CS 498: Data Visualization

The Narrative Visualization Project

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(Summer 2020)

Messaging

What is the message you are trying to communicate with the narrative visualization?

This visualization illustrates the city MPG and highway MPG of the Chevrolet and Honda vehicles, over three consecutive years (2010, 2011, and 2012). Users can compare the horsepower of these vehicles as well. The main message of this narrative visualization is to compare the relative city MPG, highway MPG, and horsepower of the models released by these two companies and show how their vehicles have changed over 2010, 2011, and 2012. The visualization also reveals a general relationship between city/highway MPG and horsepower values.

- You can view the visualization at (https://yaldar2.github.io/)
- The original data is available at (https://corgis-edu.github.io/corgis/csv/cars/)
- The subset of the dataset used for this visualization, along with the associated codes and files are available at (https://github.com/yaldar2/yaldar2.github.io)

Narrative Structure

Which structure was your narrative visualization designed to follow (martini glass, interactive slide show or drop-down story)? How does your narrative visualization follow that structure? (All of these structures can include the opportunity to "drill-down" and explore. The difference is where that opportunity happens in the structure.)

The chosen hybrid structure for this visualization is the “interactive slideshow” format. This structure gives the opportunity to drill down into details in a particular scene and then takes the user to the next slide. Users can also choose to continue on if they are not interested in the details of that slide.

The proposed narrative visualization consists of three scenes and an author-directed path can be followed through the slideshow. At each slide, users can drill down into some details by moving the mouse over data points to highlight the vehicles of one company, read slide-specific messages highlighted by the author, and also see some information about the interesting data points of that chart through annotations. They can also navigate to the next slide and explore associated details of that scene if interested.

Visual Structure

What visual structure is used for each scene? How does it ensure the viewer can understand the data and navigate the scene? How does it highlight to urge the viewer to focus on the important parts of the data in each scene? How does it help the viewer transition to other scenes, to understand how the data connects to the data in other scenes?

As mentioned, an interactive slideshow from the category of hybrid structures is used for this project. Scenes of this visualization highlight the same type of data (city MPG, highway MPG, and horsepower for vehicles of the two car companies of Chevrolet and Honda) in three consecutive years.

- For visual consistency and keeping viewers from getting disoriented through transitions, the exact same template is used for all three scenes. The scene title is fixed above the chart, and the visualization canvas has the exact same size and position during the slideshow. Circular marker points with the same color template is used to represent the vehicles form a specific company in all three scenes. Different sizes of these markers help users compare the relative horsepower of the cars released by these two companies.
- The plot axes, axes titles, and legends are consistent and fixed in the exact same position for the duration of the narrative visualization. The axes are linear and extend the range of the data and the same plotting scale is maintained in all three scenes.

These considerations help the viewer connect data in all three scenes. Maintaining visual consistency in all other scene elements, urges the users to focus on how the data points move when shifting from one slide to another, and indeed, better observe the changes in the aforementioned variables through the given years.

Scenes

What are the scenes of your narrative visualization? How are the scenes ordered, and why?

Each scene in this narrative visualization is a single chart that plots highway MPG over city MPG for different vehicle models of Chevrolet and Honda, released in a specific year. Also, circular markers with different sizes are used to provide a relative comparison metric for the horsepower of the cars manufactured by the two company. Scenes follow a chronological order, i.e., first, second, and third scenes illustrate the associated data in 2010, 2011, and 2012, respectively. This order best conveys the main message of this story and helps users better understand the data as they can start form year 2010, move to 2011, and then 2012 to see how Chevrolet and Honda vehicles have changed over time in terms of city MPG, highway MPG, and horsepower features.

Annotations

What template was followed for the annotations, and why that template? How are the annotations used to support the messaging? Do the annotations change within a single scene, and if so, how and why?

