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.
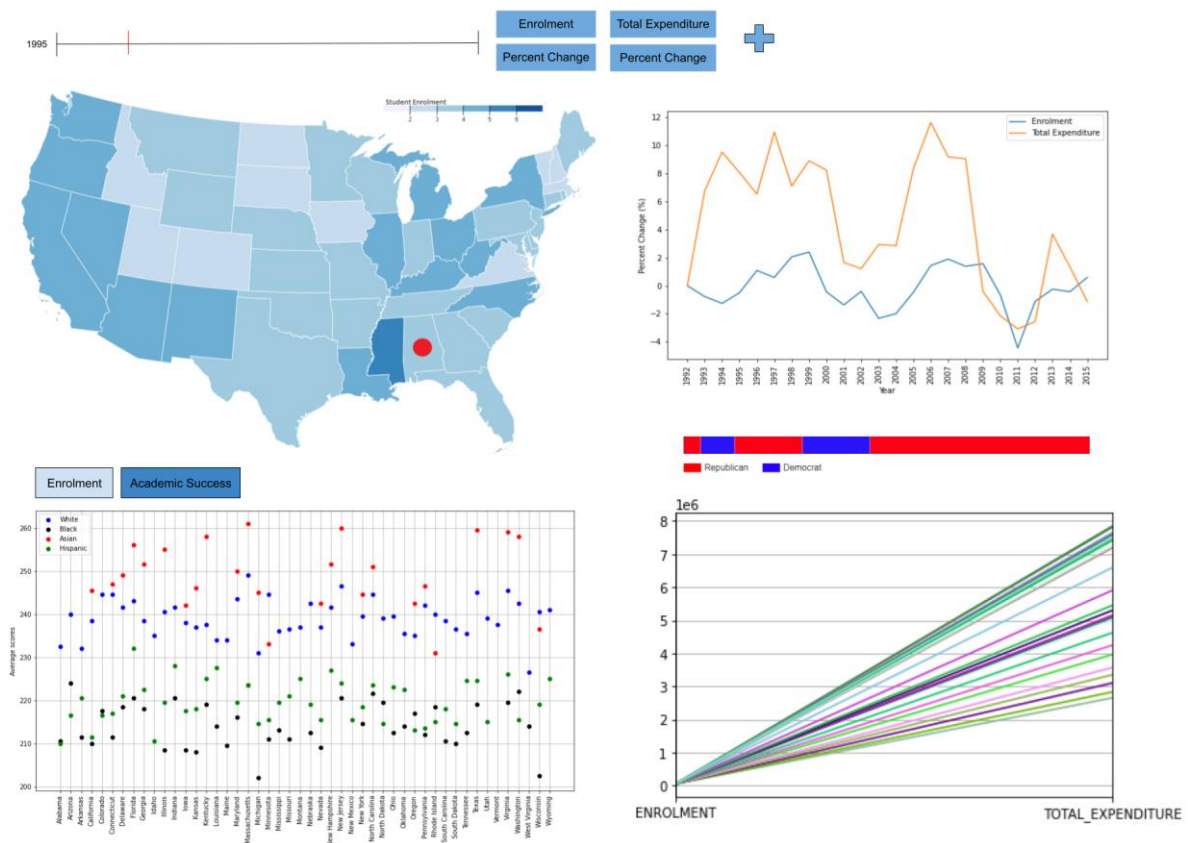

Figure 1 - Overall view of the dashboard

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. It is not possible to select multiple years because it requires that we aggregate data for every possible selection of years. With 30 years and more than 50 attributes this is simply not possible. Doing this in real time is also not a possibility due to performance restrictions imposed by D3.js

Right next to the slider the user can pick the attributes for the visualization (by clicking the 'plus' button). These will affect what is seen on the choropleth map, parallel coordinates, and 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 first attribute selected 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 dot plot can only display enrolment and academic success because the dataset only contains information regarding ethnicity for these two attributes.

The line chart and parallel coordinates display data regarding the selected attributes for the selected state over the years. 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 line chart, parallel coordinates, a dot plot, and a Gantt Chart.

The choropleth map encodes the values of the first attribute for the selected year, using 2D shapes for marks. The colour saturation encodes the first 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 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 parallel coordinates show the relationship between the selected attributes using lines for marks. Each line connects two different attributes and corresponds to a year for the selected state. The x position of the starting and ending point of the line encode what attributes the line is connecting while the y position encodes the value of these attributes.

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 line chart and the parallel coordinates are particularly helpful for this one - in the first one we can compare the lines' slopes and in the parallel coordinates we can tell by looking at the relationship between the lines: the more parallel they are, the bigger the correlation between attributes.

In Figure 2 we can see a storyboard that answers this question (In the storyboard some plots are greyed out to show changes in the dashboard resulting from user actions. When the user checks the dashboard for the first time, the plots display default information).

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 and both state revenue as a percent change and state investment as a percent change as

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

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 one of the attributes. We can then look at the line chart and the Gannt chart and see if we can spot any correlation 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 correlation between student ethnicity and academic success.

Figure 2 – Storyboard for answering the first question