

Generalized Web-Based Data Analysis Tool for Policy Agendas Data

Paul Wolfgang
Temple University

ABSTRACT

The Policy Agendas web site includes a data analysis tool that permits selection of the data from various datasets. Associated with each dataset there may be filters. The Pennsylvania Policy Agendas Database project has similar datasets to those in the national database, but the structure of the database tables and available filters are different. This paper describes the design of a generalized web-based data analysis tool that can be configured to work with different datasets and different filters. The tool is table driven so to add a new dataset one merely adds data to the tables that describe the dataset and the filters. The policy codes and their description are also table based to accommodate the variations of the various agenda projects. The tool is developed using the Java language and Java Server Pages, and can be easily modified to accommodate different kinds of datasets and filters.

Introduction

This paper describes the design of a web site that can be used to display and analyze the data collected by the agendas projects such as the United States Policy Agenda and the Pennsylvania Policy Database. The web site is both configurable and extensible. The datasets are described by a table in the database that defines information about each dataset and the filters associated with that dataset. Each kind of dataset and filter is defined by a Java class. If a dataset or filter that does not fit the currently defined datasets or filters, then a new Java class can be added to accommodate the dataset or filter.

This paper begins by giving the background describing the Policy Agendas data analysis tool and the initial adaptation to the Pennsylvania Policy Database. Next the two configuration tables: Tables, and Filters, are described to show how they can be used to define the different datasets. Then the detailed design of the website is given. Finally a description of how a new kind of dataset or filter can be implemented.

Background

The Policy Agendas web site includes a data analysis tool that permits selection of the data from various datasets. The Pennsylvania Policy Database Project mirrors the national project and provides corresponding data about Pennsylvania. The Pennsylvania project wants to provide the same or similar data analysis tools as the national project. The national project graciously gave us the complete source of their web site and database. The data analysis tool was written using Microsoft's Visual Basic Script

language within Active Server Pages. The original code was designed specifically for the national project, and there was no documentation. I was able to modify this code to work with the Pennsylvania data, but the results were not totally satisfactory. Whenever I made a small change or added a feature, there was a danger that I would break something. Therefore, I decided to re-write the application using Java and Java Server Pages. I choose Java because it is an object-oriented strongly typed language, and the re-design takes advantage of these features. The goal was to maintain the same look-and-feel as the original.

Analysis Page

The analysis page presents a form that contains three sections: the top selection allows the selection of the dataset, the middle section the selection of the policy areas, and the bottom selects the range and output format. For each data set there are two columns: the left column gives the name of the dataset and a check-box to select it. The right column lists the filters available for that dataset. Figure 1 shows a portion of the analysis page for the Pennsylvania Policy Database Project.

Dataset Selection

The data select section consists of two columns: one to select the data set and the other to select the filters. Most datasets are selected by a single check-box. For example

Governing Magazine

The Hearings, Bills, and Budget data are special. The hearings data can include House hearings, Senate hearings, or both.

Hearings
 House
 Senate

The Bills data is the most complicated. Bills originating in the House, Senate, or both can be selected. Bills, Resolutions, or both may be selected. Finally one can also (or only) select Laws. The selection of originating house and bill vs. resolution apply to the laws. Also, all filters are common between bills and laws. If selected, laws act as a separate database in the data display.

Bills and Resolutions
 House
 Senate
 Bills and Resolutions
 Bills
 Resolutions
 Laws

The Spending and General Fund Balance allows for selection of the Total Spending All Funds, General Fund Balance, or both. The General Fund Balance can optionally include the “rainy day fund”. While

Figure 1 A Portion of the Analysis Page

The screenshot shows a web browser window displaying the 'College of Liberal Arts TEMPLE UNIVERSITY' logo and the 'Pennsylvania Policy Database Project' title. Below the title is the heading 'Build Your Own Policy Analysis Query'. A sub-heading reads: 'This form enables you to graph trends and download data from the main Pennsylvania Policy Project datasets. Scroll down the page for the available search options.'

