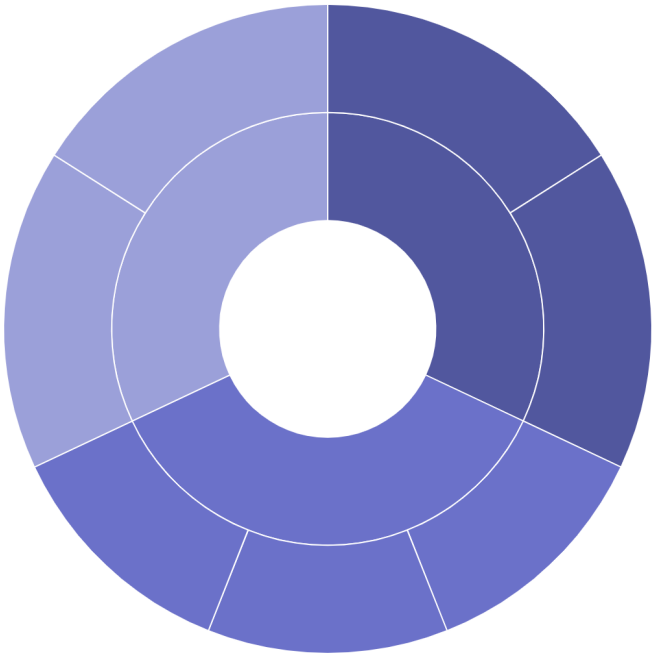
Members: Sai Vadlamudi, Marie Tessier

- **Overview and Motivation: Provide an overview of the project goals and the motivation for it. Consider that this will be read by people who did not see your project proposal.**

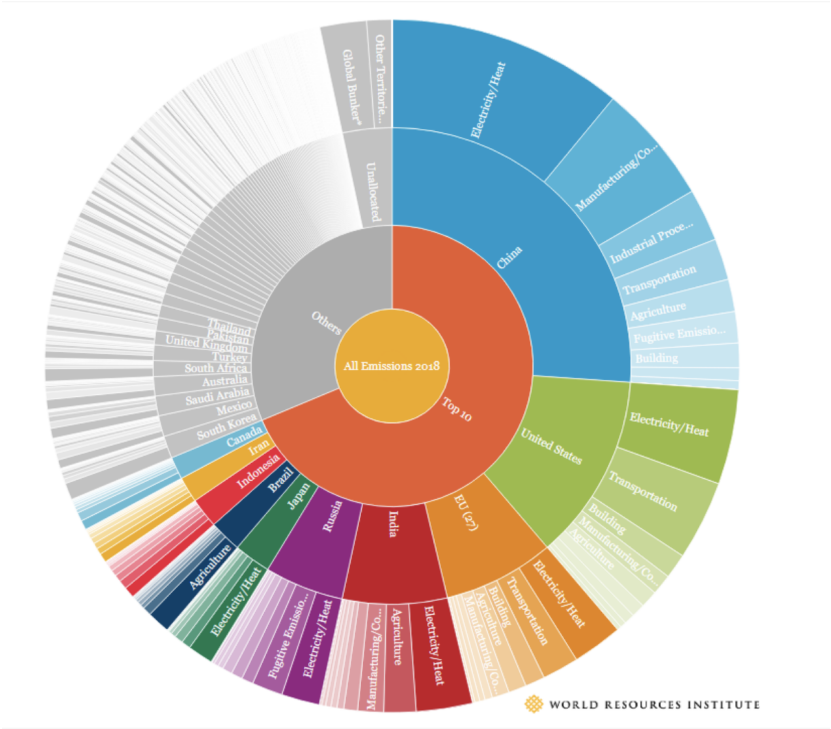
The purpose for this website is to bring an understanding on the effects of climate change. We want to create clear visualizations on temperature changes through the years in the Worcester area.

