

**DATA
VISUALIZATION
PROJECT**

**COM-480
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**IF NOT ALCOHOL,
WHAT MAKES
YOU HAPPY?**

GO.EPFL.CH/HAPPINESS


A DIFFERENT VIEW ON OUR WORLD

In times of uncertainty, populism and war in Europe, we wanted to investigate a lighter but nevertheless as important topic: what truly makes us happy?

At individual level, a first approach regarding happiness and revenue tends to show a logarithmic relation between the two. The higher your earnings, the higher your happiness, but up to a certain point. The topic of individual happiness is more than present in media, social networks and libraries and has engendered numerous workings on lifestyle and personal development.

Our approach here is different : what if we take a look at country level?

Could we show on what parameters does a country's happiness level depend?

Fortunately this work has been done previously: the world happiness report has published yearly (since 2005) measures of the countries happiness rate (based on on-the-ground interviews with local populations) along with some quantitative and qualitative parameters**. 

But where a 158 pages report could be really insightful, it may also be extremely time-consuming. The created visualization aims to act as complement:

We aim to provide a quick, easy and complete view of the data, easily accessible to any public (not only data scientists or sociologists), with a specific focus on:

- **Young professionals/Digital Nomads** looking to find the country that will bring the most joy to them or their future family
- **Individuals** interested in insights on the well-being and consumption habits worldwid
- **Politicians** who would like to strategize on how to improve their citizens' lives
- **Casual alcohol* consumers** eager to compare drinking habits in different countries

Happiness

Economic
Production
(per capita)

Social
support

Life
expectancy

Freedom

Absence of
corruption

Generosity

Alcohol ?*

*Alcohol consumption analysis was added by our team, more explanation in the "Data" section

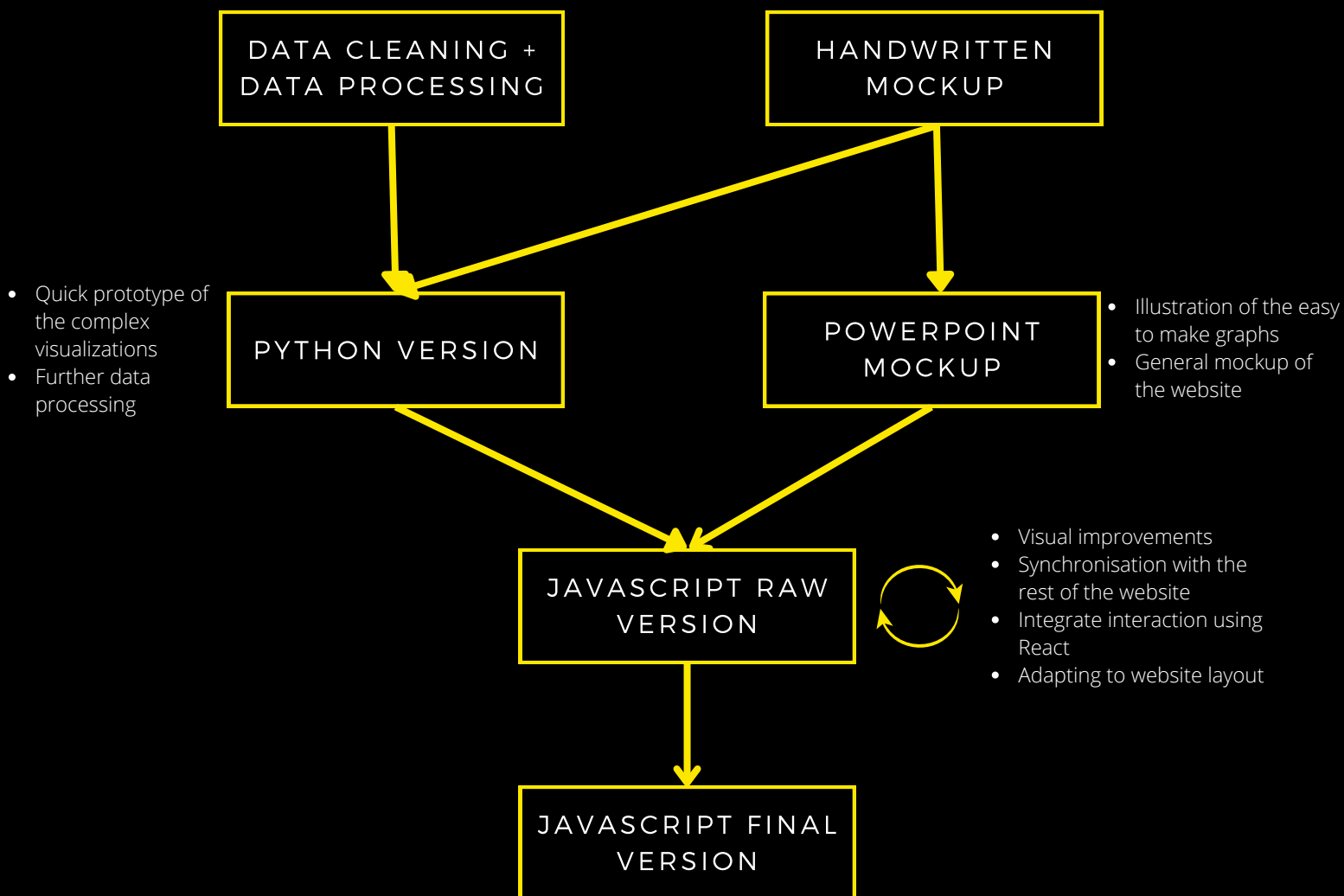
**More details about the definitions of these parameters [here](#), in "Technical Box 1"

