

# Connect to Congress

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## ABSTRACT

We describe a prototype of an interactive visualization system designed to provide insights into congressional voting patterns. Connect to Congress is a multi-view system that provides the capability not only to look up specific data but also to conduct high level analyses of voting and cosponsorship patterns as they evolve over time.

**KEYWORDS:** Visualization, Information Visualization, Visual Analytics, Grand Challenges, Politics, Congress, Voting

**INDEX TERMS:** H.5.0 [Information Interfaces and Presentation]: General; J.0 [Computer Applications]: General

## 1 INTRODUCTION

Members of the *IEEE Infovis 2008 Grand Challenges Panel* [1] outlined an ambitious research agenda for the InfoVis community including a challenge called “Total Political Transparency.” The goal of the challenge is to reduce government corruption through civilian oversight, by granting the public easy to use, synthesizable information regarding areas such as “campaign contributions, voting records, redistricting, earmarks,” and so on.

Although much of this data is already available in theory, it is so difficult to find that it can take hours to find a representative’s voting record for a particular piece of legislation, leaving the public to rely on the media’s reporting of that information, a potentially unreliable source.

The Connect to Congress project aims to provide visualization tools to enable civic exploration of congressional voting records. Specifically, we believe that Connect to Congress must be able to answer complex questions like, “Did congressional voting patterns change in the lead-up to the previous election, and if so, how?” Connect to Congress retains the ability to easily look up the results of specific votes by bill or by member of Congress while providing a simple interface for understanding the overall pattern of votes.

## 2 DATA

We populated our database with data from the 110<sup>th</sup> Congressional Session (January 2007 through December 2008) and the 111<sup>th</sup> Congressional Session through April 3, 2009. Specifically, we retain all information related to every roll call vote which took place, every bill and amendment proposed, all of the titles, actions, and statuses associated with each of those bills and amendments, all of the sponsors and cosponsors for each of the bills and amendments, and all of the people in Congress along

with their committee assignments and positions. This data was obtained from GovTrack[2], an open-source website which scrapes the data daily from the THOMAS website.

We feel that we only obtained the minimum amount of data necessary in order to investigate the votes which took place in Congress during this period of just over two years. However, the resulting data, including meta-data (such as the summary of a bill or an amendment) is over 1.4 million rows in our database, with approximately 6.8 million values in the tables. The THOMAS website, and GovTrack both have data going back to 1989, resulting in over 16 GB of raw data. Although we would have liked to include all of this data, we believe that we retained sufficient data for a proof-of-concept implementation.

## 3 RELATED WORK

Govtrack.us provides a single, static visualization called the political spectrum. This visualization is a Singular Value Decomposition run on a filtered data set of bills proposed during the 110<sup>th</sup> Congress based on cosponsorship. Although the GovTrack political spectrum provided the inspiration for our political spectrum, we believe that several of our improvements to the visualization are significant.

GovTrack’s political spectrum provides a final analysis for the 110<sup>th</sup> Congress while our system allows the user to explore the evolution of the data over time. For example, two Senators may have very different records over a two year period, but a very similar record over a given two week period. Our system will allow this kind of insight. Further, our political spectrum view utilizes two axes enabling simultaneous analysis of both cosponsorship data and voting data. Our equalizer view provides a different view of the same data enabling easier comparisons between individuals while retaining context.

SocialAction[3] also integrated statistics and visualization to observe Senatorial voting patterns, yielding similar results. However, much like the GovTrack spectrum, SocialAction provided a view over only one period of time. Additionally, because of the graphing technique selected which relies on visualizing edge strengths, the users had to filter out a large amount of data in order to retain a usable visualization. Different filtering levels yield different visualizations, thereby opening the system up to potential manipulation.

## 4 SYSTEM OVERVIEW

Although our system does retain tabular and textual views as well as additional visualizations, discussion of those views is outside of the scope of this poster. Instead, we focus on the Political Spectrum and Equalizer views.

### 4.1 The Political Spectrum

The spectrum view in our system provides users with an overview of the voting and cosponsorship patterns of members of congress. Each circle in the spectrum view is a member of congress. In accordance with the other views in the system, color encodes a member’s party—red for Republicans, blue for Democrats and black for independent (or someone whose party information is

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anomalous or has changed). The horizontal axis represents the voting history, while the vertical axis shows the cosponsorship. The distance between two people is a measure (utilizing Singular Value Decomposition) of dissimilarity in their voting and cosponsorship patterns. It should be noted that the absolute position of a data point does not have any explicit meaning. Rather, the distance between points is the aspect of importance.

