

CS416 Narrative Visualization Project

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Messaging

The narrative visualization presents data related to airline safety, comparing incidents, fatal accidents, and fatalities in two distinct time periods: 1985-1999 and 2000-2014. The visualization employs interactive elements and data-driven storytelling to engage the viewer and facilitate understanding of the complex data.

The primary message of the narrative visualization is to showcase the safety records of various airlines during two significant time periods. **By comparing incidents, fatal accidents, and fatalities, the visualization aims to answer the question of whether you can correlate an airline with a low or high crash or incident risk.**

As shown by the data and the analysis done in Scene #4 of the visualization, we notice a weak correlation between fatalities and airlines; however, there is a moderate correlation between incidents and airlines (with a few exceptions).

Narrative Structure

The narrative visualization follows an **interactive slide show** structure, enabling users to explore the data in a sequential manner while providing opportunities to drill down and examine specific details. Specifically, the visualization takes users through the 1985-1999 data, then the 2000-2014 data, and concludes with an overview that compares both time period data.

Users can select different airlines from a dropdown menu to see individual safety records for each airline during each time period. In the final scene, users can toggle the regression line to see the correlation between the two time period's data. The visualization guides users through scenes via buttons, allowing them to comprehend the data's context and connections. If a user so chooses, they can explore each airline individually; however, the visualization contains analysis in scene #4 as well as tables highlighting important outliers for each time period scene.

Visual Structure

For each time period scene, a bar chart is used to visually represent the safety records of the selected airline. Blue bars represent incidents, orange bars represent fatal accidents, and red bars represent fatalities. This color scheme is consistent across both time period scenes.

Because the data is comparing incidents, fatalities, and fatal accidents, the bar chart is the most appropriate chart because it can provide an easy-to-digest visualization of this and easy access to compare them between certain airlines. Additionally, for each time period, we include a table with quick access to some interesting or outlier data points. A table provides a quick reference for this data for users who do not want to explore the individual airlines. Finally, ranking information for each airline is shown above each bar chart for each time period scene so a user doesn't have to manually check each airline's safety ranking in comparison to others by hand.

The bar chart's design ensures clarity and ease of navigation, with labels for each data point and axes to indicate the scale. The use of distinct colors for incidents, fatal accidents, and fatalities allows viewers to focus on essential data points. To transition between scenes, there is a button beneath each scene that allows a user to either go to the homepage to transition between scenes or a button that prompts the user to go to the next scene. Each scene is represented by a different HTML file that is referenced by the main index.html or the preceding scene, which gives it the "slideshow" structure.

At the end (scene #4), a scatterplot is used to compare the quantitative data between the fatalities and incidents between the two time periods. The use of regression lines allows users to visualize any conclusions made about correlations. Each scene also contains text that describes the main points each scene is trying to make. For the time period scenes, that is primarily communicated via the information tables that highlight outlier airlines.

Scenes

The narrative visualization consists of scenes representing the safety records of different airlines during the two time periods. The first two scenes offer a structured exploration of the data by allowing a user to select an airline and explore data. They are arranged in chronological order, with the 1985-1999 period being shown first and the 2000-2014 data being shown second. This organization helps users identify patterns and compare safety performances across airlines. The final scene shows two scatterplots that compare these two periods side-by-side for incidents and fatalities and draws conclusions about airline safety by the airline based on their correlation. The logic here is to allow a user to understand the data for each individual time period and then illustrate any persistent trends and outliers in the final slide when all conclusions and analyses are presented.

Annotations

Annotations in the narrative visualization follow a concise template, displaying the ranking of the selected airline based on its safety record in each category. These annotations provide additional context and support the messaging by offering users a clear understanding of an airline's safety performance in relation to others. Annotations remain consistent within a single scene to maintain clarity and aid in cross-scene comparisons between both time periods.

Between Scene #2 and Scene #3, annotations primarily take the form of “Ranking” information as mentioned above. This ranking is displayed on-screen depending on which airline the user chooses. In addition, each Scene contains information about outliers / interesting data points for incidents, fatal accidents, and fatalities for each time period. Annotations do change between each of these scenes because we want to showcase how the ranking changes depending on the airline that a user selects. They change when a user clicks on a different airline.

For Scene #4, I’ve annotated some interesting data points on each scatterplot! These points were determined by calculating outliers from the interquartile range of the data.

Annotations in these cases are used to showcase differences between airlines and aid user exploration of inconsistencies/test persistence of airline hazard rates. They support the messaging because you can see that the ranking for various airlines on fatality rate varies wildly whereas the ranking for various airlines varies not as wildly for incident rate between the two time periods. In the last scene, annotations are useful to aid user exploration between the two time periods in such a way that users don’t need to search through all the data to find outliers.

In addition, it’s important to note that for Scene #2 and Scene #3, a user can hover over each bar in the bar graph to see the specific number for the respective safety category. In addition, for Scene #4, a user can hover over each data point to see the specific incident number or fatality number for both time periods for each scatterplot.

Parameters

The main parameter in the narrative visualization is the selected airline. This parameter defines the state of the visualization and determines the data shown in each scene. By choosing an airline from the dropdown menu, users can switch between different airlines and explore their safety records for both time periods.

The initial, default state for Scene #2 and Scene #3 is to show the ranking and safety information for Aer Lingus for the respective time periods. When a user changes the selected airline, the safety records for that respective airline are shown. Going into the technical details, the drawChart function is responsible for rendering the bar chart based on the selected airline. The handleDropdownChange function is triggered when the user selects a new airline and it updates the visualization with the newly selected airline.

I’m not sure there are explicit parameters for Scene #4; however, it does have an initial state and a different state. Initially, the drawScatterplot function is called and generates the two scatterplots for incidents and fatalities for the two time periods. When the user clicks on the Toggle Regression Lines option, it updates a boolean value that draws the regression lines on the respective scatterplots.

Triggers

Specific Triggers

Dropdown Selection Change:

- When the user selects an airline from the dropdown list with the ID "airlineSelect," the `handleDropdownChange()` function is called. This trigger updates the scatterplot and highest data table for the selected airline, showing the safety records for that specific airline from the dataset.

Next Scene Button Click:

- When the user clicks the button with the ID "nextSceneButton," the `handleNextSceneClick()` function is called. This trigger navigates the user to the next scene.

Toggle Button Click:

- When the user clicks the button with the ID "toggleButton," the `toggleRegressionLines()` function is called. This trigger toggles the visibility of the regression lines in both the fatalities and incidents scatterplots.

Affordances

Dropdown List:

- The dropdown list with the ID "airlineSelect" affords the user the option to select different airlines. When they make a selection, the visualization updates to show safety records specific to the chosen airline.

Next Scene Button:

- The button with the ID "nextSceneButton" provides the user with the affordance to proceed to the next scene in the narrative. Clicking this button allows them to navigate through the narrative.

Toggle Button:

- The button with the ID "toggleButton" provides the affordance to the user to enable or disable the visibility of regression lines on both the fatalities and incidents scatterplots. This helps users interactively explore the correlation between the two data sets.

These triggers and affordances make the narrative visualization interactive and user-friendly, allowing users to explore and comprehend the data effectively.

Conclusion

The narrative visualization communicates the safety records of various airlines, comparing data from two distinct time periods. Through its interactive slide show structure, visual design, and annotations, the visualization engages viewers and enables them to explore and compare the data. The project concludes that airline safety has little to do with airlines and that any correlation between airline and hazard rate is moderate at best. Correlation between airline and incident rate would be the best correlation to identify if such a conclusion were to be drawn and for the most part, airlines do not have a consistent hazard ranking between time periods.