- **Related Work: Anything that inspired you, such as a paper, a web site, visualizations we discussed in class, etc.**

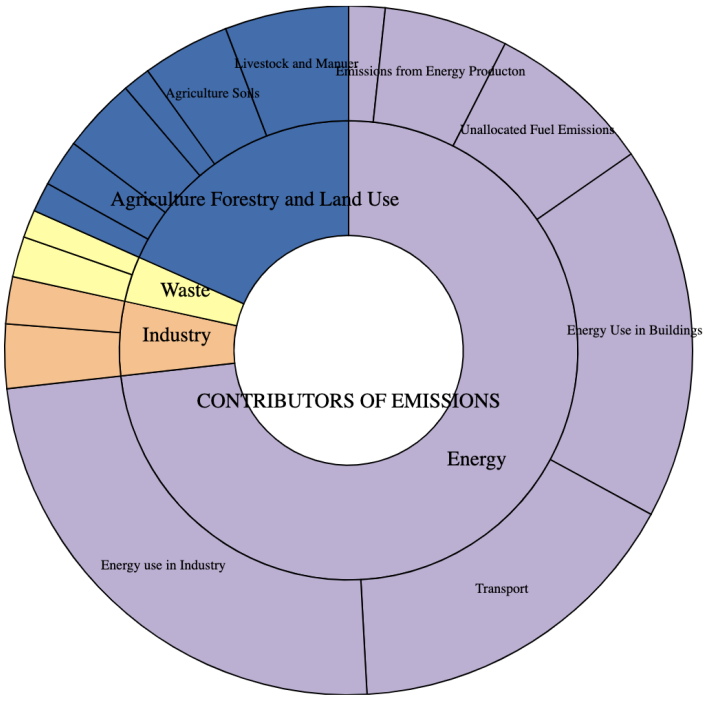
When we first talked about what we wanted to do we were focused on showcasing the ongoing climate crisis. We began to look online for data visualizations that emphasized just how dangerous global warming is getting and the factors that contributed to it. One of our main inspirations comes from bl.ocks.org that showcases various data visualizations but the one below stuck out the most.



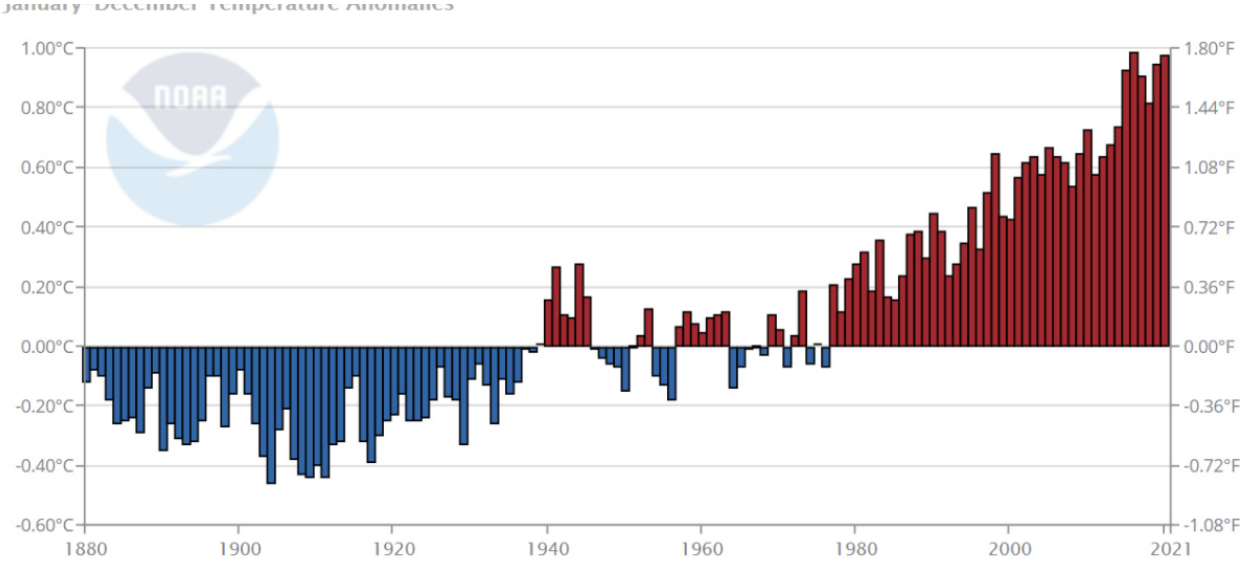
We felt that this graph known as the “sunburst” could incorporate various data points such as the top countries in greenhouse gas emissions of the world which could be placed in the inner ring and the main contributors of emissions in that country as the outer ring. This can be better seen in the visualization below:



