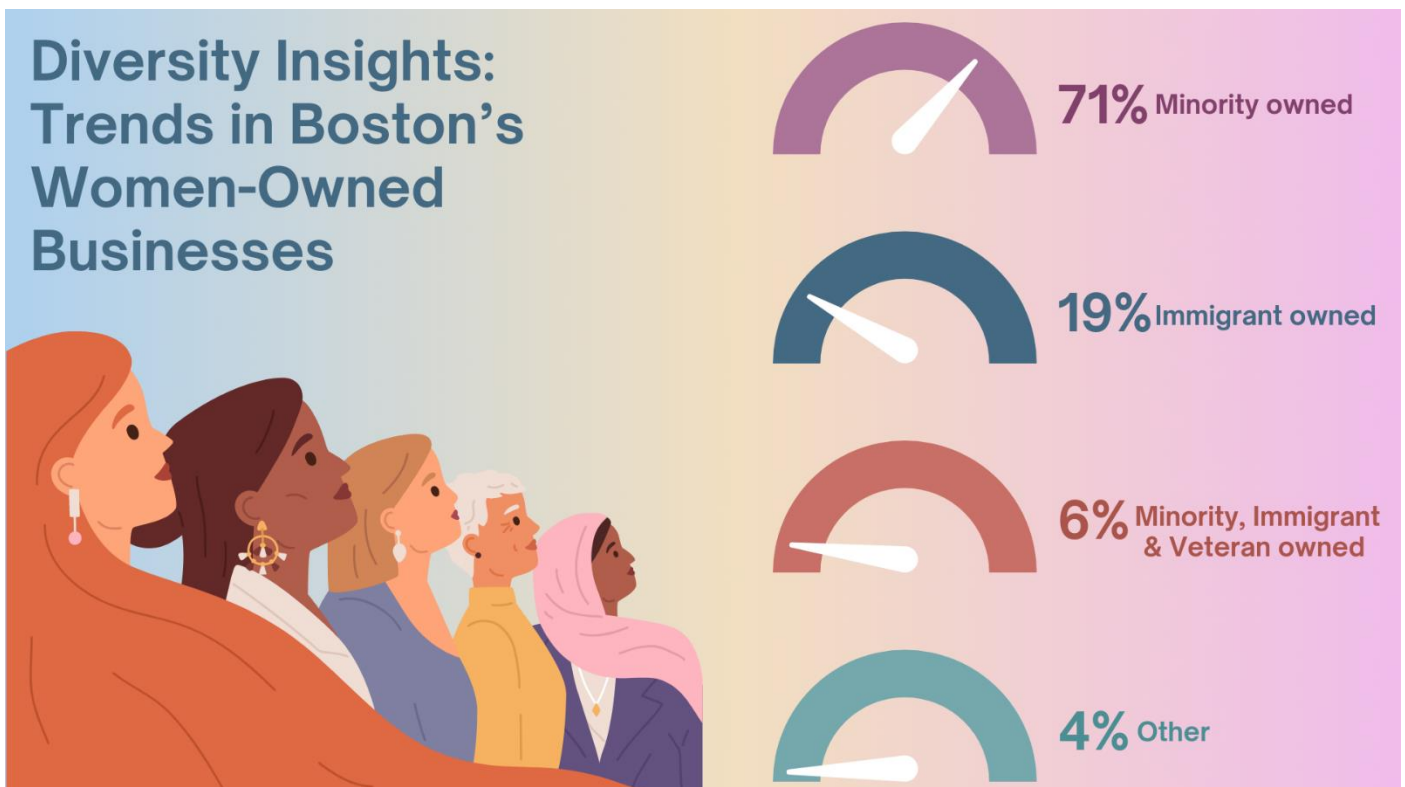cs617 visualizing.boston

Where Women Lead
She Means Business: Exploring Boston's Women-driven Enterprises
CS 617 Final Project Report

Nishika Divya Lewis 20 May, 2024

ABSTRACT:

This project aims to analyze self-identified Women-Owned businesses in the City of Boston using a comprehensive dataset to gain insights into their distribution, digital presence, and ownership diversity. By leveraging various data analysis frameworks and visualization tools, the project will deliver a clear data story that can inform policy decisions, highlight trends and opportunities, and support women entrepreneurs in the region.

