

# Exploring Fuel Efficiencies of Vehicles Based on Fuel Source

<https://timothyta12.github.io/cs416-narrative-visualization/index.html>

In the provided link, a narrative visualization of the fuel efficiencies of various vehicles is explored. The focus of this narrative is to emphasize the efficiency differences between different fuel sources. Fuel efficiency is defined by the average amount of miles driven for a given gallon of fuel. For diesel and gasoline, this unit, known as MPG, is intuitive. However, electricity is not expressible in terms of volume. Thus, an equivalent unit normalized on the amount of energy expended, MPGe is used for comparison. The message being communicated to the audience is that electricity is far more efficient than the use of gasoline and diesel. This message is conveyed through the various elements of narrative visualizations, which are narrative structure, visual structure, scenes, annotations, parameters, and triggers.

The interactive slideshow structure was chosen to convey this message to the audience. This is achieved through a slider. This slider progresses the user between 5 pages that displays the data in a progressive manner. The start of the visualization starts off as a blank graph. As the user progresses through each page, they are introduced to additional subsets of the data along with annotations to support the message. On each page, the user can freely drill down on each data point to see the make of the car in addition to the MPG values of the car.

The visual structure is simple, being a graph plotting each vehicle's average highway MPG and average city MPG. The graph emphasizes the relation of each vehicle with respect to their fuel efficiencies. Each fuel source's vehicles are introduced on separate slides, in addition to being color coded. This slow introduction emphasizes the locations of each fuel source's data points relative to each other. When cars using electricity are introduced, they lie very far from the datapoints of gasoline and diesel.

The various scenes are achieved by plotting different subsets of the data onto the same graph. The first being an empty graph, allowing the user to become oriented with the page, what actions they are allowed and what the graph is plotting. The scenes are ordered in a progressive nature, adding more datapoints with each scene. The second scene shows the fuel efficiency of diesel vehicles. Since there are fewer diesel vehicles compared to gasoline vehicles, this serves as a good introduction to how the scatterplot represents each vehicle as a data point. Also introduced is the concept of allowing the user to drill-down each data point to inspect what make the car is in addition to the exact values of MPG. The next scene introduces gasoline vehicles emphasizing the variability of efficiency. Lastly, vehicles using electricity are introduced last to show the distinction between its efficiency compared to gasoline and diesel.

The circle callout annotation was used to convey the primary message. The circle was used since it highlights the datapoints newly introduced and provides an opportunity to support the messaging of the narrative. In the last scene, instead of calling out a set of points with a

circle, one point was called out. This was done to reinforce that the most fuel-efficient car was an electric vehicle.

One parameter was used to define the state of the narrative. This parameter, being the page number, is represented to the user as a slider. This page number is used to define what scenes and annotations are shown to the user. As the user selects a page, a different scene and set of annotations come into and out of view.

A few triggers are used to allow the user to interact with the visualization. The primary trigger is the slider. This slider is used to set which page the user is viewing. While the slider suggests the user to go through the slideshow in a serial manner, the user is free to skip between pages if they would like. The other trigger is when the user mouses over various data points in the scatter plot. This is notified to the user in the form of text above the scatterplot.

Overall, the narrative visualization is focused on the message that vehicles using electricity are far more efficient than gasoline and diesel vehicles. This message is conveyed through an interactive slideshow, allowing the user to see a progression of data through various scenes. Each scene comes with annotations to introduce the user to new data and support the message. The user can control the pacing of the visualization using a page slider, as well as drilling-down to each data point to see details about the vehicle.