truInfluence

Information Visualization of Funding Bills

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Abstract - **truInfluence is a web-based data visualization tool that provides a holistic view of federal campaign financings influence on the political system. Bills are mapped on a scatter plot according to the funding voters received from organizations that have a stance on the bill. A supporting visualization maps the respective legislator votes and funding. The tool provides a holistic view to enable users to decipher if there is an issue and measure if future solutions are effective.**

I. INTRODUCTION

truInfluence is a web based data visualization that provides a holistic view of federal campaign financing influence on the political system. As the 2016 elections are nearing, politics seems to be at the center of attention for nearly everyone in the United States. Majority of the Americans – 84%– believe money has too much influence on the political campaigns today, according to the New York Times/CBS News Poll. 55% of the Americans think that the candidates who eventually win and hold a public office promotes policies that directly benefits the individual or organization. But currently there is no easy way to prove that this is actually the case.

Exploring a candidate's campaign funding's influence on the political system require time and deep investigation to find correlations between different variables. Existing tools, such as the Sunlight Foundation's Influence Explorer, do not provide an overall assessment. Campaign funding includes monetary contributions from individuals and organizations in support of specific candidates. The difficulty in finding correlations in the dense data that exist is a problem for individuals, activists, researchers, and journalist who are interested in exploring the topic and creating legislation to protect the system against potential corruption. Solving this problem is important because it would help researchers analyze with quantitative data if the issue is real and serious enough to attempt to fix, as well as provide an interface to later measure if the solutions are effective. The goal of truInfluence is to create a data visualization that serves this purpose.

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II. RELATED WORK

Various organizations including the Sunlight Foundation, Maplight, and The National Institute of Money in State Politics have developed tools to combat the same problem. One popular strategy has been creating a web platform where users can look up an organization or individual and see who they have donated to. Other platforms will inform you of a politician or organization's position and of general bill voting data. Using these tools require having to aggregate information from many different sources to find correlations. truInfluence attempts to take all of this data and with a holistic visualization allow users to explore how campaign funding may influence legislation and to what scale.

Maplight U.S. Congress - This tool aims to connect money to bill votes by mapping campaign funding to legislator votes. The data sets include campaign contributions given to each member of Congress, how members of Congress voted on each bill, and which interest groups and companies support and oppose key bills and presents the data for each bill in a table and bar chart form. This tool accomplishes the goal of our project from a detailed view, but what we hope to add to this work is a holistic view, giving viewers an idea of whether funding influences votes within a couple minutes of exploration. This form of view is not provided by Maplight or by similar tools such as Open Secrets, Follow the Money, or the Sunlight Foundation's Influence Explorer.

Predicting Congressional Votes Based on Campaign Finance Data - This paper provides the first quantitative analysis of if donations are for political votes by attempting to predict results based off of that assumption. Predictions are made by training a classification model on legislators with knowledge of who donated to them and how they voted. The classification model is then tested on the remaining legislators and the results of both groups are assessed for their accuracy. The findings were that a relationship between donations and votes was not identified. However there was a strong correlation between political party and financial contributions and most politicians tended to vote in line with their political party. This study notes the importance of considering other factors and prompts the exploration of campaign funding with grouping by political parties to further investigate money's influence on politics.

Campaign Financing For the U.S. House of Representatives: An Interactive Web Map
In this paper the author presents a new form of data visualization for campaign funding. As noted in our introduction, most campaign funding visualizations are presented in the form of tables or bar chart. This project explores a spatial representation of the data mapping the geographic origins of contributions and location of expenditures. The results, validated by survey, was that users preferred the engaging form of the interactive map over the tables and data, however upon reading we felt the results lacked measurements for the effectiveness of this form of visualization. The preference of something more engaging than tables and charts is taken into account while we explore our visualization options.