Diversity Insights: Trends in Boston's Women-Owned Businesses

71% Minority owned

19% Immigrant owned

6% Minority, Immigrant & Veteran owned

4% Other

(Numbers for Representational purposes only)

DESCRIPTION:

INTRODUCTION:

Women Entrepreneurs Boston (WE BOS) group plays a vital role in empowering female entrepreneurs by providing crucial resources and fostering a supportive network. As part of this mission, WE BOS offers a valuable dataset showcasing self-identified women-owned businesses within the city. This dataset, meticulously updated since October 3rd, 2019, offers a rich source of information to understand the landscape of women-owned businesses in Boston.

While women entrepreneurs are a significant driving force in the city's economy, readily available metrics of their distribution, industry focus, and ownership diversity remains limited. This lack of data driven insights can hinder informed decision-making for local policymakers, support networks, and aspiring women entrepreneurs.

The goal is to bridge this data gap by leveraging the WE BOS dataset. Through a comprehensive analysis, we will uncover meaningful patterns and trends within the data, ultimately generating actionable insights that can empower stakeholders across the ecosystem supporting women-owned businesses in Boston.

BACKGROUND MOTIVATION:

My personal experience perfectly exemplifies the impact of women-owned businesses in Boston. As a huge fan of Tatte Bakery's phenomenal cookies, I was thrilled to discover it is a woman-owned venture. Seeing their products lining grocery store shelves further solidified the impressive reach of this business, born from a local market in Boston. This discovery sparked a deeper curiosity – I wanted to explore the broader landscape of women-owned businesses in Boston and understand their collective impact.

This project goes beyond simple exploration. As a fellow woman, I am driven by the desire to contribute to the success of these businesses. By bringing data-driven insights to light, we can identify areas where support networks and resources might be lacking, ultimately empowering these businesses to thrive even further.

FINAL DESCRIPTION:

This project delves into several key characteristics of businesses using the WE BOS dataset, which is current as of May 15th, 2024.

Specifically, it investigates:
Industry Types: The project categorizes businesses according to the North American Industry Classification System (NAICS). NAICS codes provide a standardized way to classify businesses based on their primary activity.
Geographic Distribution: The project examines the geographical spread of the businesses. This involves analyzing the locations by neighbourhood. This project reveals where these businesses are concentrated and provides insights into potential regional trends.
Online Presence: The project assesses whether the businesses have an online presence, likely indicating a website. In today's digital age, a website is a crucial tool for businesses to reach customers and establish credibility.
Business Owner Diversity: The project explores the diversity of the business owners based on the information available in the WE BOS dataset.

By examining these various aspects, this project aims to paint a comprehensive picture of the businesses within the WE BOS dataset. It can provide valuable insights into industry trends, geographic landscapes, online engagement, and the makeup of business ownership.

DATASETS

DATA SOURCES:

Primary Dataset: https://data.boston.gov/dataset/women-owned-businesses
Supplemental Data Resources:
https://www.boston.gov/departments/economic-development/women-entrepreneurs-boston
https://www.fundingcircle.com/us/resources/boston-resources-for-female-entrepreneurs/

Original Dataset:
The dataset contains information about various women owned businesses, structured into eight columns:

1. Business Name: The name of the business.
2. Business Type: A description of the industry or services provided.
3. Physical Location/Address: The street address of the business.
4. Business Zip code: The postal code where the business is located.
5. Business Website: URL of the business's website, if available.
6. Business Phone Number: Contact telephone number for the business.
7. Business Email: Email address for business contact.
8. Other Information: Additional details such as whether the business is minority-owned.

Wrangled Dataset:
The dataset contains information about various women owned businesses, structured into eight columns:

1. Business Name: The name of the business.
2. Business Type: A description of the industry or services provided.
3. Physical Location/Address: The street address of the business.
4. Business Zip code: The postal code where the business is located.
5. Business Website: URL of the business's website, if available.
6. Business Phone Number: Contact telephone number for the business.
7. Business Email: Email address for business contact.
8. Other Information: Additional details such as whether the business is minority-owned.
9. Neighborhood: A list of Neighborhoods where the businesses are in, based on Business Zip code.

PERFORMED DATA WRANGLING:

- Handled missing data by interpolation or flagging for further research **(e.g., filling in missing website URLs where possible)**.
- Standardized Business types using the North American Industry Classification System (NAICS).
- Removed duplicated data.

