# Guide for Interactive Learning for Yelp Business Data Analysis

# Section 1: Sharing and understanding data

**POLL 1:** Which of these problems could be avoided by understanding your data, perhaps by using a data dictionary? (Answer: B)

1. There is a sudden uptick in customers calling about problems with a specific unit your company makes. Your quality engineering team discovers a problem with a batch that was shipped out, and now you may have to consider a product recall.
2. By analyzing historical data, you project that Betty’s Bakeries across the U.S. each go through roughly 60 eggs per day. After budgeting and placing orders for the next month, you realize the bakeries actually go through 60 *dozen* eggs each per day.

**Discussion (optional):**

* How does a data dictionary help increase data understanding?
* What are the advantages to including a data dictionary with a dataset?
* Give an example of how a business might use data incorrectly without a data dictionary.
* For more information about data dictionaries and metadata, check out this link: <http://library.ucmerced.edu/data-dictionaries>
* For some examples of more complex data dictionaries, check out this link: <https://data.nal.usda.gov/data-dictionary-examples>

# Section 2: Asking the right questions

One important way that businesses can take advantage of this data is by comparing themselves to similar businesses. This involves grouping businesses by particular categories.

**Breakout Rooms:**

1. What are some of the ways that you might group similar businesses, based on the columns in the data table above?

Example answer:

Data could be grouped by category, such as grouping all Yoga studios together, or by location, such as grouping all zip codes together.

1. How might businesses take advantage of the user data that Yelp collects? Try thinking about this question from a marketing perspective.

Example answer:

If a business is considering expanding to a new region, this data could be used to better understand the competitors that exist in that area. A business could also better understand the current customers of a similar business in that area.

1. If you could collect any user data from Yelp, what new data might you want to collect? What kinds of questions could you answer with this data?

Example answer:

Number of years that business has been open, price point, operating hours. I might ask, “if I’m opening a new coffee shop in Las Vegas, NV, how late should I stay open to remain competitive?”

# Section 3: Interpreting data visualizations

**Discuss:** One way that you could group businesses is by state. See the following bar chart for an example of this type of grouping.

A screenshot of a cell phone

Description automatically generated

Plots like this one can also be useful to Yelp users. For example, if you were trying to decide where to move, you could examine which cities have the most of certain businesses you like to visit, such as restaurants or museums. Note that this is just a subset of data – states such as Florida (FL) certainly don’t contain zero businesses with Yelp reviews!

**POLL 2:** If you wanted to move to a state that seems to have the most saturated market (i.e., the most businesses) based purely on the graph above, which state would you move to? (answer: AZ)

1. ON
2. NV
3. AZ
4. SC

**Discuss:** Another way to visualize this data is by location (specifically, coordinates), which can be seen below.

A screenshot of a cell phone

Description automatically generated

This visualization shows businesses grouped by city, and then plotted using the businesses’ latitudinal and longitudinal coordinates.

**POLL 3:** Which city on the heat map appears to have the highest concentration of businesses? Is this surprising given your answer to the last question (**POLL 2**)? Answer: a. Las Vegas, NV. This might be surprising, as AZ had the highest concentration of businesses at a state-level. We can infer the businesses in AZ are more spread out as opposed to being more concentrated in one city, according to this dataset.

1. Las Vegas, NV
2. Phoenix, AZ
3. Ontario, ON
4. Calgary, AB

**Breakout Rooms:**

1. Look back at question 3. If you had collected that kind of data, what kind of visual representation could you create to understand the results?

- For guidance and inspiration, check out: <https://www.data-to-viz.com/>

Example answer:

e.g. If I was seeking to expand my yoga business, I may want to know what the price points are for other yoga studios by location. For this I could make a heat map with latitude and longitude such as the one above, but size or color my bubbles based on price point rather than number of businesses.

1. What might you infer if you mistook this data set to be representative of all businesses in the US?

Example answer:

You might think that FL has zero businesses, or that the Yelp app is only regionally popular.

# Section 4: Data ethics and privacy

Yelp acquires access to all of this data by collecting user feedback. While it is not presented here, Yelp keeps data on specific users as well as businesses. Yelp is then able to track the kinds of places you like to go, as well as your location.

**Breakout Rooms:**

1. Is Yelp’s data collection a violation of privacy, or is it necessary to provide the best possible service to its users?

Potential Discussion Options:

Is downloading the Yelp app or making an account a good enough form of consent? E.g., is the data collection made clear in the terms and conditions

How are users benefitting from Yelp saving their data? E.g., Yelp can recommend places based on similar places you’ve liked. Is that service worth the loss of privacy?

1. What other types of applications are keeping track of your data?

Potential answer:

Spotify, Apple and Google Maps, Facebook, Instagram, Snapchat, and most other apps!

* To continue this discussion of the ethics involved in Artificial Intelligence, check out these materials: <https://github.com/generationai/Johns-AI-Intro-2020>

# Challenge problem: Try it yourself

**Challenge Problem:** Using the Excel file *NC\_Yelp.xlsx* containing data Yelp data from North Carolina (NC), add filters to different columns and examine the different ways to filter the data based on your preferences. For example, try looking for restaurants in Charlotte, NC, with a rating above 3 stars using Excel filters. How many businesses did you find?

Answer: 1814

\*\*Note: This data is a small subset of data from one single state. If you wanted to look at this entire data set, or a data set containing years of Yelp reviews across the United States, you would need to use more advanced tools to open and manipulate the larger data set. For instance, you could learn a statistical programming language such as R or Python, or you could create a *data base* that you can *query* (or ask questions to) in a language called SQL. In the year 2020, you may have a data scientist who does this for you. In that case, it’s important to be able to communicate effectively with the data scientist and have some understanding of how data can be used for analysis.

In the future, it may be increasingly useful for you to be capable of manipulating large data sets yourself, regardless of your field or job title. To learn more about how to manipulate the entire dataset used here and see how these graphs were made, take a look at the code [here](https://mitreextorg.sharepoint.com/sites/GenAI/Shared%20Documents/Forms/AllItems.aspx?id=%2Fsites%2FGenAI%2FShared%20Documents%2FGeneral%2FPurdue%2FYelpBusinessesLesson%2FSolution%5FSet%5FYelp%2Eipynb&parent=%2Fsites%2FGenAI%2FShared%20Documents%2FGeneral%2FPurdue%2FYelpBusinessesLesson).