Checkpoint III: Visualization Sketch

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Overview

In Figure 1 we can see the overall view of the dashboard. This visualization features five different idioms, each with its own purpose and all interconnected and interactable.
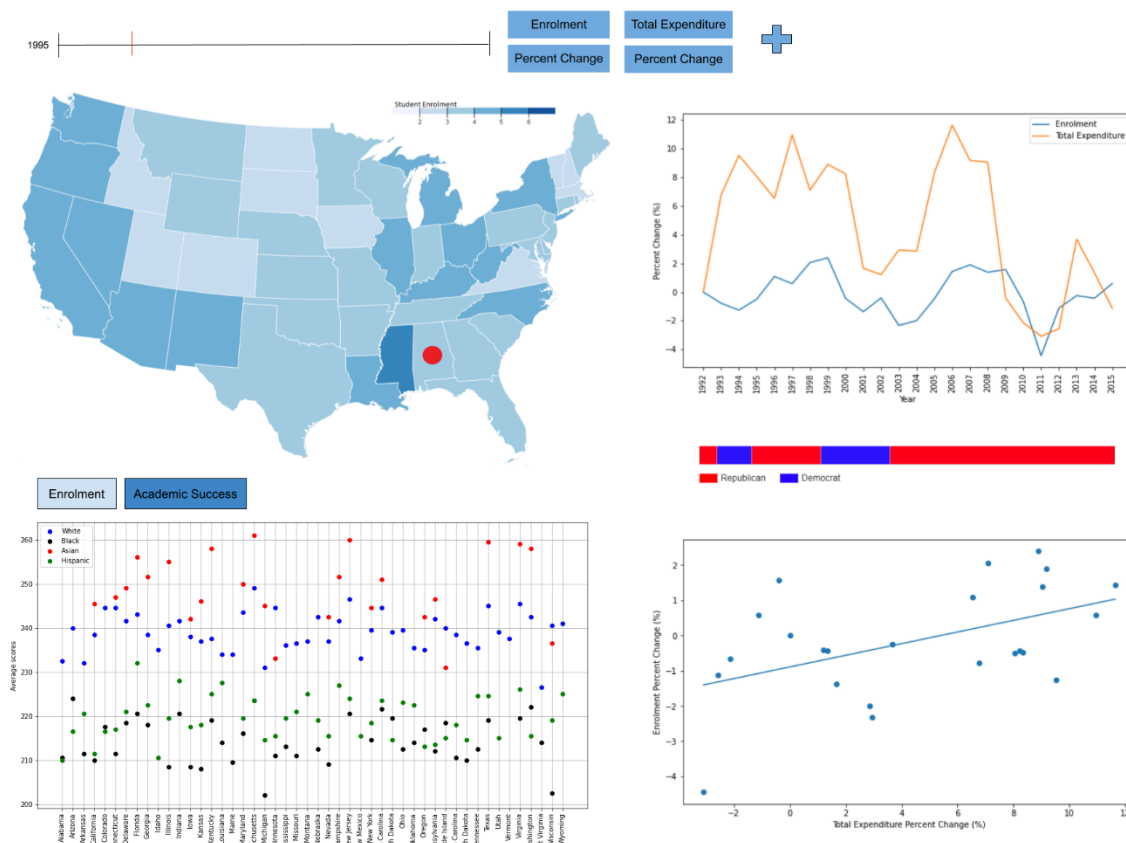

Figure 1 - Overall view of the dashboard

The visualization is split into two halves with two different perspectives – the left half shows data aggregated by year and the right half shows data aggregated by state.

The slider above the choropleth map allows the user to change which year the data is being taken from, this affects both the choropleth map and the dot plot below it.

Right next to the slider the user can pick the main attribute for the visualization from a drop-down menu and up to two secondary attributes (by clicking the 'plus' button). These will affect what is seen on the choropleth map, scatter plot and multi-line chart.

The choropleth map is interactable - each state is clickable (and gets highlighted) and changes what is represented on the three idioms on the right side of the visualization. It shows the values of the main attribute and allows the user to filter data for a single state.

The dot plot features buttons to toggle between two attributes. These buttons allow for the user to always visualize the values for enrolment or academic success, despite the selected attributes. By default, all values are highlighted, but the user may click on one of them to highlight a specific ethnicity.

The multi-line chart and scatter plot display data regarding the selected attributes for the selected state over the years, with the main attribute being always represented on the y axis. The Gantt Chart shows the ruling party on the selected state over the years.

Visual Encoding

We decided to use five different idioms for this visualization: a choropleth map, a multi-line chart, a scatter plot, a dot plot, and a Gantt chart.

The choropleth map encodes the values of the main attribute for the selected year, using 2D shapes for marks. The colour saturation encodes the main attribute value, and the shape, position and spatial region encode the corresponding state.

The dot plot encodes the values of one of enrolment or academic success for all the states for the selected year, per ethnicity. The x position encodes the value of the state and the y position the value of the attribute. The different ethnicities are encoded with different hue values.

The multi-line chart represents the evolution through time of the selected attributes for the selected state, using dots connected by lines as marks. The x position encodes the year and the y position the value of the attributes. The line's slope encodes the change in the attribute's values. Hue is used to encode what attribute each line corresponds to.

The Gantt chart shows the timeline of the governing party for the selected state. This is a horizontal bar that is split in several parts color-coded according to the party (blue for Democrats, red for Republicans). The starting and ending positions of a bar encodes the starting and ending year of the mandate. The length of a bar encodes the mandate length, in years.

The scatter plot shows the relationship between the selected attributes using dots for marks. Each dot corresponds to a different year for the selected state. The y position encodes the value of the main attribute, while the x position encodes the values of the secondary attributes. Hue encodes what secondary attribute each point refers to. The scatter plot also contains a line that encodes, in the slope, the trend observed in the plot.

Answering the Questions

1. How did changes in investment in education impact grades and student enrolment?

To answer our first question, we select the attribute total investment as a percent change from the drop-down menu and then press the plus sign to add the other two attributes (academic success as a percent change and enrolment as a percent change). For the comparison, the multi-line chart and the scatter plot are particularly helpful for this one - in the first one we can compare the lines' slopes and in the scatter plot we can tell if there is positive or negative correlation between the values by looking at the dots' positions and the trend line's slope. Positive slope means that an increase in investment results in an increase in academic success or student enrolment.

In Figure 2 we can see a storyboard that answers this question.

2. Is state revenue more impactful for academic success than state investment in education?

The second question can be answered in a similar fashion. We pick academic success as a percent change as our main attribute and both state revenue as a percent change and state investment as

a percent change as secondary attributes. For the comparison we can look at the scatter plot and check which trend line has the biggest slope.

3. Which type of investment (instruction, support services, capital outlay) has the greatest impact in enrolment and academic success?

For the third question we choose either enrolment as a percent change or academic success as a percent change as the main attribute and the investment types as percent changes as secondary attributes. We can then look at the scatter plot and see which trend line has the biggest slope.

4. Is there any correlation between the party that governs a state and its investment in education?

The third question requires us to selected total investment per capita as the main attribute. We can then look at the multi-line chart and the Gantt chart and see if we can spot any trend between the governing party and increases/decreases in investment.

5. Is there any trend regarding student ethnicity and their academic success?

For the last question, we can use the dot plot. If we can spot a higher concentration of points from one ethnicity on the higher academic scores across most states, then there probably is a trend regarding student ethnicity and academic success.

Figure 2 – Storyboard for answering the first question