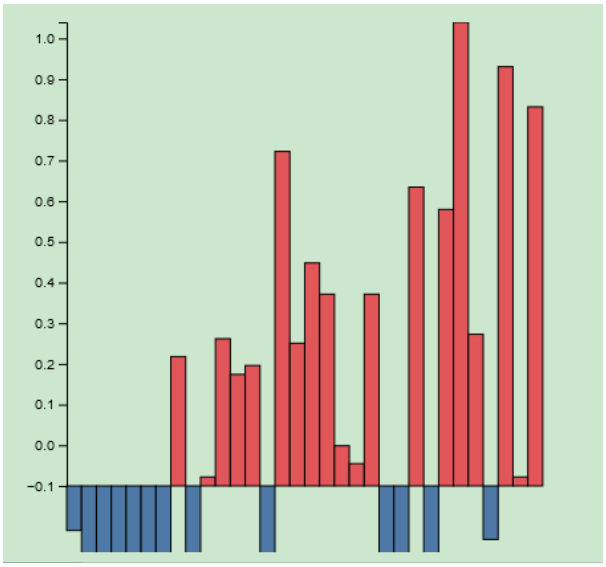
This is the visualization that we were going for but then we realized that this graph would not particularly give people new information as it is commonly known where the biggest emissions come from such as China, India, and the United States. Instead we opted to go for different data points but still using the sunburst chart. We settled on using the top causes of greenhouse gas emissions and the industries they are caused in. This can be seen in the final rendering of our graph below:



In addition to this we also wanted to show the climate crisis over time and when researching how best to visualize this, we came across this visualization.



We felt that this perfectly described how as time goes on, the average temperature continues to increase. Using the above graph as an inspiration we were able to build the following rendering:



- **Questions: What questions are you trying to answer? How did these questions evolve over the course of the project? What new questions did you consider in the course of your analysis?**

  The main question we were trying to tackle is what were the leading contributors in greenhouse gasses to the climate change crisis. In addition to this we were looking to

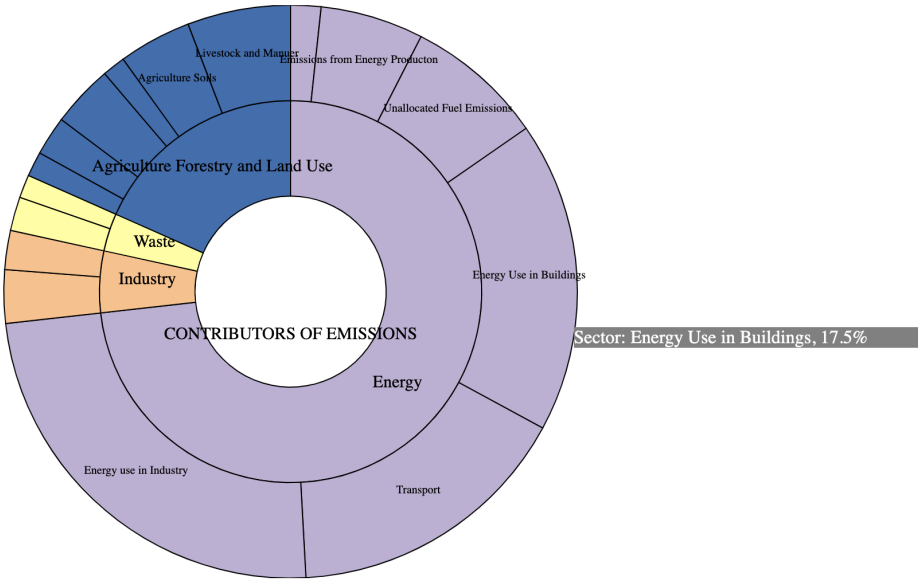
visualize how the world is changing over time due to this crisis. We feel that with the combination of these graphs we were able to answer these questions or atleast get a better understanding.

