CS 416 Final Project – Narrative Visualization Essay

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URL of visualization: https://franknsalamone.github.io

1. Messaging

The goal of this visualization is to communicate the message that automobile efficiency improved from the 1970s to the 1980s. This increase in efficiency resulted from technological advances such as turbocharging, diesel engines, and from changes in design exemplified by imported cars. This messaging is highlighted by allowing the user to selectively display data from 1970s cars and compare it to data from 1980s cars. The user would see that newer cars have higher efficiency. The user may also choose to selectively display cars from domestic, Japanese, and European manufacturers. The message communicated would be that Japanese cars were generally more efficient. A final message is that turbocharged and diesel engines can be more efficient than naturally aspirated cars.

2. Narrative Structure

My narrative visualization follows an interactive slide show structure. My visualization follows this structure by presenting 3 slides that attempt to communicate my message. The first slide shows a chart that acts as a general overview of the message of the visualization. As the slides progress, more detail about specific engine technologies is added. Each slide allows the user to drill down for more information by hovering over the individual marks, as well as by selecting the particular car origin the user wants to view.

3. Visual Structure

The visual structure of all of the scenes is a large chart on the left side of the slide that displays the data highlighting the correlation between the data that user should understand. As the scenes progress they become more visually complex. Hopefully going from simple to complex helps the viewer adapt to the presentation. Generally, annotations are used to highlight particular cars (Porsche 928) or types of cars (A particular turbodiesel car) that are interesting in terms of power or efficiency.

In terms of navigation, all of the scenes have a slider at the top that allows the user to select the particular car origin (domestic, Japanese, European) that they are interested in. The slider is a standard control and should be understandable to the user. Visually, this functionality allows the user to see the differences in performance by origin. A large button allows the user to add 1970s cars to the chart, visually showing that the marks from the 1970s cars are to the left (lower performance) than 1980s cars. To navigate to the next scene, there is a large “Next Scene” button.

The third scene uses the d3 transition function to slowly add cars with higher technology, visually showing, by their position to the right in the chart, that they have higher efficiency. This last scene gives the “why” that the cars from the 1980s have higher efficiency, that is, that they have higher technology.

Overall, the goal is to visually highlight that 1980s cars are more efficient (slides 1 and 2), and that this efficiency is due to technology (slide 3).

4. Scenes

There are three slides in my interactive slideshow. Overall, the scenes are ordered from the general to the specific. In the first scene, a chart with where engine horsepower versus displacement is presented. This shows a fairly linear relationship between these two variables as highlighted by trend lines. The user can drill down using tool-tips to see the actual types of cars presented. The second scene shows the relationship between horsepower and MPG. By comparing 1970s and 1980s cars in this scene, the viewer can see that, in general, 1980s cars are more fuel efficient. The third scene shows how technologies such as turbocharging and diesel engines help improve MPG while maintaining good power. This furthers the message that technology has helped improve the efficiency of cars from the 1970s to the 1980s.

The scenes are visually consistent in terms of chart placement, mark color, tool-tip function, and annotation design.

5. Annotations

Annotations are used on the first and third slide. On the first slide, an annotation displays when the user clicks the "Add 1970s Data" button. Pressing this button adds information about 1970s cars to the chart, as well as trend lines to show the overall average differences between the decade's cars. An annotation appears highlighting this trend line. The annotation text describes how the 1970s cars get less power out of each unit of engine displacement. This annotation highlights the important trend that horsepower increases linearly with displacement, and that the slope on the trend line is steeper for 1980s cars. This annotation is added and removed when the trend line is present.

On the first scene, an annotation also highlights that each mark represents a particular car, helping the viewer understand what is being displayed on the chart. An annotation also highlights a Porsche 928, a particularly advanced car, that produces a lot of power from a modest displacement. Highlighting the Porsche furthers the narrative that technology aids in efficiency.

On the third slide, an annotation appears when marks corresponding to turbodiesel cars appear, highlighting how cars having these engines are both powerful and efficient. It highlights a particular mark that shows a turbodiesel car with good horsepower and good efficiency.

The annotations use the d3 annotation library to maintain visual consistency.

6. Parameters

There are three parameters of the narrative visualization. On the first two slides, the user can select via a toggle button if they want to display data from 1970s cars. If this button is pressed, it changes the seventies_on parameter to true. This changes the state of the visualization so that the 1970s data, trend lines for the 1970s and 1980s data, and an annotation explaining the trend lines are displayed. If the toggle is pressed again, these elements are hidden again and the seventies_on parameter is set to false. This parameter is used in the second slide in a similar fashion.

On all three slides, the user can choose to display cars of all national origins, or of just a single origin. This state is controlled by the origin parameter and selected by the user via a slider. When the origin parameter is 0, the state of the visualization is to display domestic, Japanese, and European cars. When

the parameter is 1, just domestic cars are displayed. When the parameter is 2, just Japanese cars are displayed, and when the parameter is 3, just European cars are displayed.

The particular slide being displayed also represents a state.

7. Triggers

I use several triggers in this visualization. In the first scene, the introduction scene, one can click a button in the upper left-hand corner of the chart. This triggers a change in the state of the visualization (and corresponding parameter in the code) to toggle between presenting data from cars of the 1970 and hiding this data. An event handler mediates this change. Cars from the 1980s are always present. This allows the viewer to compare the improvements in horsepower per unit displacement between these two decades. The ability to add the 1970s data is signaled to the user by the text “Push to Add 1970s Data”. When the 1970s data is present, the text is changed to “Push to Remove 1970s Data”. Further information about how to use this functionality is given in the box to the right of the main graph. The “Add 1970s” button works in a similar fashion on the second slide as well.

On all three of the slides, an event handler is triggered by manipulation of a slider at the top of the webpage. This slider allows the selective display of cars from an individual origin.

On the first and second slides, mousing over the individual marks, each representing a specific model of car, triggers a tool tip to appear that gives information about the make of the car. This uses the d3 .on event functionality.