COMP40610 Visual Exploration Tool Design Document

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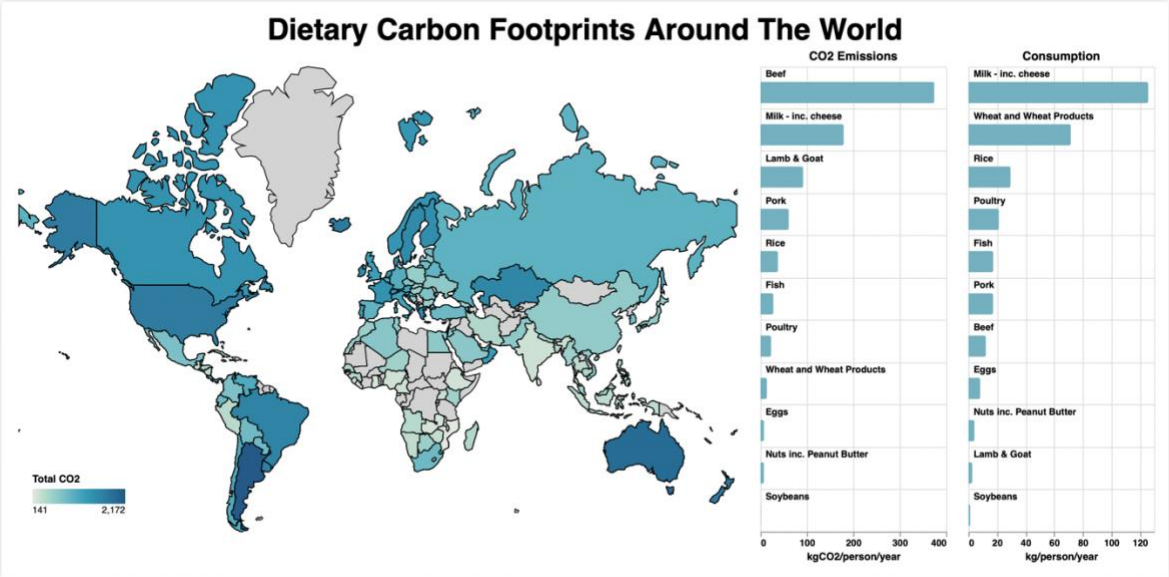
Title:

Dietary Carbon Footprints Around The World

Screenshot:



Dataset overview:

The dataset that was used for this visualisation was web scraped by Kasia Kulma from nu3.de. It is a dataset of food consumption and food-related carbon dioxide emissions of different countries. The dataset contains country names, food categories (beef, milk, lamb & goat, pork, rice, fish, poultry, wheat, eggs, nuts, soybeans), food consumption (kg/person/year) and CO_2 emissions ($kgCO_2$/person/year). Using Tableau Prep I cleaned the dataset by rounding the food consumption and emission numbers to two decimal points and altered two country names (USA → United States of America, Taiwan. ROC → Taiwan). The country names were changed so that they would match the names that were in the TopoJSON file. The altered dataset can be found here.

Design considerations

Overall goal: My overall goal with this tool was to enable the exploration of carbon emissions resulting from food consumption in different countries. The user can view which countries have the biggest/smallest diet-related carbon footprint and can explore what foods are contributing the most/least to these countries' carbon emissions.

Bar chart: There are two bar charts, one displays average annual CO_2 emissions ($kgCO_2$) per person for different food categories and the other is for average annual consumption (kg) per person for different food categories. The bars are sorted in descending order to make it clear which food categories have the highest/lowest consumption as well as which contribute the most/least to carbon dioxide emissions. I tried using an isotype dot plot with a different emoji for each food category instead of bars to make it more visually interesting, but because there is so many categories it would have made it overwhelming and hard to read. I moved the category labels above the bars to make the charts more compact as having the labels to the side made the tool very wide. Instead of having a different colour for each category, I decided to use just one colour as it makes it easier on the eyes and each bar already has a label above it. Another reason I thought about using different colours for each bar is so it is easier to find the same category in both charts but I decided against this because you can click on a bar and it highlights the category in both charts.

Choropleth map: This is a choropleth map that shows the total food-related CO_2 emissions of different countries around the world. The darker the colour the more CO_2 a country emits, this makes it easy to see which countries have the biggest diet-related carbon footprint. I decided not to use the typical green to red colour scheme as it is not colourblind safe. The countries without data are coloured grey. This is actually two layered maps, one is the choropleth map and the bottom layer is an all grey map, this is done because there are a lot of countries missing from the dataset and not having the grey map makes the choropleth have big white holes in places where the countries are missing. I use a 'joinaggregate' transformation to calculate the total CO_2 emissions by summing all the individual food categories. I tried to layer a scaled dot plot map on top to show total consumption for each country but it made the map look cluttered especially in places with a lot of small countries. Instead, I enabled tooltips so the user can view the total food consumption as well as name of the country and CO_2 emissions. To make this visualisation I used a TopoJSON map of the world which can be found here.

Interaction consideration: The interaction I used for this tool is cross-filtering. A user can select a country or countries and this will filter the data in the bar charts to show the CO_2 emissions and food consumption averages of the selected country/countries. On the other hand, a user can select a food category or categories from the bar chart and filter the data displayed on the map so it shows the total CO_2 emissions resulting from the selected categories/category. Also if the user selects a category/categories from the bar char they can view the exact total CO_2 emissions and consumption by hovering over a country and viewing the tooltip. These interactions let the user explore the relationship between the countries' diet-related carbon footprint and the foods that contribute to it the most.

Note: I had to filter out the zero values for the CO_2 emissions and consumption because there seems to be a bug with the 'joinaggregate' when using it to sum the total. I noticed that when you selected a food category and hovered over a country which had a zero in the selected category the CO_2 emissions in the tooltip would show up as a very tiny negative value. This is despite there not being any negative values in the dataset.