The form is divided into two main sections: 'DATASETS TO SEARCH' and 'DATASETFILTERS'. The 'DATASETS TO SEARCH' section includes a note: 'Keep scrolling down the page to select:' followed by a list of search criteria: 'additional datasets', 'policy topics and key word search', and 'time frame'. Below this are checkboxes for 'Hearings', 'House', 'Senate', and 'Governing Magazine'. The 'DATASETFILTERS' section is titled 'Pre-set to default values' and contains several filter options. It includes dropdown menus for 'House Hearings' and 'Senate Hearings', both set to 'ALL COMMITTEES'. There is a checkbox for 'Annual Budget Hearings (Appropriations only)'. Under 'Where Held', there are radio buttons for 'Both', 'Harrisburg', and 'Outside Harrisburg'. A list of categories follows, each with three radio buttons: 'no filter', 'Exclude', and 'Include'. The categories listed are: Executive, Legislative, Judicial, State Agency, Local Government, Federal Government, Interest Groups, Elections, Changes in Governance, Dealing with Taxes, Concerning the Elderly, Budget, and Mandates.

these represent separate data sets, they are displayed in a common format, and have a common inflation adjustment applied. This is specified using the filters column of the form.

This close-up shows the 'Spending and General Fund Balance' filter section. It contains the following elements:

- Checkbox: Total Spending All Funds
- Checkbox: General Fund Balance Include Rainy Day Fund
- Radio buttons: Yes, No
- Radio buttons: Display Dollar Values, Display Percent of Total Spending, Display Percent Change
- Radio buttons: Un-adjusted Dollars, Inflation-adjusted Dollars Base Year
- Dropdown menu: 2000

The Tables Table

To specify which datasets are available a table in the database is defined. This table is given the name Tables. Table 1 shows the structure of the Tables table. Flexibility is achieved by using different Java classes to process the different kinds of datasets. The datasets which are selected by a single checkbox are processed by the Table class. Special classes are defined for the Hearings, Bills, Public Opinion, and spending data. Table 2 shows the table name, table title, and Java class from the Pennsylvania Policy Database's Tables table.

Table 1 Structure of the Tables table.

Column	Contents
ID	A unique identifying integer
TableName	The database table that contains the data
TableTitle	The title that is displayed in the selection column
MajorOnly	A flag to indicate that this dataset only is classified by major category.
MinYear	The minimum year data is available
MaxYear	The maximum year data is available
Class	The Java class name that defines the kind of data set. Most datasets are described the Table class. Special classes are defined for Hearings, Bills, Public Opinion, and Budget.
TextColumn	The name of the column that contains the text of interest.
YearColumn	The name of the column that contains the year.
LinkColumn	The name of the column that contains the hyperlink to the raw data behind the record.
DrillDownFields	The names of the columns that are to be displayed in the drilldown table.

Table 2 Selected columns from the Pennsylvania Policy Database Tables Table

ID	TableName	TableTitle	Class
1	Senate_Hearings	Hearings	HearingsTable
2	Governing_Magazine	Governing Magazine	Table
3	Newspaper_Data_1997_2000	Newspaper Clips	Table
4	Bills_Data	Bills and Resolutions	BillsTable
5	LegAgencyServiceReports	Legislative Agency Service Reports	Table
6	GovernorsBudgetAddress	Governor's Budget Address	Table
7	ExecOrders	Executive Orders	Table
8	SupremeCourt	Supreme Court	Table
9	PublicOpinion	Most Important Problem	PublicOpinionTable
10	Budget	Budget	BudgetTable

Filters

The filters are defined by the Filters table as shown in Table 3.

Table 3 Structure of the Filters table

Column	Contents
ID	A unique ID number assigned to this row
TableID	A reference to the table to which this filter applies
ColumnName	The database column containing the data to be used for selection
Description	The description of the filter
FilterClass	The Java class name for this filter. The different filter classes are described below.
TableReference	The table where additional filter selection criteria are stored. This applies to filters where several choices are provided.
AdditionalParam	Additional specialization data that is needed for some of the filters. Details described below.