- Added an additional column "Neighborhood" based on the column "Business Zip codes" for maintaining consistency to perform location analysis.
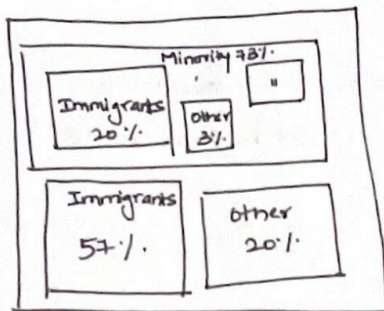
PAPER SKETCHES
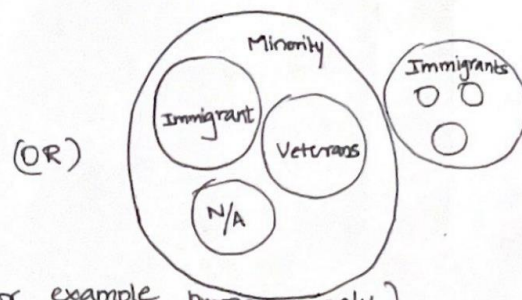
PROPOSED VISUALIZATION SKETCHES ON PAPER:
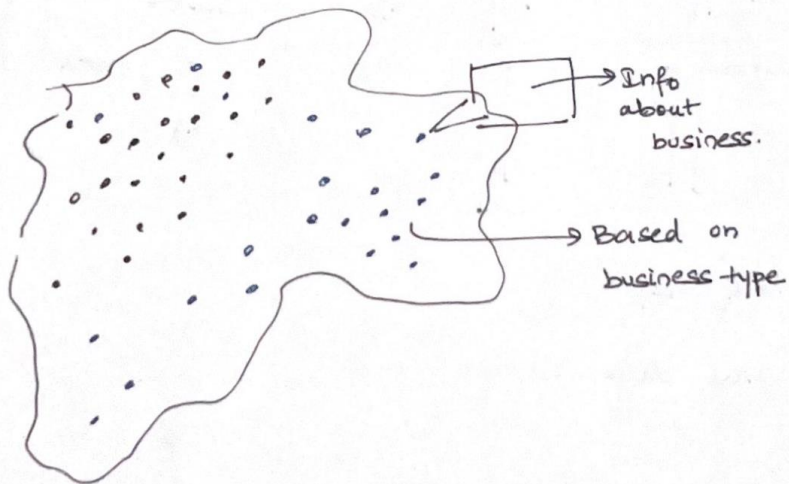
*ONLINE WEBSITE PRESENCE

Graphs or Infograph of comparison

* GEOGRAPHICAL ANALYSIS

Dot Distribution map - Proposed graph

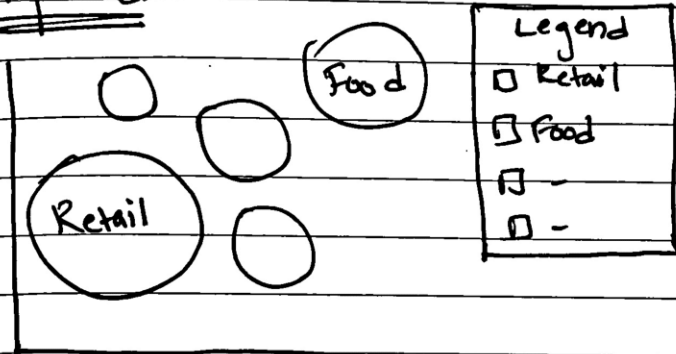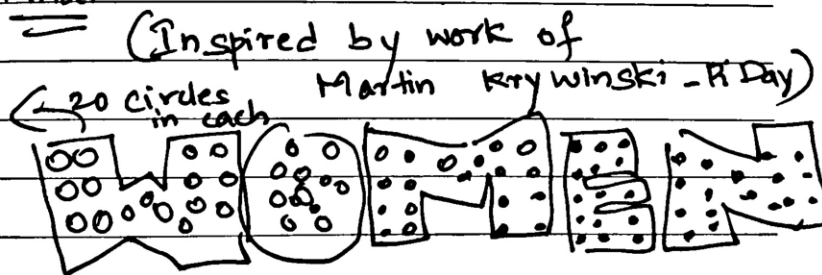→ Info about business.