Legislative Explorer - This project interactively visualizes more than 250,000 congressional bills and resolutions assisting users in discovering how bills become laws. The intuitive interface for watching as a bill is introduced, moved through congress, and made a law while including factors of time and political party makes this visualization an inspiration piece for truInfluence. The work is not only engaging for what is often a dry topic, but is also effective in using data to show how a political system works.

III. DATA ANALYSIS AND ABSTRACTION

This visualization required a data structure collated from three disparate datasets, first, the **Organization's position on Bills**. Organizations will either support, oppose or have no take on the bills which comes up in the House of Representatives and the Senate. We call this as taking a position on the bills. There is a no precise or authentic data set available currently which captures this result. Closest information which we have found is a dataset from MapLight.org Bill Position API where their team of researchers have gone through bills which have been come up in the session and compared it against articles, statements or letters published by organizations in public records. For a given organization, the API returns which bills the organization took a position upon, the position they took (i.e., support or oppose), and citations of publications that MapLight used to determine their position. For a given bill, the service returns organizations that took a position and the position they took, with citation, and a category code for the organization. This does still not cover every organization which have an interest in it.

Second **Legislator funding by Organization**, this contains contributions made by organizations/individuals towards the campaign funding for the candidates. We specifically considered for the funding made by the interested groups only for the candidates who have been elected.

Third **Legislator votes on Bills**, votes casted by the legislators (elected candidates) on the bills present in the House of Representatives or the Senate. This data provides the view who supports or opposes a bill.

Attributes	What it means?	Sample	Attribute Type
Bill ID	The unique id of the bill	106439	Categorical
Bill Type	How the bill was passed in Senate, Joint Resolution	HR, S, HRes	Categorical
Bill Title	Describes what the bill is about	Proposing a balanced budget amendment to the Constitution of the United States.	
Bill Num	Bill Id among where the bill originated	1	Categorical
Session	Session of the parliament		Categorical
Bill Status	Bill Passed or Failed	PASSED	Categorical
Money in Support	Amount of money received from supporters of bill	$2982389	Quantitative
Money in	Amount of money received	$82389	Quantitative

Oppose	from opposers of bill		
Interest Group	The bill belongs to which sector of the industry	Taxation, Agriculture	Categorical

Data collated from Maplight

Along with these, there are some additional details about the Bill such as which industrial sector does this bill affect (for e.g. Agriculture, Taxation, Telecommunication, Law) for a bill, session, title, description. The bulk data is available through the Maplight Foundation's and Govtrack.us organization's data repository in JSON. We collated all these files together into one csv file using python scripts.

IV. TASK ANALYSIS AND QUESTIONS

The overarching question for this project is,

1. "Does legislator funding influence bill vote outcomes?"
   - Which leads us to two more questions, one answering the question holistically.

2. "Are more bills approved if they have more funding from organizations that support them then those opposing them?" (And vice-versa)
   - taking into account previous research that prompts an analysis of legislator funding's relations to political party views,

3. "Does legislator funding influence the views of political parties?"
   - Our goal is to enable viewers to quickly analyze the data from a holistic view as well as explore other factors that may be involved.