There are several kinds of filters.

Binary Filter

The BinaryFilter allows for three choices: no filter, Exclude, or Include



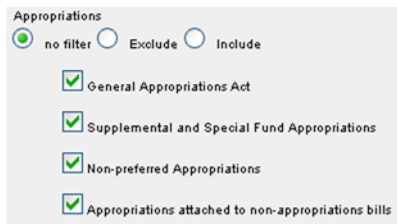
Mention Filter

A special filter is used for newspaper clips, called the MentionFilter that allows for four choices: no filter, No Mention, Mention, or Significant Mention.



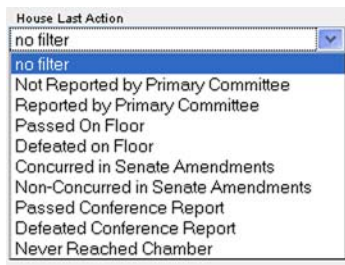
Multi-valued Filter

The multi-valued filter is an extension of the binary filter that allows the filter to either include or exclude one or more of a sub-category selection. It is used with the newspaper clips to specify the document type and with the Bills and Laws to select the final state of Constitutional Amendments and the kind of Appropriation Bill. The list of choices is specified by a separate table that is referenced in the Filters table.



Drop-down Filters

The drop-down filters display their selection choices using a drop-down box. They are used to display the committees and the last house/senate action on a bill.



Since special processing is required to select the committees, special Java classes are defined for hearings committees and the bills committees.

Check-Box Filters

The check-box filters display a selection option with a check-box. By checking the box the selected item is included, leaving it unchecked the item is excluded. This is similar to the binary-filter except that the "no filter" option is not available.

Conference Committee

Where Held Filter

A special filter is defined for the committee hearings to select hearings that are held in the state capitol, outside the state capitol, or both. The name of the state capitol is defined by the AdditionalParam column of the Filters table.

Where Held
 Both Harrisburg Outside Harrisburg

Public Opinion Filters

This is not actually a filter, but is used to specify the display format. The Most Important Problem can be displayed either as a percentage or by rank.

Most Important Problem Display as Percent Rank

Budget Filters

This is also not a filter, but is used to select the display format. Spending and general fund balance data can be displayed in dollars, percent of total spending, or percent change. The raw data values can be displayed or the values can be adjusted for inflation with the base year specified.

Display Dollar Values
 Display Percent of Total Spending
 Display Percent Change

 Un-adjusted Dollars
 Inflation-adjusted Dollars Base Year

Selection of Policy Area

The selection of policy area is table driven, just as it was in the Policy Agendas project. The names of the tables are “hard-coded” into the program currently. The table MajorCode contains the major codes and their description and the table Code contains the minor codes and their description. The selection form was copied from the Policy Agendas project as shown in Figure 2.

Figure 2 Policy Areas Selection

POLICY AREAS TO INCLUDE:

Each record includes a short description (a sentence or phrase) of the item. This features allows a text search of that field and will help identify the best topic from the list to the right.

- To select multiple subtopics/topics, press the control (ctrl) key or Apple Command key while using your mouse to click on desired topics.
- To select just major topic(s), select the option "All subtopics in ..."
- To select *all* major topics, check the box "Search ALL topics ..."

Search ALL Topics, or select specific topics/subtopics from the lists below.

Agriculture

All subtopics in Agriculture
Agricultural Marketing, Research, and Promotion
Agricultural Research and Development

Banking, Finance, and Domestic Commerce

All subtopics in Banking, Finance, and Domestic Commerce
Bankruptcy
Consumer Finance, Mortgages, and Credit Cards

Remainder of the form

The remainder of the form was copied from the Policy Agendas Project as shown in Figure 3.