- **Data: Source, scraping method, cleanup, etc.**

  For the sunburst chart depicting the biggest greenhouse gas contributors, we found a website that already had data last updated in 2016 and simply took the data of the website at (https://ourworldindata.org/emissions-by-sector) and structured it in the javascript in json format. For the temperature anomaly chart we were able to find a csv file depicting average temperature anomalies starting from 1990 to 2022 within the coordinates of Worcester MA. There was no data cleanup necessary as all the information that we needed existed.

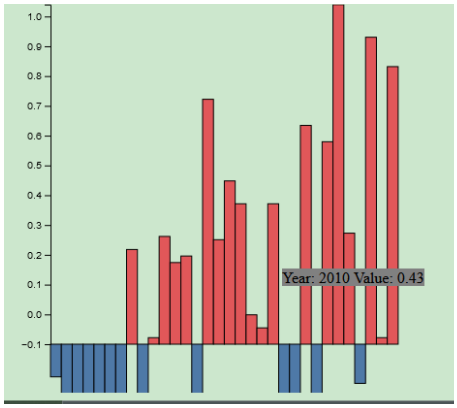
- **Implementation: Describe the intent and functionality of the interactive visualizations you implemented. Provide clear and well-referenced images showing the key design and interaction elements.**

  One of the biggest functionalities we implemented both in the sunburst chart as well as the temperature anomaly chart was the ability to hover over the data. When hovering over the data you are able to see more information pertaining to that portion of the



  graph.

  For example when hovering over the portion entitled “Energy Use in Buildings” You are able to see the sector name as well as what percentage it contributes to the overall graph. In addition to this, we decided that it would be most beneficial if we left out the names of the smaller areas so that the user can hover over and find the names in a more efficient way rather than the names being cluttered. However, we chose to include all the names of the major contributions so the user may know what category of emissions they are selecting.



Another major functionality is a temperature anomaly bar graph. It has the capability for mouse hover over to display the year and temperature value. The color choice was to indicate temperatures with a warming trend to be red and a colder trend to be blue.

- **Evaluation: What did you learn about the data by using your visualizations? How did you answer your questions? How well does your visualization work, and how could you further improve it?**

  For further improvement, we could make the sunburst chart easier to read and have the titles all show up at once and have them outside of the chart so that they are not as crowded. In addition to this I feel that we could have another ring in the chart depicting another data key such as countries with highest greenhouse gas emissions.

  When implementing the barchart, we could improve the layout. It could be more intuitive for the audience to read if the chart had grid lines to provide reference for the value of the bars.

Research:

https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/worcester_united-states_4956184
https://www.ncdc.noaa.gov/cag/global/time-series/42.3,72/land_ocean/12/1/1880-2022
https://www.ncdc.noaa.gov/monitoring-references/dyk/anomalies-vs-temperature
https://pstblog.com/2016/10/26/climate-change
https://www.metoffice.gov.uk/hadobs/hadcrut4/data/current/download.html
http://bl.ocks.org/chrisdamba/fa46a13260b875c0b08da81fdc64dac8
https://www.nytimes.com/2020/04/23/learning/whats-going-on-in-this-graph-global-temperature-change.html
https://www.anychart.com/blog/2021/01/15/climate-change-data-visualizations/
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https://bl.ocks.org/denjn5/e1cdbbe586ac31747b4a304f8f86efa5