V. VISUALIZATION INTERACTION AND DESIGN

The Visualization of funding data is presented for the parliament session 112, over the years 2011-2012. This project went through a lot of iterations, displaying a new faucet of information every time.
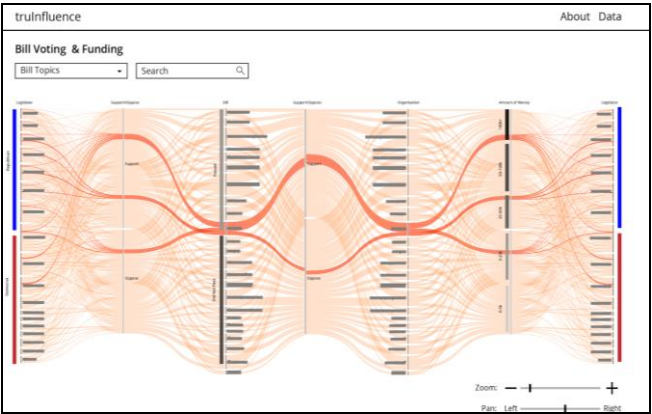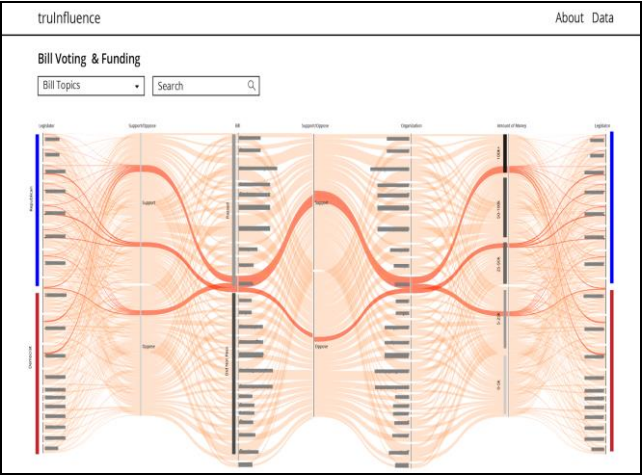
1st Iteration: vertical axes

From Left to Right, the following is the order of the vertical axes which we have come to an agreement on: The Legislator (the candidates who have been elected) are grouped on the vertical axes by the party which they represent. As shown in the image, the Republican are grouped on the top half of the axes and the democrats are grouped together at the lower end of the axis. The Support/Oppose axis gives the mapping between the axis on the left and right, based on which data on the left supports/opposes the attribute on the right.

Legislator to Bills will be mapped using the Support/Oppose axis which will give us the information that which legislator supported/opposed which bills. The lines, initially, will be of the same color and thickness indicating the trend of the correlation between these 2 axes. Similarly the relation between the Bills to organization and organization to Legislator will be established extending the legislator to Bills correlation. As you chose each data point from any of the axes (will work one at a time), the trends for that particular data point will be highlighted using a contrasting color and a thicker line. As shown in the image, on choosing a particular Bill from the bills axis, the correlations between the legislator and organization will be clearly visible. We can easily see the trend whether the legislators supported/opposed the bill and whether the organization who supported the legislator also supported or opposed the bill and how much money did the legislator were funded by these organizations. As shown in the image, which shows a clear pattern that there are large number legislators who supported the bill selected in the image where the organizations who funded them had a positive stance on the bill, which clearly indicates that the bill had been influenced by these organizations. If the majority of the bill topics gets this type of trend then it answers our question that indeed there is an influence on the political ecosystem of the country by organization and that the legislator voting is influenced by the people who have funded them.

Additionally, we can also find trends like if more money is funded by organization to legislators how likely are they to support and oppose the bill based on the organization stance on the bill. Also, we can try and correlate whether the overall party's viewpoint towards a particular bill fluctuates based on the amount they receive from an organization. If this patterns come out to be as what general public also thinks then this would solidify the stance of changing the economics governing

the funding to political parties and candidates, so that more rigorous checks are in place to overall process. If it does not comes out to as expected then the process is stable and the notion of the influence of money over politics will considered a myth, with the fact being it does not have any effect on it. Even though the earlier visualization was able to encompass the dataset, it was only able to answer the question when we start analyzing the visualization one Legislator, one bill and one organization at a time. So the overall question was not being effectively being answered. Hence prompting us to think in new directions.

After a lot of thought and discussion, we came to a conclusion that one Visualization may not encompass everything and may leave out some data aspects, so we have agreed to list different visualizations answering the same question giving more detailed information.