Figure 3 Remainder of the Analysis Form

INCLUDE KEYWORD(S)	<input type="text"/>	<input checked="" type="radio"/> search only selected topics/subtopics <input type="radio"/> search all topics/subtopics
FOR THESE YEARS OR LEGISLATIVE SESSION:	<input checked="" type="radio"/> the years from <input type="text" value="1979"/> to <input type="text" value="2006"/>	<input type="radio"/> the Legislative Sessions from <input type="text" value="1979-80"/> to <input type="text" value="2005-06"/>
GRAPH AS:	<input checked="" type="radio"/> Number of cases per year <input type="radio"/> Percent of all activity per year	
<input type="button" value="Reset Form"/> <input type="button" value="SEARCH"/>		

Results Page

The results page is similar to that produced by the national database website. An example is shown in Figure 4. At the top are links to download the selected data as an Excel spreadsheet. This is followed by a bar-graph of the data. Finally there is the drill-down table that lists the values for each row and column. The entries in the drill-down table are links that will display the detail data for that row and column. The data columns displayed are specified by the DrillDownFields in the Tables table. An example of the drill-down results is shown below.

Drilldown Results - Mozilla Firefox

http://babyhuey.cs.temple.edu/PAPolicy/drilldown.spg?query=H4sIAAAAAAAAAAFXkvQqDMBSG4Vv5NvIUJq0jv6cYqVSA

College of Liberal Arts
TEMPLE UNIVERSITY®

Pennsylvania Policy Database Project

Drilldown Results

Session	Bill	Sponsor	Abstract	Hyperlink
1997-98	HB 144	Tangretti, Thomas A.	An Act making an appropriation to the Department of Health for epilepsy support services.	http://www.legis.state.pa.us/WU01/LI/BH/1997/0/HB0144.HTM
1997-98	HB 119	Godshall, Robert W.	An Act relating to bone marrow, providing for a special leave of absence for bone marrow donors, and providing for a tax credit and for additional duties of the Department of Health and the Department of Revenue.	http://www.legis.state.pa.us/WU01/LI/BH/1997/0/HB0119.HTM
1997-98	HB 132	Vance, Patricia H.	An Act amending the act of November 6, 1987 (P.L. 381, No. 79), known as the Older Adults Protective Services Act, adding certain definitions; further providing for reporting, for investigations and for reporting suspected abuse by employees.	http://www.legis.state.pa.us/WU01/LI/BH/1997/0/HB0132.HTM

Figure 4 Sample Analysis Results

Analysis Page - Mozilla Firefox

File Edit View History Bookmarks Yahoo! Tools Help

http://babyhuey.cis.temple.edu/PAPolicy/display.spg

Most Visited http://www.google.co...