→ Based on business type

FINAL VISUALIZATION SKETCHES ON PAPER:

FINAL VISUALIZATION SKETCHES

① BUSINESS TYPES:-

Proposed:

	Legend
Food	□ Retail
Retail	▣ Food
	◪ -
	◨ -

Final

(Inspired by work of Martin Krrywinski - A Day)

← 20 circles in each

WOMEN

↳ Dot Matrix

Legend
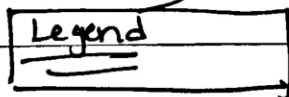
$O \Rightarrow$ 1 unit
or
1 °/e

② LOCATION ANALYSIS:—

PROPOSED:—

Retail
Business
name

FINAL:—

Image

→ Highest

→ Bar graph
race

(Changed due to
inconsistent
location data)

(no latitude/longitude
provided)
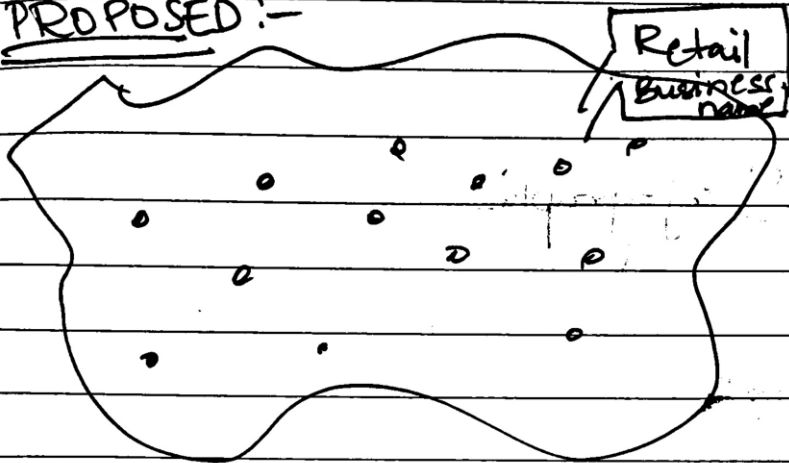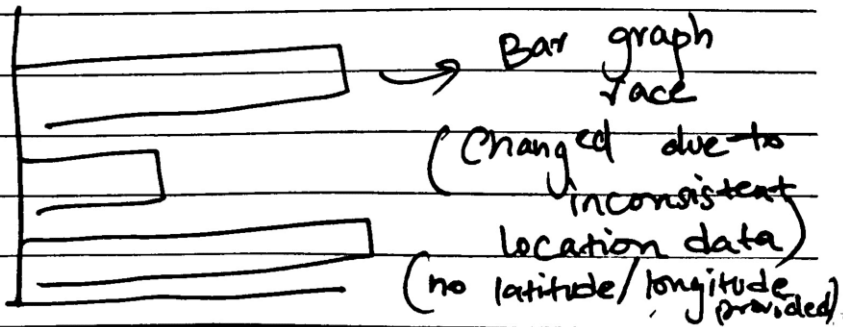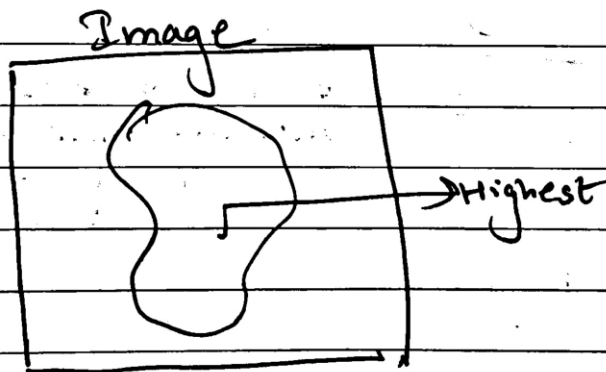
③ ONLINE WEBSITE PRESENCE

PROPOSED

Infographic

FINAL

Single Isograph

8 out of 10 businesses have Jan online presence

□ □ □ □ □ ▨ ▨

④ DIVERSITY ANALYSIS

PROPOSED

TREE MAP

MINORITY

Immigrant
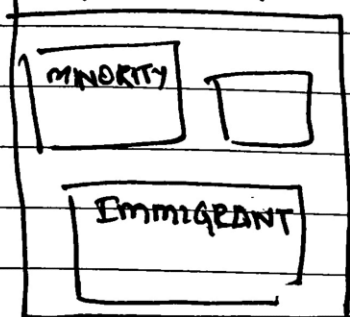
(OR)

