# DH100 Data Storyboard

Greenhouse Gas Emissions | Student: Jacob Chow | 5/26/21

#### Introduction:

Carbon dioxide is the largest greenhouse gas(GHG) contributor to climate change, and the majority of the atmospheric carbon today is a result of anthropogenic sources. This project intends to track the annual carbon dioxide emissions by entity/regional location. As modern day society finds itself increasingly burderned by the impact of climate change, we must continue to substitute fossil fuels for renewable alternatives.

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53387412.07

4279224.01

Asia and Pacific (other)

Americas (other)

China 245611.54

United States

EU-28

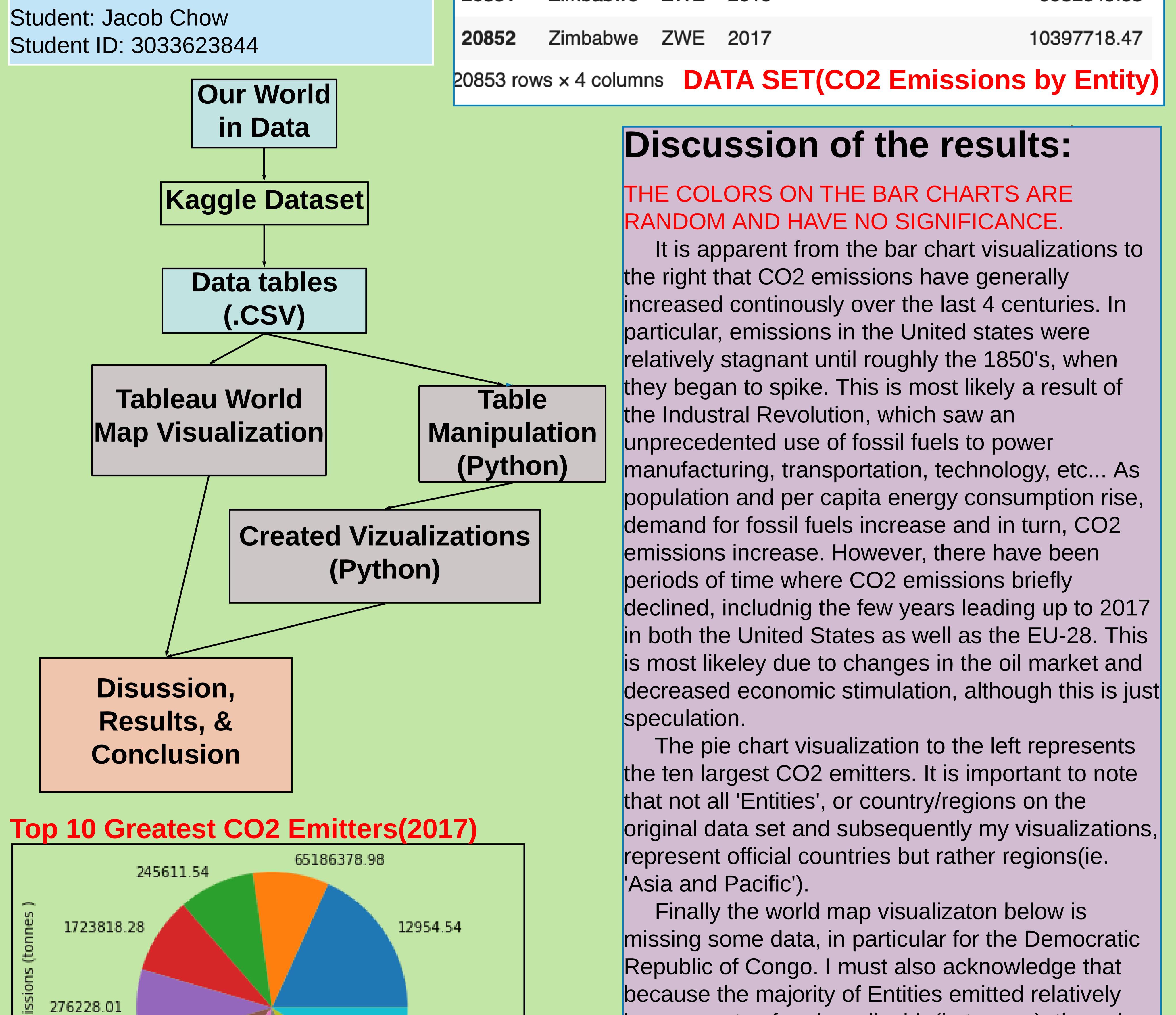
India

Middle East

Europe (other)