Search Web Mail Shopping Personals My Yahoo! Ne



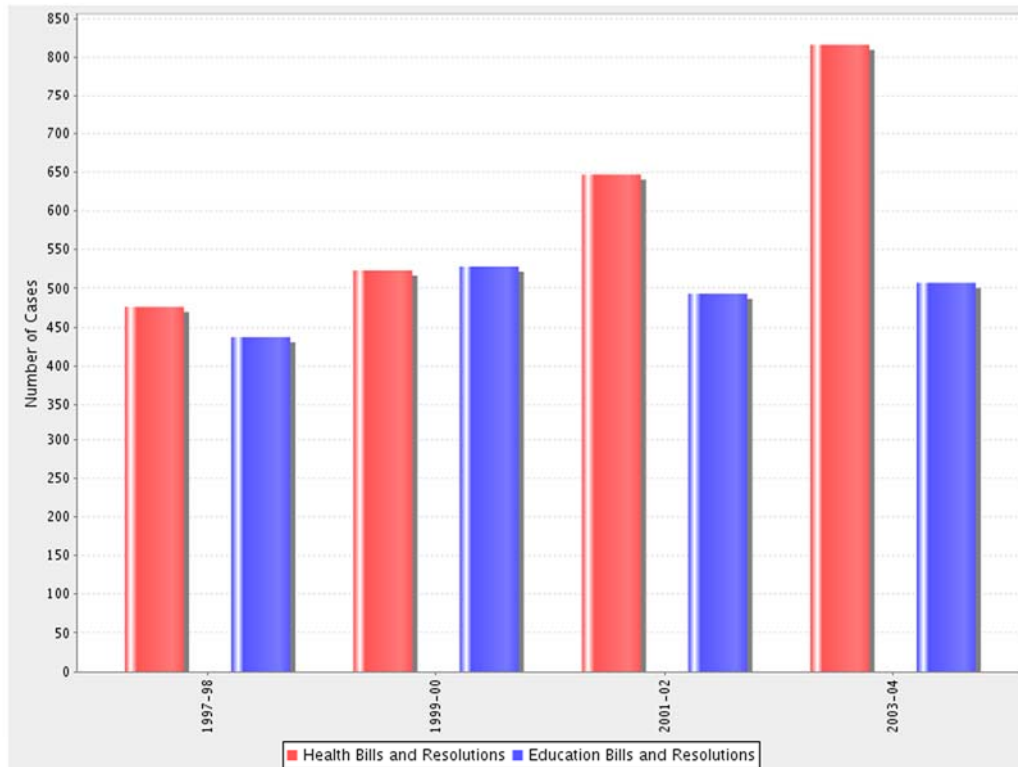
College of Liberal Arts

TEMPLE UNIVERSITY®

PENNSYLVANIA POLICY DATABASE PROJECT

To download the raw data as an Excel spreadsheet, click on the link

[Health Bills and Resolutions](#)
[Education Bills and Resolutions](#)



To download the image, right-click on the image

	Health Bills and Resolutions	Education Bills and Resolutions
1997-98	476	437
1999-00	523	528
2001-02	647	493
2003-04	816	507

How it works and how to customize

The Table class

Table class is responsible for:

- Generating the HTML that is used to create the dataset selection cell in the analysis form.
- Generate the SQL query to select the data by topic for a date range.
- Generate the SQL query to select the total over all topics for a date range.

For most datasets this is done using the parameters defined in the Tables table. For the bills and resolutions, budget data, hearings data, and public opinion data, special Java classes are defined that “override” some of the methods of the Table class. This allows for more complicated processing for these datasets. While the Table class is fairly general these other classes are coded based on the specific structure of the PA policy data. To adapt this system to the national data the Table class could be used for most of the datasets, but special classes will be needed for the budget, hearings, and public opinion data.

The filters

For each of the filters described above there is a Java class that is responsible for:

- Generating the HTML that is used to create the filter selection cell in the analysis form.
- Generate part of the SQL query to restrict the selection to the filter criteria.

The national database would only need the BinaryFilter and the MultiValuedFilter.