Annotations are used to highlight the trend in the data and also draw attention to the point(s) of interest. The annotations use a consistent template for font size and font type to support visual consistency. Two types of messaging are used in this visualization:

- The main trend in the data and important information to reinforce the desired massaging of the narrative visualization are presented using a general message in each slide. This annotation appears on top of the visualization in all three scenes with the same template and at the same position relative to the chart elements. The message does not change within a single slide, but is cleared when moving to other scenes and a new message is shown depending on which slide the user is looking into.
- Points of interest about which the author wants to communicate some information are also annotated using an elbow-shape line with an arrow that points to the target marker in the chart. A text message appears below the line indicating the desired information about the

target point that the author wants to communicate with the user. This template helps users easily notice/identify the point(s) of interest in each chart and read the associated information. These annotation messages change between the scenes (but not within a single scene) to highlight the important points in the current slide. The same format, including the size and orientation of the elbow-shape line, font size and type, is also adopted for visual consistency.

Parameters

What are the parameters of the narrative visualization? What are the states of the narrative visualization? How are the parameters used to define the state and each scene?

In all scenes, the charts are plotted using the vehicles' make, city MPG, highway MPG, and horsepower. A slide bar positioned at top-left coroner of the chart is a parameter that controls the current scene of the visualization. Users can click on the buttons on this slide bar to move from one scene to another. The next parameter is "year" that is positioned on bottom-right corner of the visualization in each slide. This parameter indicates the year in which the plotted car models on the current chart are released. When changing the scene using the slide bar parameter, the "year" parameter also changes to show the associated year for the current scene.

States of the narrative visualization in each scene are three charts that indicate the car models of Chevrolet, Honda, or both (the default state). The current state is controlled by the parameter "make" which is a categorical variable in the data representing the brand of the vehicle and have two possible values: Chevrolet, and Honda. When users move the mouse over a data point (the trigger) belonging to a particular vehicle brand, the data points associated with the other brand are set to opacity = 0.01, and thus the chart only indicates the models of that specific brand. When mouse moves off the data point, the current state changes and opacity for all data points for both vehicle brands returns to 1.

Triggers

What are the triggers that connect user actions to changes of state in the narrative visualization? What affordances are provided to the user to communicate to them what options are available to them in the narrative visualization?

Triggers are utilized as the connections between parameters of this visualization:

- A trigger is used with the slide bar parameter of the narrative visualization. When the user clicks a button in the slide bar menu, it triggers a change in the value of this parameter and updates the visualization by displaying the scene that is associated with the clicked button (year). The change in the slide bar triggered by the user click event also changes the "year" parameter on the bottom-right corner of the visualization which indicated with a bold and large font to be distinguishable. Affordances provided to communicate this option with the user are:
    - The buttons on the slide bar are designed to be easily noticeable by the user. A darker background is used for the buttons so the users can easily distinguish them from the other chart elements. A visible padding is also utilized to separate the

buttons and communicate to users that there are multiple buttons (options) available to select.

- Buttons are labeled as "2010", "2011", and "2012", left to right. This chronological order may also help users understand that they can choose between different years.
- The button label that represents the current state of the visualization is displayed with a bright green color, while other button labels appear in a grey color. This difference between the selected and unselected buttons conveys the message that other buttons may also be selected.
- When the user hovers the mouse over an unselected button, it triggers a change in its appearance and the label become temporarily highlighted. This also indicates to the user that the button may be clicked on.
- Clicking a button also triggers a change to the scene being displayed (and also the selected button label appears in bright green). The changes when a button is clicked indicates that the buttons on the slide bar menu can change the visualization and present new information.

- Triggers are also utilized with the data points in the charts. The user event of "mouse over" a data point, triggers a change in the current state of the chart by applying an opacity of 0.01 to all data points that have a different brand from the one that the mouse is over on. The user event of "mouse off" then changes the current state of the chart by returning the opacity of all data points back to 1. Affordance provided to communicate this option with the user is:
  - A message inside the chart that appears on the first slide of the narrative visualization. Note that the exact same template of all three scenes in the visualization helps the user recognize that this option is available in other slides as well.
  - This message appears in a grey (but noticeable) color and with an italic font to communicate with the user that this is a side information. This format also makes the message distinguishable from other scene annotations.