1. Tree Map
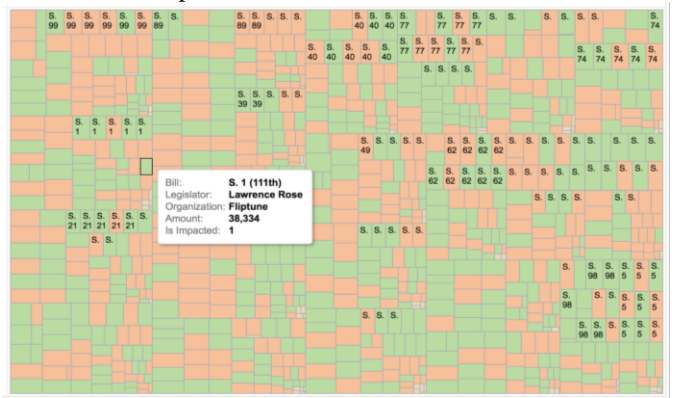
If the visualization has more green color that means there is a positive influence of money over politics.
If it's more orange then there is a negative influence
If it's in equal or near equal proportions then they have no influence. As shown below is the Treemap and the same Each block in the treeMap is a grouping of legislator-Bill-organization. The color indicating the block's influence and the size of the block is the amount of funding received by the legislator from the organization. Hovering over each block will give further information.

2. Bar Charts
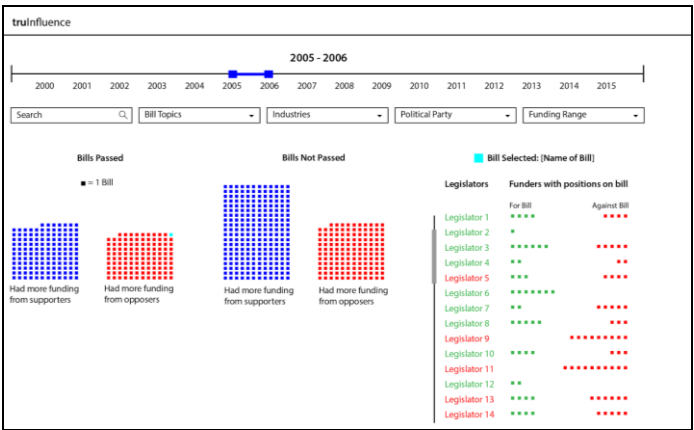
This concept maps whether or not a bill was passed to funding. In the "Bills Passed/Not Passed" charts on the left each smaller square represents one bill. The data that is being added to what is in the previous concept is whether or not the bill has passed. The visualization on the left are the bills that have been passed. We are comparing the two bars in that section to analyze whether more bills had funding from supporters than from opposers. The same is depicted in the center of the document for bills that were not passed. The chart on the right of the document shows for a selected bill how each legislator voted, how many of their funders had a position on the bill, and what that position was. The color indicates which side the legislator voted with.

3. Scatter plot
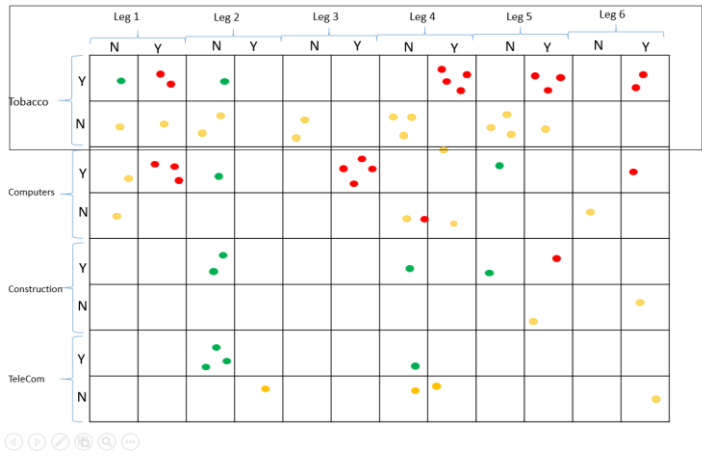
This graph gives us the holistic picture of the influence for one Interest Group. Comparing the red dots across the table row, indicate that the bills are influenced by funding. The vertical section will give us the Legislator's behavior across all the interest groups.