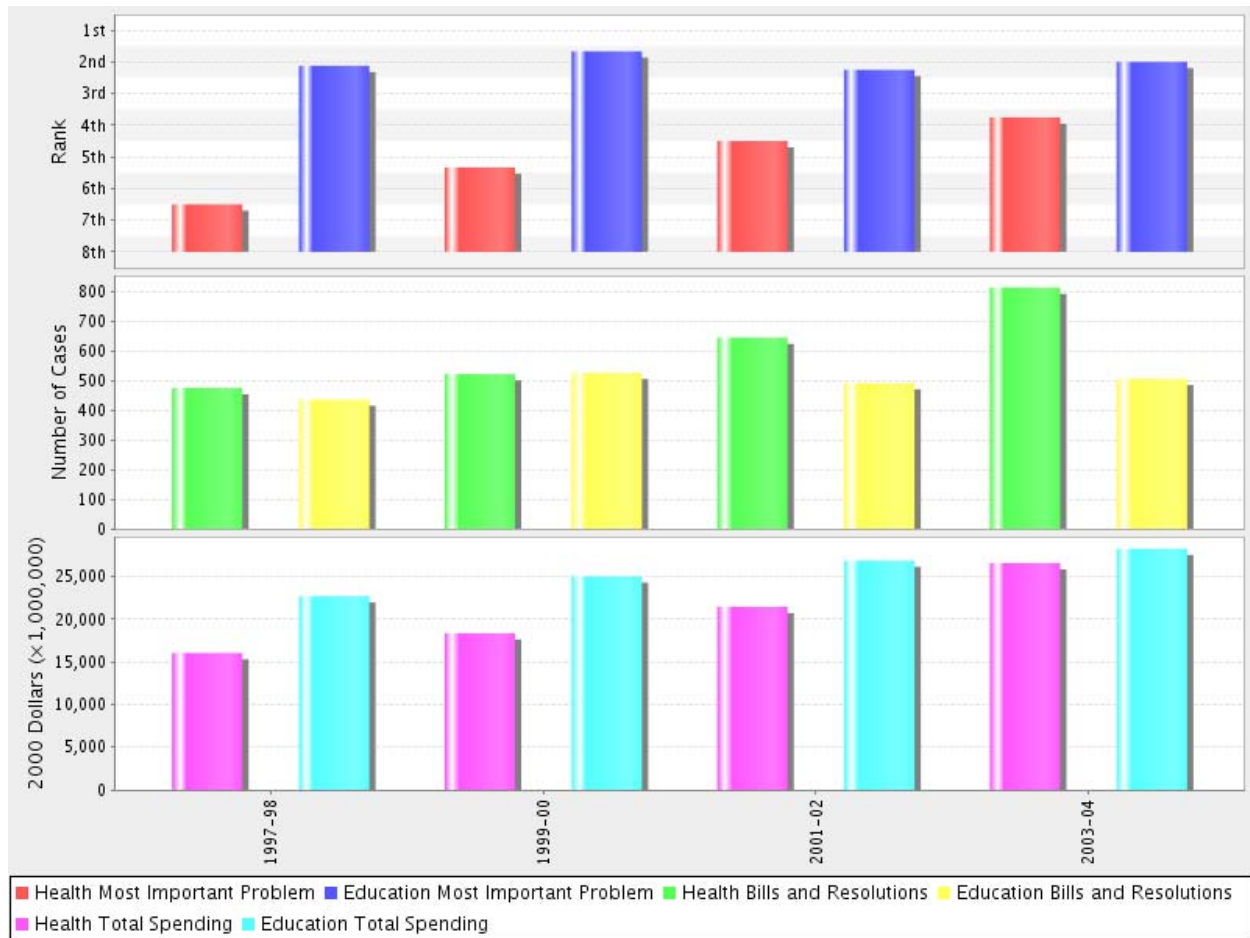
Graph Display

To generate the graph an open-source Java package known as JFreeChart is used. This package can generate a variety of charts, but only the bar-chart is used. JFreeChart allows for the display of multiple axes, but this does not work well for bar charts. The individual data is not integrated, thus for example, the budget data (units of dollars) is hidden by the count data. To solve this problem, data with different units is displayed stacked as shown in Figure 5.

Future Work

For the Pennsylvania Policy Database some additional testing is needed to ensure that the system works as desired. I would also like to modify the JFreeChart so that the multiple axis data is displayed on one chart. The documentation implies that this is possible, but it does not appear to work. Finally, to demonstrate the flexibility, I plan to reproduce the national database’s analysis tool.

Figure 5 Stacked Chart Example



References and Sources

The current prototype of the PA Policy Database is at <http://babyhuey.cis.temple.edu/PAPolicy>

The national policy database is at <http://www.policyagendas.org>

Documentation on Java and Java Server Pages is at <http://java.sun.com>

The Spring framework is used, documentation at <http://www.springsource.org/about>

JFreeChart is at <http://www.jfree.org/jfreechart/>

The Excel down-load capability uses the Apache POI Project <http://poi.apache.org/>