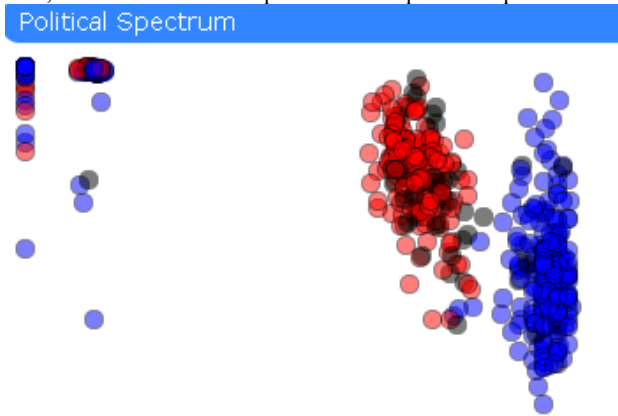


Figure 1. A typical two week period displayed in our Political Spectrum

Each frame of the spectrum contains data for a two-week period beginning January 4th of 2007 through April 3rd of 2009. Using a horizontal slider, a user can move through the two-week intervals. We animate the transition between time periods using linear interpolation to ease tracking different entities between frames. Clicking a data point causes the point of interest to be highlighted by changing its color to green and updates other coordinated views such the Equalizer. In this way, the user can both see the context and focus on the details.

Using our political spectrum, the user can quickly get a general idea of how much overlap there is between parties with respect to both voting patterns and cosponsorship, while conducting exploration of interesting individuals. For example, once users have become acclimated to a “typical” two week period’s (see Figure 1) visualization, they could easily identify the two week period encompassing September 30, 2008 as anomalous (see Figure 2). This is the two week period in which financial markets experienced a precipitous drop immediately following the results of the Congressional vote on a financial bailout plan, leading to a period of strong bipartisanship in Congress.

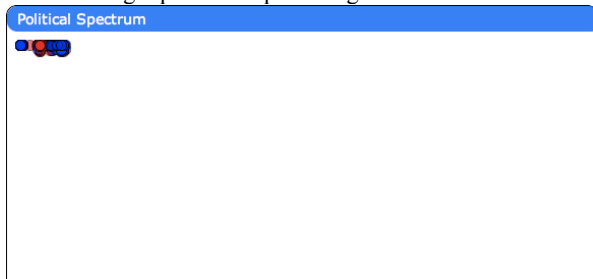


Figure 2. The two week period including a major financial market collapse (September 30, 2008)

#### 4.2 The Equalizer

The equalizer view provides an alternative visualization of the political spectrum enabling a kind of drill-down. The best way to

understand the equalizer is through the metaphor to a stereo equalizer. The first person selected in the political spectrum becomes the baseline. We then render a thin, party-colored (i.e. Republicans are red, Democrats are blue, Independents are gray) line for each other person in the Political Spectrum. The height of these lines is determined by the distance between that person and the baseline representative. Future work will include ordering these vertical lines along multiple data dimensions.

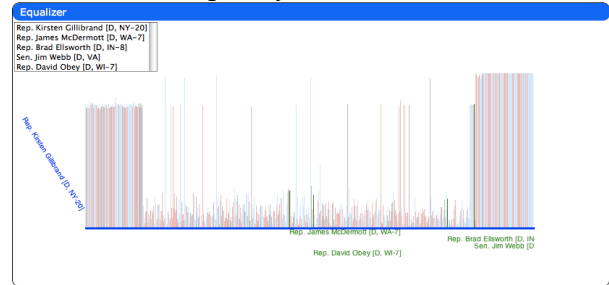


Figure 3. The Equalizer View

The equalizer metaphor, therefore, works well, since shorter (quieter) lines mean that the person in question is relatively similar to the baseline and, therefore, almost indistinguishable. On the other hand, taller (louder) lines mean that the person is very different from the baseline representative.

Both the political spectrum and the equalizer are connected to the same controller so that the user can easily track changes over time both between specific (selected) congress persons and within the overall context of voting and cosponsorship.

Further selections in the political spectrum highlight those individuals in the equalizer. The user can then double-click on any individual selected in the list to make that person the new baseline, thus enabling different kinds of comparisons.

Using the equalizer view during the Presidential primary elections would be sure to provide insights regarding similarity or dissimilarity of candidates who have Congressional voting history.

The political spectrum, therefore, enables high-level analysis of overall voting patterns in Congress and provides a starting point for exploratory analysis. The equalizer view, on the other hand, enables easier comparison of one person against many. The clusters visible in the political spectrum remain visible in the Equalizer view, and highlights (through selection) enable comparison of individuals to the baseline while retaining the fainter lines for context.

#### 5 CONCLUSIONS

Connect to Congress is an information visualization tool that facilitates exploration of members of congress. We have incorporated a number of views that provide rapid lookup of specific data while providing easy to understand, high level analytical tools. Accompanying video materials demonstrate the power of the system for exploratory analysis.

#### REFERENCES

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