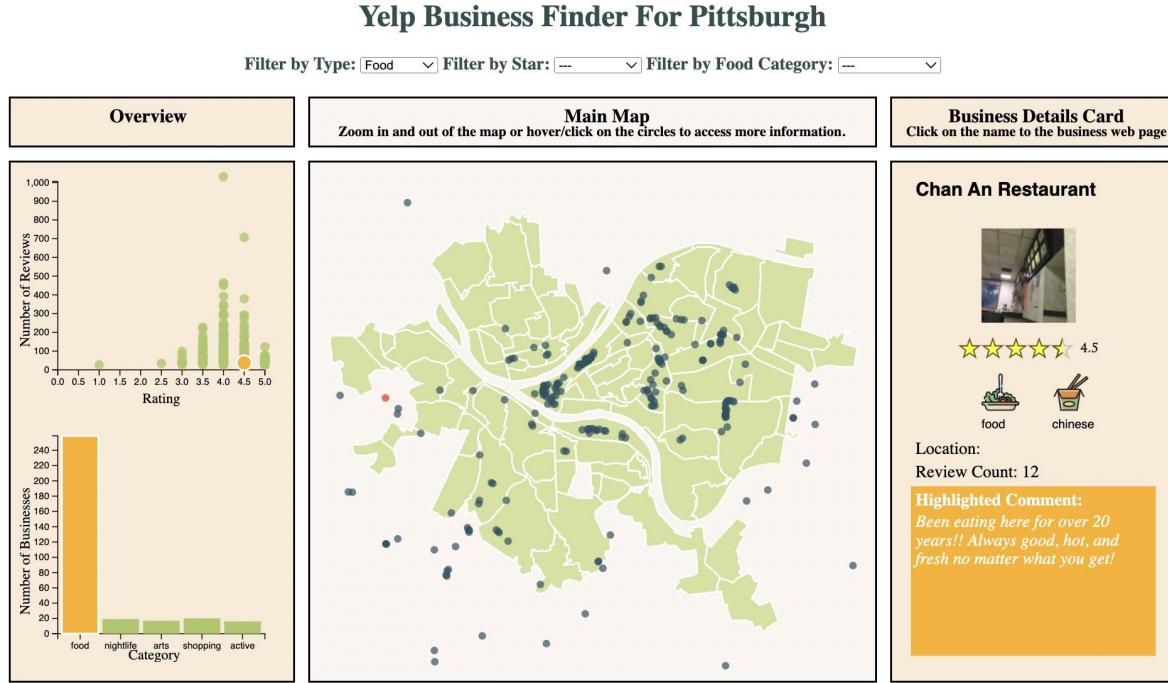


Assignment 3 Report (zl846, tw537)

<https://hayleyzhl.github.io/consumerVisualization/>



Data Selection & Pre-Processing

We have selected the "yelp_pittsburgh.csv" as our dataset. It contains 332 data points representing businesses in the city of Pittsburgh. Each data point includes information such as the business's category, unique identifier, name, neighborhood, location coordinates, rating, number of reviews, review snippet, business type, and Yelp page URL.

We performed numerical preprocessing on several columns, including 'Position', 'latitude', 'longitude', 'rating', and 'review count'. We also added a new attribute 'dataID' to uniquely identify each data point in the absence of a unique ID for all the data in the dataset. This way we can easily find a datapoint without causing any issue. We later use it to connect multiple plots.

The provided icon_list.json file contains a JSON object with key-value pairs where each key represents a category (such as "coffee", "donuts", "nightlife", etc.) and the corresponding value is a URL pointing to an image file for the category icon. The images are in PNG format and have a size of 512x512 pixels, except for the "french"

icon which is 128x128 pixels. These icons are used to visually represent the different categories on a website or app related to food, dining, and related activities. By mapping the category names to their corresponding icons in the JSON object, we can easily display the correct icon for each category as needed.

User's Exploration Needs

The user's primary interest is to explore different types of businesses based on their location and neighborhood. They may want to filter businesses based on their type, such as selecting the highest-rated or most-reviewed business in a particular category. Additionally, the user may wish to narrow down their search by exploring subtypes within each category, such as the best Asian restaurant among all restaurants.

The user might also wish to view a comparison of a business's rating to others in the same category, as well as its image and a direct link to its website.

Storyboard



Interaction Reasoning

We have created a user-friendly interaction design that is tailored to meet users' varying needs. Our design provided flexible options and display as much useful information as possible, while keeping the interface intuitive and easy to navigate.

