



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Data visualisation

Process book

CHARLES GALLAY
THOMAS BATSCHELET
VALENTINE SANTARELLI

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1 Project proposal (November 14)

For our visualisation project, we decided to focus our attention on environmental changes and plausible correlations between several aspects at a country level .

Our goal will be to show the links between ecological footprints, GDP, CO2 emissions and global temperature changes in an interactive map that catches interest. The resulting tool will be an intuitive visualisation that raises awareness among people and present actual knowledge by giving an objective insight about environmental changes without arguing global warming.

This thematic has certainly been a major topic for the last decade but we could argue that due to the massive amount of information that is regularly given by news, it can be hard to filter out the actual relevant facts that influence climate evolution. Therefore, it would be nice and helpful to be able to visualise different aspects of the changes to take a better grasp at the actual problems.

Technicalities:

A map of the world showing the average temperature per location through time. Build into this map, we want to integrate the possibility for the user to select one (or multiple country) to see more detail about a region, like the ecological footprint or GDP evolution.

Questions our project can answer:

- Is a healthy country more likely to impact the changes ? (GDP)
- Does the ecological footprint of a country directly impacts its climate changes ?
- Can we visualise the correlation between CO2 emissions and temperature changes at country level ?
- Does climate tend towards global warming or extreme temperatures (freezing winter and unusually warm summers)?

2 Visualisation organisation (November 28)

The group met to fix the visualisation elements and interactions to get on the same page before coding.

2.1 The interface

The user will arrive on the web page with a map of the world. He/she will be able to choose between following the storytelling implemented like a tutorial or immediately dive in the discovery of the datasets.

The interface will be divided in two parts: the world map and the panel.

World map

The world map will have different utilities;

- it would be used to display the choropleth of the mean temperature/CO2 per country by selecting a checkbox.
- it will also be use to select one or two countries or none. If no country is selected then the visualisation will display statistics about the entire world. If one country is selected the statics will take into account the data corresponding to this country. If two countries are selected, then the statistics of both will be displayed to enable a comparison between them.

Panel

The panel will display different graphs and statistics on temperature/CO2 and its variations , but also about the ecological footprint. We agreed on the following visualisations:

- A line plot of variables evolution in time. The variables are the temperature and CO2 and each of them will have its own graph because their scale and unit differ. But they will be displayed one under the other to facilitate comparison.
- The next graphs will be similar expect they will represent the evolution of the variation of the variables.
- The ecological footprint of a country is measured in globally comparable, standardised hectares with world average productivity. Each country will have a 3D representation of a planet who's surface correspond to the ecological footprint measure. This planet comes with the 3D representation of the Earth as a reference. The planets will be nested with the bigger one being semi-opaque.
- To go further in the correlation between temperature and CO2, we thought about a bubble chart representing the CO2 in function of the temperature with the size of the bubble representing the ecological footprint of the country.

Time handler

The time handler is composed of a time range slider on the years, a time range slider on the months, and a play button. The time handler, at the bottom of the page, has different utilities:

- it can select a range of years to take into account in the displayed statistics in the panel (example: the evolution of the temperature only visualised for the time range selected).
- it can also select the specified months of the years, for example to visualise the evolution of the mean temperature for September over the years.
- it also comes with a play button what will animate the choropleth selected (temperature or CO2) but also the year range slider and the statistics that are time dependent with a animated red tick that will display the current time.

2.2 Exploratory analysis

The temperature/CO2 choropleth depending on the time tick of the slider will enable the user to gain insight on the spatial and temporal evolution of the temperature/CO2.

The months slider range will enable the user to gain insight on the annual evolution of temperature and CO2 for specific months. We expect our visualisation to show us that summer and winter seasons might have been shift over the years.

Most visualisations in the panel will have the purpose to gain insight on the correlation between the temporal evolution of the temperature and CO2.

2.3 Deviations

The ecological footprint dataset actually gives the data per country for the year 2016. We decided to go on with the ecological foot print visualisation using 3D planets and search later for a dataset over several years if we have enough time. We also decided to start with CO2 and temperature and add the GDP data to the visualisation last, if we have enough time.