After a series of iterations we settled for a scatter plot for bills, plotted for funding received in support of the bill against funding received in oppose. Each point corresponds to a bill and passed not passed is indicated by its color. If there are more bills which pass and have a greater funding from the supporters displays the money influence on bill voting. On similar lines, if there are more "Not Passed" bills with greater funding from the opposers displays influence. We can filter the bills by interest groups, which will display a better understanding of how much is this sector of industry involved in funding bill are they influencing the bills.

VI. FINDINGS AND INSIGHT

Visual exploration plays a significant role in the discovery new hidden conclusions of the Big Data.

We observe some interesting patterns, selecting the bills that pass and did not pass.
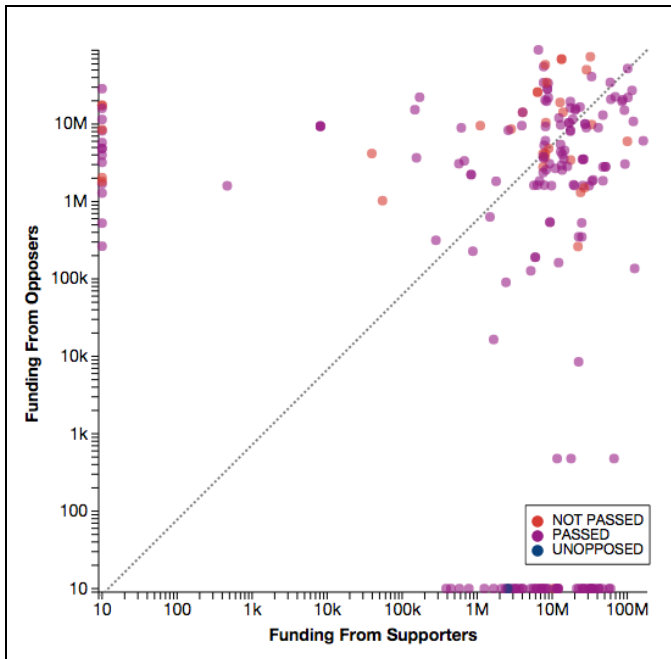
Finding 1: Bill Voting results and Funding.
Figure shows that more bills are passed if the legislators received more funding from organizations that support the bill then those opposing them. However for bills that have more funding from organization in oppositions the results are mixed. This indicates that campaign funding may have more influence when it comes to bills being passed rather than opposed.
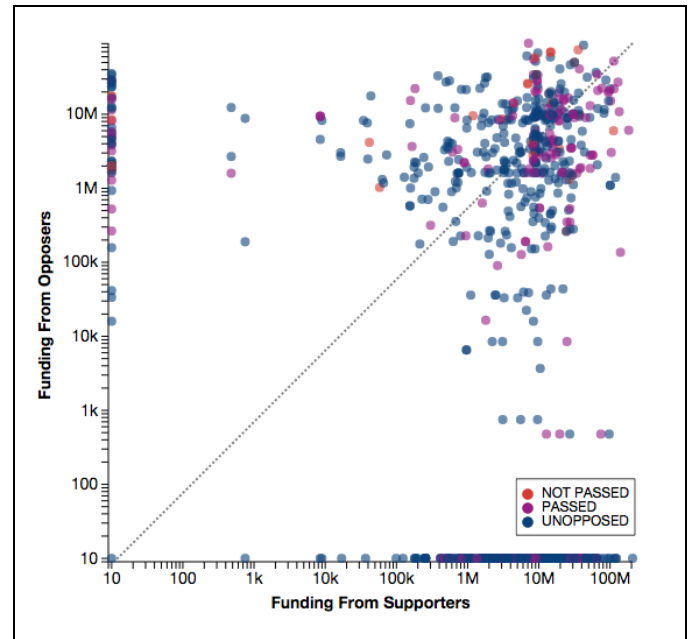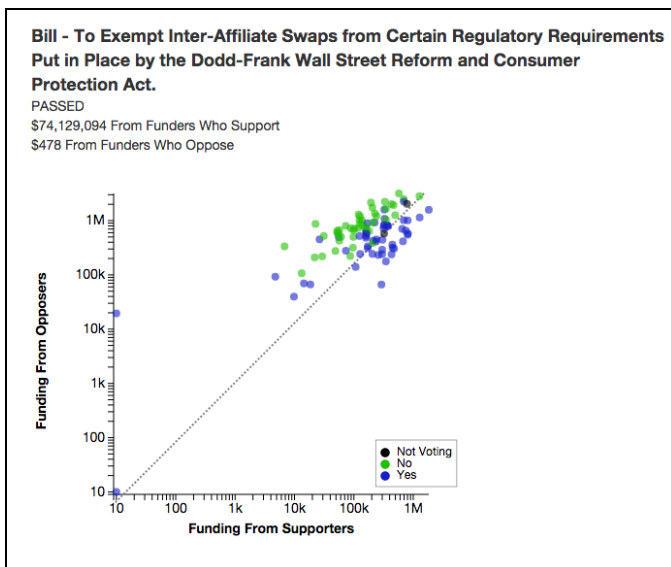