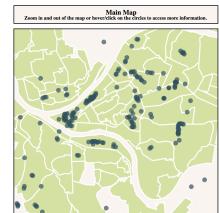
➤ ***Dynamic Querying - Filtering Function***



When the user first enters the page, they will be presented with a map of all businesses in the city of Pittsburgh. The user can then select a specific category of business to view, such as "food", which will filter the map to display only businesses in that category, such as restaurants. Then, the user can further refine their search by selecting a subcategory, such as "new american restaurants". This allows for flexibility in meeting the user's changing needs and ensures that only relevant information is displayed, making the user experience more intuitive and efficient.

➤ ***Pan/zoom on the Map***

The pan/zoom on the map is to allow users to explore and view more detailed information about a particular area of interest. This feature can be particularly useful when users want to examine a specific location or area in more detail, or even if they just want to navigate around the map to explore different areas.

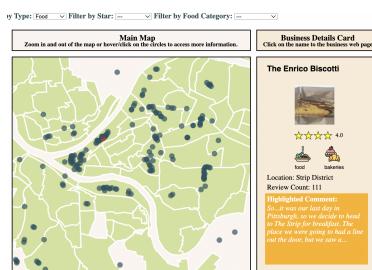


➤ ***Overview + Detail - Hover on Map***



When hovering onto a circle(datapoint) in the map, the user will see a text box that includes the name, type, and category of the circle(datapoint). We designed this to provide users with more detailed information about individual data points on the map, while also allowing them to maintain a sense of the overall data distribution.

By hovering over a data point, users can see more details without losing the context of where the point is located in the larger map view. The fact that the div follows the cursor can enhance the user experience and make it easier to view the information.

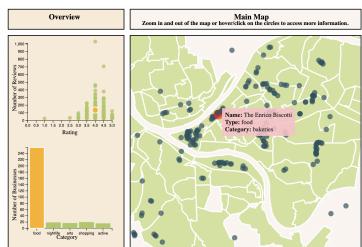


➤ ***Overview + Detail - Click to show the details on the right***

When the user clicks on a point in the map, a card with details of that particular business will appear on the right.

The card will display the title and link of the business, along with its ratings and categories. Additionally, the location, review count, and highlighted comments will also be shown, providing users with comprehensive information about the business at a glance.

➤ Focus + Context - Scatter Plot and Bar Chart

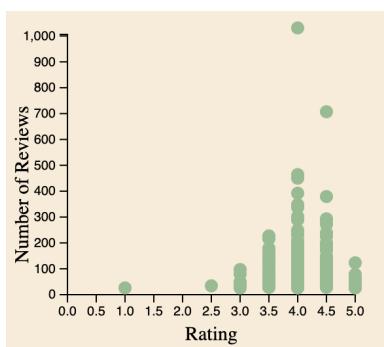


The scatter plot and bar chart are designed to provide users with a way to understand the selected data point in relation to the overall data set. By highlighting the selected point in the scatter plot and bar chart on the left-hand side of the screen, users can see how the selected point compares to other data points in terms of the variables being plotted.

This feature can be particularly useful for identifying patterns or trends in the data set and for gaining a better understanding of the selected data point's significance in the overall context.

Visual channels and Rationale for Design Choices

(Left) Plot 1 - Scatter Plot:



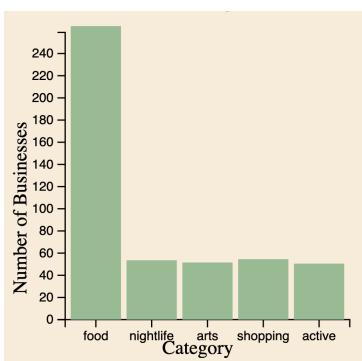
➤ Visual Design

- **Marks:** Circles
- **Visual Channel:** Varying the circles' horizontally aligned position and vertically aligned length.

➤ Interactions:

Clicking on a data point on the map will highlight the corresponding point in the scatterplot. Highlighting the corresponding point in the scatterplot when clicking on a data point on the map allows users to see the comparison of the selected point and the rest of the data points in the scatterplot. This can provide users with a better understanding of the overall distribution and patterns of the data, and can help them make more informed decisions based on the selected data point. By providing users with a visual representation of the selected point's location in the context of the entire data set, this interaction allows for a more comprehensive analysis of the data and a deeper understanding of the insights that can be gleaned from it.

(Left) Plot 2 Bar Chart:



> Visual Design

- **Marks:** Rectangles.
- **Visual Channel:** Varying the rectangles' horizontally aligned position and vertically aligned length.