Russia

Africa



9838754028.0

1512172.78

72702485.07

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	Entity	Coae	rear	Annual Co	O <sub>2</sub> emissions	(tonnes)
0	Afghanistan	AFG	1949			14656.00
1	Afghanistan	AFG	1950			84272.00
2	Afghanistan	AFG	1951			91600.00
3	Afghanistan	AFG	1952			91600.00
4	Afghanistan	AFG	1953			106256.00
•••		•••	•••			
20848	Zimbabwe	ZWE	2013			11536239.29
20849	Zimbabwe	ZWE	2014			11866348.41
20850	Zimbabwe	ZWE	2015			10907603.94
20851	Zimbabwe	ZWE	2016			9932649.88
20852	Zimbabwe	ZWE	2017			10397718.47
20853 rows x 4 columns DATA SET/CO2 Emissions by Entity						

#### Discussion of the results:

THE COLORS ON THE BAR CHARTS ARE RANDOM AND HAVE NO SIGNIFICANCE.

It is apparent from the bar chart visualizations to the right that CO2 emissions have generally increased continously over the last 4 centuries. In particular, emissions in the United states were relatively stagnant until roughly the 1850's, when they began to spike. This is most likely a result of the Industral Revolution, which saw an unprecedented use of fossil fuels to power manufacturing, transportation, technology, etc... As population and per capita energy consumption rise, demand for fossil fuels increase and in turn, CO2 emissions increase. However, there have been periods of time where CO2 emissions briefly declined, includnig the few years leading up to 2017 in both the United States as well as the EU-28. This is most likeley due to changes in the oil market and decreased economic stimulation, although this is just 2) This data analysis will only analyze the carbon emission speculation.

The pie chart visualization to the left represents the ten largest CO2 emitters. It is important to note that not all 'Entities', or country/regions on the original data set and subsequently my visualizations, represent official countries but rather regions(ie. 'Asia and Pacific').

Finally the world map visualizaton below is missing some data, in particular for the Democratic Republic of Congo. I must also acknowledge that because the majority of Entities emitted relatively low amounts of carbon dioxide(in tonnes), the color gradient is not as appparent.

#### Tools and Methods:

1) I used Kaggle/Jupyter Notebook to analyze the data. Panda was the main tool used to manipulate the

2) I began with a table sorted by country, which provides the CO2 emssions data for each country across various years. There are many countries, which is why it was difficult to visualize the emissions data per country for a given year. Instead I isolated the USA emissions data so that I could plot it over

3)Next, I isolated the CO2 emissions data for 2017 only, condensing the multiple entries for each entity into just one for each. I sorted the table by 'Annual CO2 emissions (tonnes)' in descending orderm. Because the Entities from the data and then I had to drop the World entity because it completely skewed the visualization. I also dropped the 'Year' and 'Code' columns. I then made a pie chart visuzalation of the ten largest CO2 emitters.

4) I then used tableau to create an interactive visualization of a world map that color codes countries based off of their 2017 CO2 emissions. Darker shades of color(blue) indicate an entity with comparitively large carbon dioxide emissions in 2017, and vice versa for entities with lighter shades of color.

### Descriptions:

1) Dataset - The data set I will work with is provided by Kaggle. It is Carbon Dioxide Emissions Data. Entries are organized by 'Entity', which represents a country/region for various years(1750-2017). The data is not available for all Entities, which will of course limit the anlysis. I will only choose to work with comprehensive data and all omitted entireis/data will be acknowledged.

sources, and not analyze the impact of said emissions. It does not take into account for emissons that can be transported to other countries/regions, and only accounts for where/when these emissons are actually being released.

#### Central Research Questions:

How have carbon dioxide emissions across the largest emitters changed over the past 4 centuries?

How do CO2 emissions compare between countries at a specific point in time? Overtime?

## Interpreting the Results:

I have multple visualizations for the data. To the left is a pie chart of the top 10 largest carbon emitters. To the right are a series of bar charts that represent how annual CO2 emissions have changed over time for the top 3 greatest emitters - China, the United States, and the EU-28(28 European countries that operate under an economic/political block). All of the bar chart visualizations are to the same scale. Below is the final visualization, a world map for 2017 that depicts Entities with higher CO2 emissions with a darker color gradient, and Entities with lower CO2 emissions are depicted with a lighter color gradient.

