

COM-480 Milestone 2

The Data Divas: An interactive journey through greenhouse gas emissions

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The goal of this project is to build an interactive website where the user can extract, compare and analyze the worldwide distribution of greenhouse gas (GHG) emissions in a convenient way. We hope that this website, by applying the data visualization knowledge obtained from lectures as well as other methods can help the user raise awareness of the importance of reducing GHG emissions and the need for collective action to address climate change. In this second milestone, we present our various goals. In section I, the conceptions and related sketches are introduced. In section II, a website prototype is shown. In section III, additional potential ideas are also introduced. Finally, in section IV, the tools implemented in this project are listed as well as related lectures.

I. CONCEPTION

A. Menu bar

This menu bar is the backbone of the website. A schematic of the planned visualization is displayed in Fig. 1.

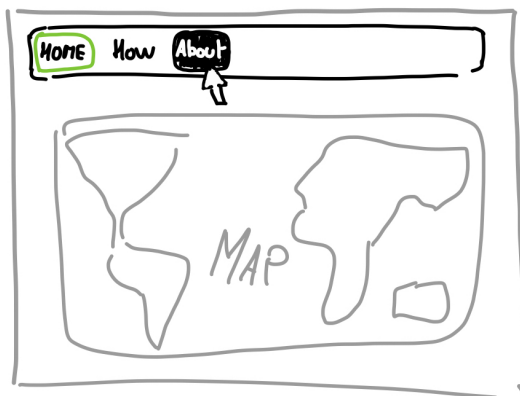


Fig. 1: Menu bar sketch.

The menu bar displays different tab names (maybe "Home", "How to", "About", and "Sources") in a way that when the user clicks on one of them, its content will display as a pop-up page. These pop-up-like pages contribute to the overall goal of the website structure being a one-pager.

B. Interactive world map of GHG emissions

This is our core visualization, based on an interactive map. Spatial and temporal information are present to explain the distribution of emissions around the globe in a way that is

easy to understand. We want this map to display the data in an engaging and striking approach so that it has an impact on the reader. The schematic of the planned core visualization is displayed in Fig. 2.

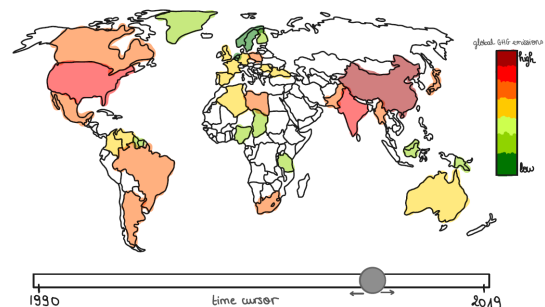


Fig. 2: Core visualization sketch: GHG emissions distribution interactive worldmap.

The country's colour represents the grade of GHG emissions (low to high). This way, the user can have a spatial comparison between countries. In addition, a time slider allows one to travel across the years.

C. Graphs of GHG emissions by sector and by gas type

When the user clicks on a selected country, we want detailed information to appear as a pop-up on the map for example as in Fig. 3. For this, the GHG emissions distribution across sectors will be displayed in a barplot like in Fig. 4. In addition, the contribution from different gases will be shown, as in Fig. 5.



Fig. 3: Sketch of the details popup appearing.

When the user hovers over a country, it will be highlighted and the actual number of GHG emissions will be displayed. If the user clicks on the country, 2 graphs would be displayed. One graph would represent a barplot comparing the sectors responsible for GHG emissions in this country, to better

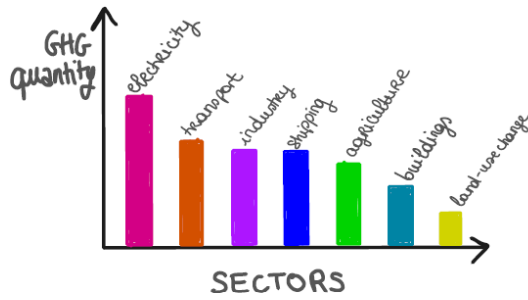


Fig. 4: Sketch of the barplot for GHG emission distribution across sectors.



Fig. 5: Sketch of the chart with the contribution of different gases to GHG.

understand the different factors at stake. Another graph (for example a stacked horizontal bar chart) would compare the different types of gases (Carbon Dioxide CO_2 , Methane CH_4 , Nitrous oxide N_2O) responsible for GHG emissions in the selected country. We would want to make first appear the sectors barplot and that the user can go to the second chart using a 'Next' arrow.

D. GHG emission counter

This widget is a funny counter that will display directly the growth of worldwide GHG emissions during the time the user spends on the website. The schematic of Fig. 6 could appear at the top right of the website.

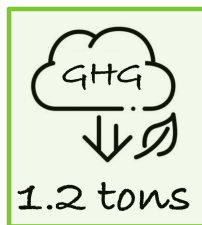


Fig. 6: GHG emission Counter

Every second, it will increment the quantity of GHG emitted worldwide in a second (roughly 1.2 tons of CO_2 equivalent).

II. WEBSITE

Our initial website can be viewed here.

III. ADDITIONAL IDEAS

A. News streamer

We want to include news on the topic of climate change, ecology, and GHG emissions. A great idea would be to display the news as a continuous information banner, like a news streamer we can find on continuous broadcast TV news channels. A schematic of the planned visualization is displayed in Fig. 7.

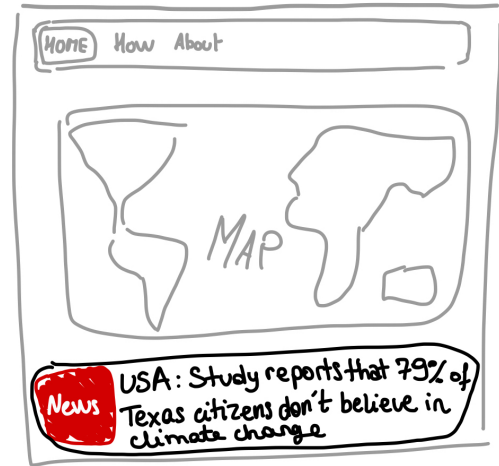


Fig. 7: GHG News streamer

IV. TOOLS

In Milestone 1 we presented the datasets used, coming from Our World In Data - CO_2 and GHG emissions. To the aim of our website, these data have been encoded in a geojson format. First, a skeleton of the countries' coordinates has been obtained from World Map Geo JSON data. Some names have been slightly modified and South Sudan coordinates have been added. Then, the datasets have been preprocessed so that the country names match with the geojson names and the global GHG emissions, the emissions by sectors and the emissions by gases have been added to the geojson.

Several data visualization tools and methods are useful for this project, including:

- Python: Exploratory data analysis, data preprocessing, geojson creation;
- HTML (Lecture 1): Building the website structure;
- CSS (Lecture 1): Adjusting the format and style of the website;
- Javascript (Lecture 2 and 3);
- D3.js (Lecture 4): Visualizing the datasets by the creation of graphs;
- Interaction (Lecture 5): Setting up interactive methods;
- Perception colors (Lecture 6): Choosing the adequate colors for the visualization;
- Maps (Lecture 8): Worldmap visualization using Leaflet.