PACKEDCIRCLE
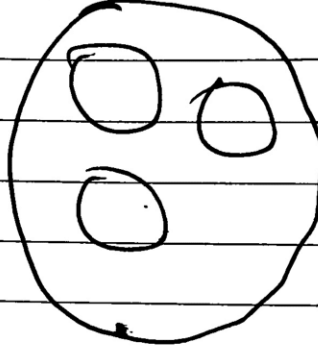
FINAL

(Interactive Donut Chart with Sound)

Legend

→ Minority

→ Immigrant

Button → for sow
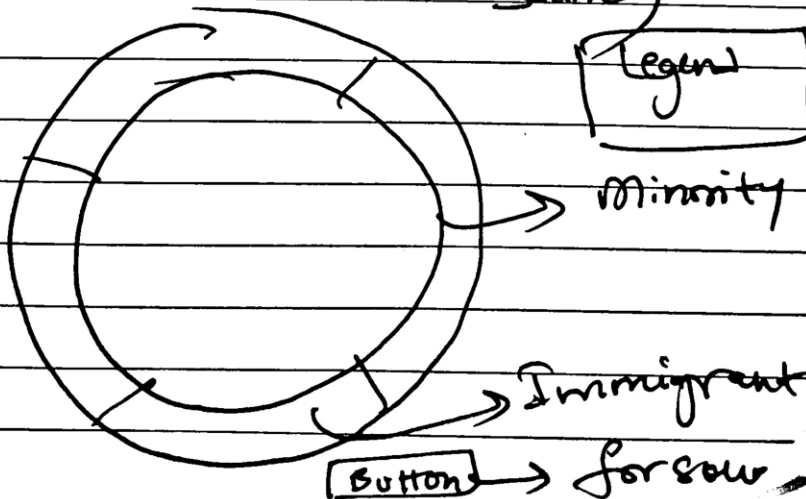
TECHNOLOGIES, DEVELOPMENT AND DEPLOYMENT STEPS:

USED FRAMEWORKS AND LIBRARIES:

The following frameworks and libraries have been used in the final implementation of the code:

1. Google Fonts
   - URL: `https://fonts.googleapis.com`
   - Purpose: To include the "Inter" font family for consistent and attractive typography.

2. Plotly.js
   - URL: `https://cdn.plot.ly/plotly-latest.min.js`
   - Purpose: To create and animate the bar chart and donut chart visualizations.

3. Intersection Observer API
   - URL: Native to JavaScript (no external URL)
   - Purpose: To detect when elements (charts) enter or leave the viewport and trigger animations accordingly.

DEVELOPMENT STEPS:

Data Wrangling:

- Handled missing data by interpolation or flagging for further research (e.g., filling in missing website URLs where possible).
- Standardized business types using the North American Industry Classification System (NAICS).
- Removed duplicated data.
- Added an additional column "Neighborhood" based on the column "Business Zip codes" for maintaining consistency to perform location analyses.

Exploratory Analysis:

- Conducted exploratory data analysis (EDA) to identify key trends.
- Mapped out all the possible charts using different field types.

Visualization:

- Mapped geographic distribution by zip code and worked on creating a Racing Bar Graph.
- Plotted dot matrix in a creative way to show percentages of business types - Inspired by the work of Martin Krywinski - Pi Day.
- Created an interactive donut chart to show diversity among business owners.
- Created a single isograph for showcasing online presence of Business owners.

Story Development and Refinement:

- Structured the data story with visualizations and descriptive text.
- Reviewed the narrative for clarity and impact.

Finalized Color Palette and Animations:

- Finalized color scheme and animations based on visualizations and the story.
- Created a storyboard with relevant frameworks.

Deployment:
Uploaded related files to GitHub repo and used GitHub website hosting to deploy.

