with MDS using R
Thresholding (Voting Together > 50%) Reveals Ideological Cliques
Thresholding (Voting Together > 49%) Reveals Ideological Cliques
Additional Work
(Less Well Known Stories)

Use the taxonomy of case types in the Table of Contents to aggregate voting associations by individual topics.

Freedom of Speech & Expression
Part II: Visual Explanations of Individual Cases

Learning Objective: Students will quickly understand the facts, legal issues, voting, topic assignments, and procedural history for each case.

Audience: (1) Law Students, (2) Political Science Students, (3) All Non-Experts of the work of the Supreme Court.

- Most complex case of the 2004 term
- 5 – 4, 5 – 4 Decision (Two Main Opinions)
- Numerous Dissents
- Need a Map of these Joining Relationships

**Holdings:** The Supreme Court, Justice Stevens, delivering the opinion of the court in part, held that:

1. federal sentencing guidelines are subject to jury trial requirements of the Sixth Amendment; and

2. in an opinion by Justice Breuer, delivering the opinion of the court in part, held further that Sixth Amendment requirement that jury find certain sentencing facts was incompatible with Federal Sentencing Act, thus requiring severance of Act's provisions making guidelines mandatory and setting forth standard of review on appeal;

3. proper standard of appellate review for sentencing decisions was review for unreasonableness; and

4. holdings as to Sixth Amendment applicability and remedial interpretation of the Sentencing Act were applicable to all cases on direct review.

Judgment of the Court of Appeals affirmed and remanded; judgment of the District Court vacated and remanded.

Justice Stevens dissented in part and filed opinion in which Justice Souter joined and Justice Scalia joined in part.

Justice Scalia dissented in part and filed opinion.

Justice Thomas dissented in part and filed opinion.

Justice Breyer dissented in part and filed opinion in which Chief Justice Rehnquist, Justice O'Connor, and Justice Kennedy joined.

STEVENS, J., delivered the opinion of the Court in part, in which SCALIA, SOUTER, THOMAS, and GINSBURG, JJ., joined. BREYER, J., delivered the opinion of the Court in part, in which REHNQUIST, C.J., and O'CONNOR, KENNEDY, and GINSBURG, JJ., joined. STEVENS, J., filed an opinion dissenting in part, in which SOUTER, J., joined, and in which SCALIA, J., joined except for Part III and footnote 17. SCALIA, J., and THOMAS, J., filed opinions dissenting in part. BREYER, J., filed an opinion dissenting in part, in which REHNQUIST, C.J., and O'CONNOR and KENNEDY, JJ., joined.
United States v. Booker, Voting Blocks

Opinion: Part 1

Opinion: Part 2
Network Graphic Approach to Booker

Opinion: Part 1
Stevens

Dissent
Breyer

Opinion: Part 2
Breyer

Dissent
Scalia

Dissent
Thomas

Except Footnote 17, Part IV
Part III: Topic Space of the 2004 Term

Learning Objective: Students will understand what topics were considered for any particular term, how those topics relate to each other, and how the current term fits the overall trend in topics covered by the Supreme Court from 1944 to the present.

Audience: (1) Law Students, (2) Political Science Students, (3) All Non-Experts of the work of the Supreme Court.
2004 Supreme Court Term West Topic Space
(Procedural Topics Removed)

Criminal Matters (Life & Limb)

Business Matters (Property)
Part IV: 60 Years of West Topic Assignments

**Learning Objective:** Using a base-map as a common reference point on which additional information is layered, students will learn trends and patterns about the frequency and types of cases heard by the Supreme Court.

**Audience:** (1) Law Students, (2) Political Science Students, (3) All Non-Experts of the work of the Supreme Court.
About the Dataset

- Co-occurrence counts of topics assigned by West Publishing to United States Supreme Court cases
- October 1944 - July 2005
- 7,948 unique cases
- 19,789 topic assignments
- 405 top level topics in the West taxonomy
- 290 appear in Supreme Court cases during this time period.
- 289 co-occur with other topics (all but Reference)
- 3743 unique topic pairings (out of a possible 83,521 (289 * 289))
- Sparse matrix


356 Slaves
356 k24 k. Abolition of Slavery; Peonage.

Record contained sufficient evidence of physical or legal coercion to support conviction for holding mentally retarded men on farm in involuntary servitude and conspiring to interfere with their Thirteenth Amendment right to be free from involuntary servitude.

91 Conspiracy
91ll Criminal Responsibility
91ll(A) Offenses
91k29.5 Conspiracy Against Exercise of Civil Rights
91k29.5(2) k. Rights or Privileges Involved.
(Formerly 91k29.6)

Statute prohibiting conspiracy to interfere with right secured by Constitution or laws of United States incorporates prohibition of involuntary servitude contained in Thirteenth Amendment.

361 Statutes
110 Criminal Law
Problem:

• There are three types of West top level topics:
  – Procedural (green)
  – Factual (red)
  – Doctrinal (blue)

• The three types can co-occur in a wide variety of cases.

• For instance, procedural topics may co-occur with just about any factual or substantive topic.
Approach 2

- Use the “Topics By Specialty” assignments in West’s Analysis of American Law to create a topic map.

- Problem: Some topics are still assigned to too many top level substantive categories.

- Remove the most tenuous, multiple, subject assignments that pull everything to the center:
West’s Topics by Specialty as a Network
Approach 3:
The above image represents all topics identified as doctrinal and assigned to law School class subjects. These were then subjected to a double treatment. (1) Each of the 55 classes was paired with its most frequently occurring subjects. (2) The graph was reduced to an edge weight exceeding 10 case co-occurrences.
PCA, Doctrinal Subjects Aggregated to Law School Course Offerings
Concept Maps Used in the Field of Education


Benefits of Computer-Based Collaborative Learning Environments

A. By spatially navigating bibliographic data, is the underlying structural organization of the domain conveyed to the user?

B. Does this lead to better problem solving in the domain?

C. Is the user able to infer something about an unknown topic based on its proximity to topics with which he/she is already familiar?
THE END