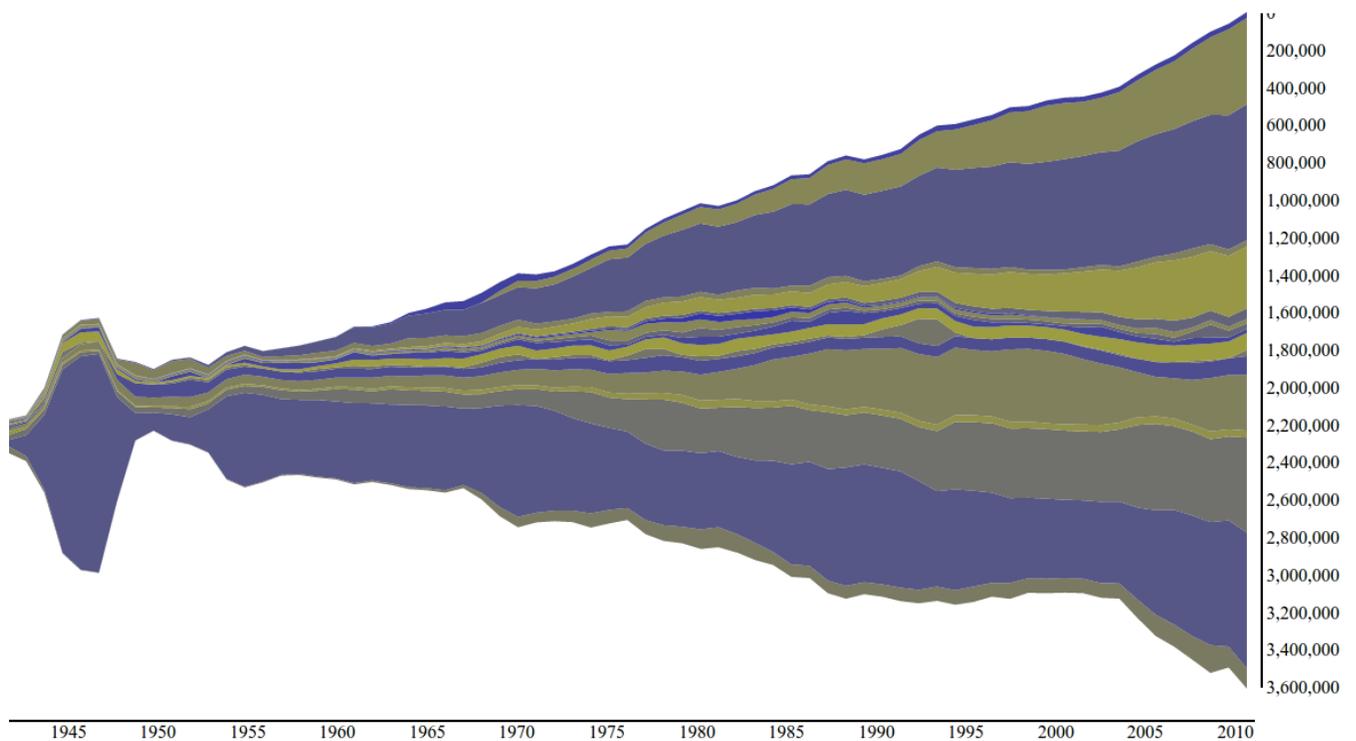


Visualizing 70 Years of the United States Federal Budget

Intro to Visualization: Final Project

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Motivation/Audience

The US Federal Budget has increasingly been a topic of conversation, especially with the upcoming presidential election. This project aims to provide an easy and intuitive way for anyone to analyze and interpret large amounts of current and historical budget data for the United States Federal Government.

Related Work, Inspiration, and Data Sources

1. Byron, Lee. "Stacked Graphs – Geometry & Aesthetics." Lee Byron. Lee Byron, 01 Nov. 2008. Web. 25 Apr. 2012.
< <http://www.leebyron.com/else/streamgraph/> > .
2. Carter, Shan, and Amanda Cox. "Obama's 2011 Budget Proposal: How It's Spent." The New York Times. The New York Times, 01 Feb. 2010. Web. 25 Apr. 2012.
< <http://www.nytimes.com/interactive/2010/02/01/us/budget.html> > .
3. Halloran, John, and Hermann Zschiegner. "TaxMapper." StockMapper. Web. 25 Apr. 2012.
< <http://stockmapper.com/taxMapper.html> > .
4. "Historical Tables." The White House. United States, 01 Jan. 2012. Web. 25 Apr. 2012.
< <http://www.whitehouse.gov/omb/budget/Historicals> > .

Visualization Design Evolution

The main goal for this project was to be able to easily and intuitively analyze historical federal budget data to identify trends, patterns, and anomalies in federal spending. I hypothesized that the final visualization would show a consistent increase in federal spending with ongoing time; I also expected to see programs like Medicare and Social Security grow in value as time approached the present.

The data set harvested from the United States Government contained historical budget information for federal budgets released on and after 1940; the data set showed many individual lineitems and was generally cumbersome to work with. Before parsing the data, I manually reduced the budget lineitems to familiar and logical categories (such as reducing the Transportation and Community Development lineitems to a single item with a relatively significant amount). After summarizing the dataset, I used a Python script to parse the spreadsheet into a JSON file readable by the D3 javascript library. Using D3, I created a Streamgraph to show both the relative expenses of individual government programs and the overall trends of federal spending. I experimented with a few different arrangements of layers within the Streamgraph, eventually settling on a "wiggle-reducing" layout that would reduce the overall change in slope of the Streamgraph.

User feedback was helpful in bringing many issues to my attention; first and foremost, users didn't know what they were looking at upon first viewing the visualization. I mitigated this concern

by adding simple and expressive titles and labels to the visualization. After adding some elements to help with context, users requested axes to help gauge the amounts being presented in the graph. In response, I added a horizontal time (year) axis and a vertical dollar amount axis. The vertical axis still seems a bit out of place; most Streamgraphs focus on relative amounts, and therefore don't have a need for axes (indeed, D3 didn't natively support the addition of axes to a Streamgraph). Per user requests, other small changes were made such as making the category tooltips easier to read and manually overriding the color choices to provide clear separation of layers within the visualization. Finally, some users requested that the visualization be adjusted for inflation so that historical dollar amounts would be directly comparable to recent dollar amounts. Using the average Consumer Price Index, another instance of the visualization was created that showed values adjusted for inflation (and displayed comparable to year 2011 US Dollars).

Future work on this visualization might include the ability to see program growth and reduction based on president currently in office or on political party with a majority vote in Congress; this may reveal trends in how different policy-makers allocate federal monetary resources. Similarly, seeing the growth of federal spending as compared to federal income may also be an interesting addition to the visualization.

Features and Implementation Details

The dataset was obtained in spreadsheet form from the US Government. After manually adjusting the format and lineitems to visualize from the budget, a Python script read in the summarized spreadsheet, parsed the budget data, adjusted for inflation, and wrote out the resultant data in JSON format to a local file.

At the core of the visualization was the D3 (Data Driven Documents) JavaScript library. D3 provides starter code for a basic Streamgraph, although customizing this default layout proved to be difficult due to the sparse documentation available. Using the generated JSON file, each consolidated lineitem of the federal budget was given a layer in the Streamgraph.