FINAL PRODUCT:

Screenshot 1:

Scrollable header with transparent background

Download dropdown menu button- to download the cleaned dataset and original dataset

Where Women Lead 💼

Download Dataset

Cleaned Dataset

Original Dataset

She Means Business: Exploring Boston's Women-driven Enterpr

Screenshot 2:

Creative dot matrix chart - Inspired by the work of Martin Krywinski - Pi Day

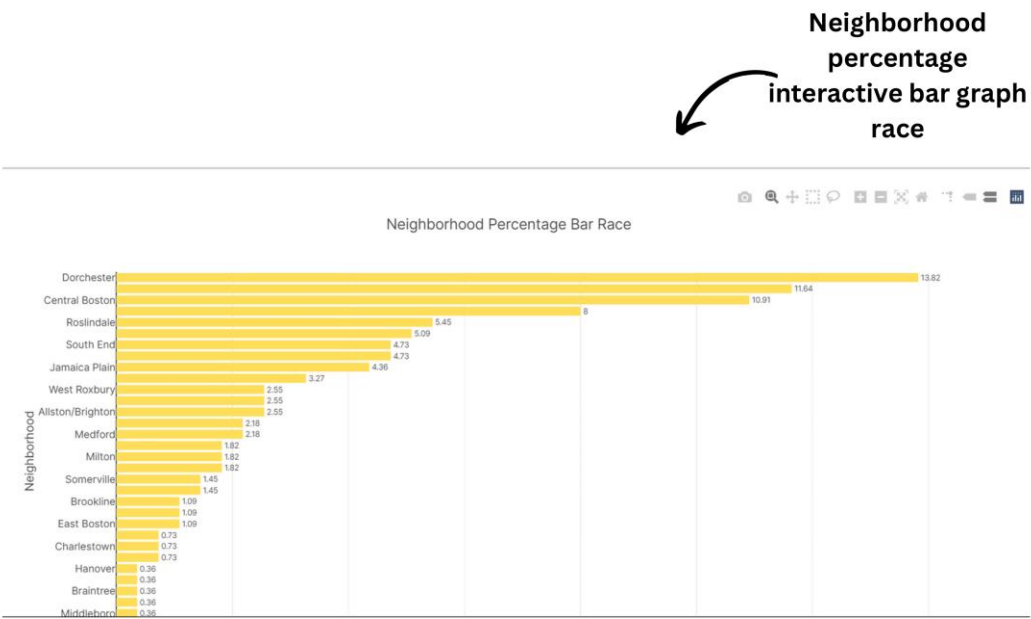### Nearly 40% of Boston's Women-Owned Businesses Focus on Professional, Scientific, and Technical Services

Professional, Scientific, and Technical Services: 40% 🔵

Retail Trade: 15% 🔵

Accommodation and Food Services: 9% 🟢

Healthcare and Social Assistance: 9%

Other Services (Except Public Administration): 8% 🟢

Education: 5% 🔴

Real Estate, Rental and Leasing: 3% 🔴

Construction: 3% 🟠

Amusement, Recreation, and Transportation: 3% 🟣

Information: 2% 🟣

Manufacturing: 1% 🟡

Finance and Insurance: 1% 🟤

Environment Services: 1% ⚪

Each letter = 20 ⚫
⚫ = 1%

Note: All percentages have been rounded to the nearest whole number.

Screenshot 3:

Neighborhood percentage interactive bar graph race

Neighborhood Percentage Bar Race

Screenshot 4:

The Powerhouse: Minority Women Shaping Boston's Business Landscape!

Diversity Breakdown of Businesses

Interactive animated donut graph

- Minority-owned
- Immigrant-owned
- Veteran-owned
- N/A

Immigrant-owned 22%

Veteran-owned 1.83%

N/A 0.917%

Diversity

Minority-owned 75.2%

Sound feature

Start Animation with Sound

Isograph gif to show online presence

8 out of 10 businesses have an online presence !

women-owned businesses in Boston are already rocking the online world. That means more customers are finding them, and their businesses are growing. Just
you're a business owner, having an online presence these days is kind of a big deal.

LINK TO PROJECT:

https://nishikalewis.github.io/Visualizing-Massachusetts/Women_owned_Businesses/index.html

LINK TO CODE AND ASSETS:

https://github.com/nishikalewis/Visualizing-Massachusetts/tree/main/Women_owned_Businesses

REFERENCES:

RESOURCES / TUTORIALS:

- https://codepen.io/cameronknight/pen/WNZVNyz
- https://www.youtube.com/watch?v=nEcjp2WiFQ0
- https://www.youtube.com/watch?v=lsP_ZVtlySc
- https://www.tutorialsteacher.com/d3js/animation-with-d3js
- https://gsap.com/community/forums/topic/33277-one-layered-panel-only/
- https://vega.github.io/vega-lite/examples/geo_circle.html
- https://www.geeksforgeeks.org/python-plotly-tutorial/