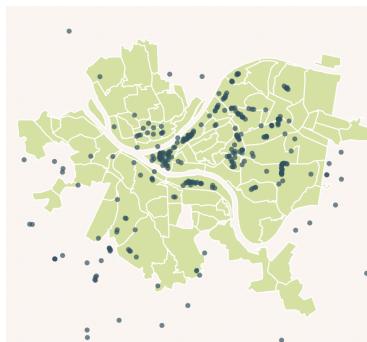
> Interactions:

Hovering over a bar in the chart will display a line on the top of the bar to help the user see the corresponding y-axis value.

This interaction can be useful for users who want to see the specific numerical values associated with each bar in the chart.

Clicking on a data point on the map will highlight the corresponding bar in the bar chart. This can provide users with a better understanding of the overall distribution and patterns of the data, and can help them make more informed decisions based on the selected data point. By providing users with a visual representation of the selected point's location in the context of the entire data set, this interaction allows for a more comprehensive analysis of the data and a deeper understanding of the insights that can be gleaned from it.

(Middle) Plot 3 Map:



> Visual Design

- **Marks:** Circles
- **Visual Channel:** Varying the circle's position on the map based on the longitude and latitude.

> Interactions:

Clicking on a data point on the map will display the specific details of the corresponding business on the right-hand side of the screen. This could include information such as the business name, photos, reviews, ratings, and other relevant details. This interaction allows users to quickly access detailed information about a specific business of interest.

Hovering over a data point on the map will display a div with the specific name and type associated with that point. The div will follow the cursor, which makes it easy for users to view the information without losing track of the location on the map. This interaction allows users to quickly and easily get more information about the businesses on the map without having to click on each individual point.

The ability to pan and zoom on the map allows users to control the level of detail and granularity they want to see. By zooming in, users can see more details about a specific

area. Conversely, by zooming out, users can get a higher-level overview of a larger area or region. The ability to move the position of the map allows users to explore different areas and view the map from different perspectives.

(Right) Plot 4 - Card :



➤ Visual Design

The details of the selected business will appear on a card upon clicking on a circle in the map. The card will display the title of the business at the top, followed by a picture of the business. The rating of the business will be shown below the picture, along with icons and text indicating the categories and types of the business. The total number of reviews will also be displayed for users who are interested in the popularity of the business.

In the bottom section of the card, a highlighted comment from a customer of the business will be featured.

➤ Interaction:

Clicking on the title of the business will take you to the actual website of this business.

Design Trade-offs

The most challenging part of designing this interface was balancing the amount of information we wanted to show and the intuitiveness of the interface. Initially, we had planned to make both the scatter plot and bar chart clickable so that when users click on a point in the scatter plot, they could see more details on the card on the right side, and when they clicked on a rectangle in the bar chart, they could see type information on the right side as well. However, we decided against this option because we thought it would make the interaction too complicated. While we could have added instructions to guide the user, this might have increased the user's cognitive load.

Another potential issue with our design is that it might be difficult to click on a specific circle on the map due to overlapping points. While the pan and zoom function helps with this issue, some of the points may still overlap. One way to alleviate this is to increase the zoom level. However, this issue is unavoidable when the zoom level is small, as we wanted to make the circle large enough for click functions without overlapping.

Balancing the need for clickable circles with avoiding overlaps requires a compromise between these two needs.

Development Process

Our development process started with focusing on the most critical aspect of our visualization - the map. We plotted all the businesses on the map based on their location. Once the map was complete, we identified the user's exploration needs and brainstormed ideas to further improve the user experience. As a result, we decided to include an overview of all businesses on the left and details of a selected business on the right.

In addition to our existing interactions that enable users to explore different dimensions of data, we wanted to integrate a recommendation system into our design to create the best information visualization system possible. This recommendation system would be location-based and suggests popular and highly reviewed businesses based on the user's preferences.

However, due to limited resources, including having only two group members and one week of implementation time, we were unable to do much beyond our current capabilities. Moreover, the recommendation system might interfere with our design layout, which includes an overview on the left, a map in the middle, and detailed information on the right.

Work Breakdown

Tia/Hayley	Dataset Selection	1 Hour	
Tia	Right Card	8 Hours	Most Time
Hayley	Scatter Plot & Bar Chart Implementation	8 Hours	Most Time
Hayley	Scatter Plot & Bar Chart Interaction	6 Hours	
Tia	Scatter Plot & Bar Chart Style	2 Hours	
Tia	Overall Style	2 Hours	
Tia/Hayley	Map Implementation	6 Hours	

Tia/Hayley	Map Interactions (Click, Zoom.. etc)	8 Hours	Most Time
Tia	Storyboard	2 Hours	
Hayley/Tia	Report	8 Hours	Most Time