Narrative Visualization: Healthcare Outcomes vs. Expense

CS 416 Data Visualization (Summer 2022)

University of Illinois at Urbana-Champaign

Angela Graci (graci@illinois.edu)

Messaging

This narrative visualization examines healthcare expenditure per capita of different countries compared to various healthcare outcomes, such as life expectancy, infant mortality rates, and maternal mortality rates. The main message that it attempts to convey is that although the United States outspends all other nations in healthcare, they have far from the best healthcare outcomes, especially when compared to other "high income" countries.

Narrative Structure

This narrative follows an **interactive slideshow** structure. In the top left corner, the user is presented with buttons that can be used to navigate through the slides, and for each slide accessed using this mechanism, the visualization parameters will have preconfigured settings. Within each slide, the user has the option to modify the visualization parameters (including the independent variable selection and income filters), using the controls on the right-hand side. Additionally, users can drill down into each slide by activating tool tips when they mouse over the marker corresponding to a particular country.

Visual Structure

For each of the scenes of this narrative, a scatterplot structure is used. The scatterplot structure was selected because it is a familiar structure for the type of data used, namely quantitative data in multiple dimensions. Annotations are used to provide highlighting to bring the user's attention to the focal point (for instance the United States as an outlier). In order to keep the user oriented, a few techniques are used. One method of keeping the user oriented is that the x-axis is always the same dimension: healthcare expenditures per capita. Additionally, the markers are always color coded to represent the income level of the associated country. D3 transitions are used when changing scenes or modifying parameters in order to show where each country moves to in the updated visualization. Finally, some of the measures were inverted (mortality rates translated to survival rates) so that the desired healthcare outcome is always higher on the y-axis. If those metrics were not inverted, it would be disorienting for the user to switch between life expectancy and the other healthcare outcomes.

Scenes

The scenes of this narrative correspond to the ordered slides. The opening slide shows life expectancy with all countries included in the filter. The following slides are for more specific healthcare outcomes: infant mortality rate and maternal mortality rate. In both following scenes, only "high income" countries are compared by the default parameter settings. In this way, the scenes are ordered from a more general overview to more targeted and specific views.

Annotations

The annotations used in this narrative are designed to call attention to the United States and where it places in terms of expenditure and outcomes relative to other nations. The annotations follow a template of a call out with a circle placed around the marker for the United States. The text shows the United States' ranking in terms of expenditure, and its ranking in terms of whichever outcome is being explored in the current scene.

Parameters

The parameters available to the user consist of 3 options for the variable shown on the y-axis, and 4 filters for showing nations according to their income level (low income, lower middle income, upper middle income, and high income). The three scenes are defined according to which parameters are set, where scene 1 uses life expectancy and all 4 income levels, scene 2 uses infant survival rate and only high-income countries selected, and scene 3 uses maternal survival rate and only high-income countries selected. When diving down into a scene, it is possible for the parameters to be modified such that the visualization is in an anonymous (non-scene) state, for instance looking at life expectancy for only low-income countries. When all the parameters match one of the three states that corresponds with a scene definition, the slide indicator will transition to the appropriate value.

Triggers

Parameter controls that allow the user to modify the state in terms of y-axis variable and income filters are displayed in a panel to the right-hand side of the visualization. Each control is clearly labeled with the option being presented. For y-axis options, radio buttons are used as the selection mechanism to indicate to the user that only one option at a time can be selected. For the filters, where multiple options can be selected simultaneously, checkboxes are used.