Finding 2: Unopposed Bills & Funding
Figure shows that unopposed bills legislators had received a funding from supporters and opposers of the bills but there is a large cluster for the ones who supported.
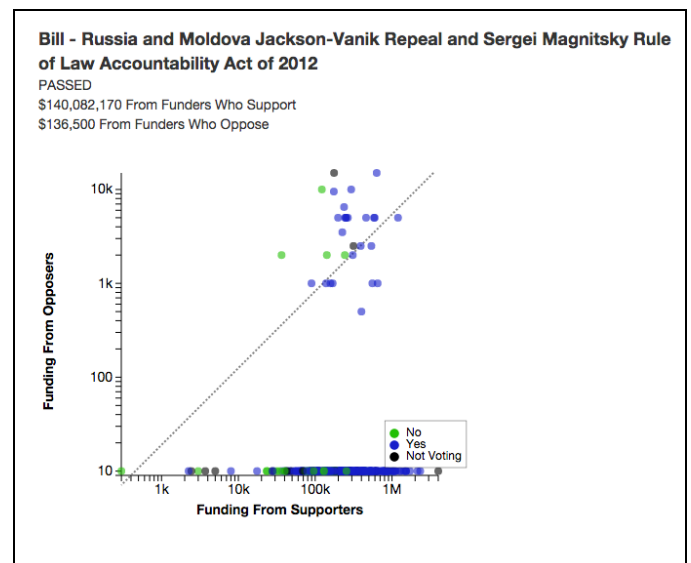
Finding 3: High probability of influence for one bill
Figure shows the bill is passed, majority of who voted for the bill have high funding from the supporters. There is a high probability that there could be an influence.

Bill - To Exempt Inter-Affiliate Swaps from Certain Regulatory Requirements Put in Place by the Dodd-Frank Wall Street Reform and Consumer Protection Act.
PASSED
$74,129,094 From Funders Who Support
$478 From Funders Who Oppose

Finding 3: Low probability of influence for one bill
Figure shows the bill is passed, majority of who voted for the bill have funding from both supporters and opposers. The probability influence seems to be low.

VIII. LINKS

Project page: https://github.com/nyu-cs6313-fall2015/Group-11
Video: https://www.youtube.com/watch?v=9JYbff-fTZA
Working demo: https://truinfluence.herokuapp.com

IX. REFERENCES

[1] Maplight Foundation, data repository http://maplight.org/us-congress/bill

[2] Govtrack.us, data repository https://www.govtrack.us/

[3] d3js.org