GENERAL PROJECT PIPELINE

A lean approach to Data Visualization

As a general principle, we decided to follow the lean approach suggested by the division in three iterative milestones. We would start from a handpaper version, go to a quick powerpoint representation and/or python implementation and finish with an interactive D3 graph. At each step the whole team would comment and try to improve the current visualization and overall render of the project, before passing to a more advanced implementation step.

The general creation process is represented below, and will be further illustrated in the corresponding sections.



GENERAL DESIGN & TECH CHOICES

Our general design choice was made as an answer to the question : "**how to provide complete information while avoiding scaring our users?**". We therefore used a bit of manipulation, or "foot in the door technique" : start by an easy "top 10" graph, with a catchy text, before diving into deeper and deeper visualizations. Keep in mind our reader needs to be able to (option 1) choose his/her future country or (option 2) as a politician, lead its country towards a happier future. In the same way nice advertisement helps you come to your favorite car dealer, you should not choose a car based solely on this: that's why we decided to add, as a last step, row data and a radar chart, in what we called a "country card".

At this point you have probably noticed the choice of the **yellow** color for this project : it is perceived in many cultures, including our's, as the color of happiness (more details in "Science" journal); it therefore appeared as a natural choice to exploit the probably strong associations in reader's mind.

DATASETS, CLEANING AND PROCESSING

While this may not be the funniest part of this booklet/project, we think it's important to provide you with an insight about the data used:

our main set contains data from 2005 to 2020, complemented by a second set with 2021 data. Finally, we decided to complete with alcohol consumption per capita (more explanation on the website).

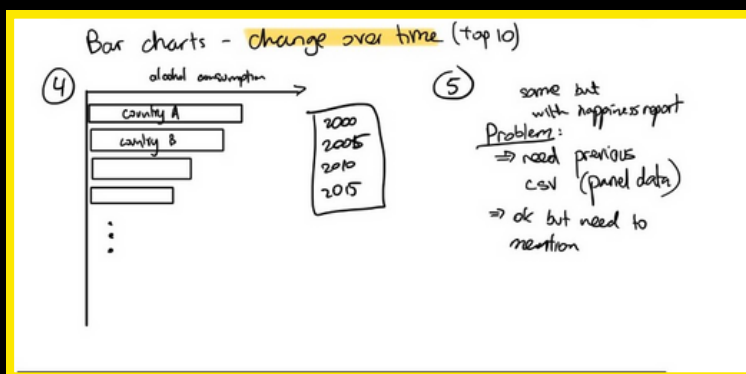
No major issues were encountered, however the reader should be aware that:

- Country Names were manually updated to follow the UN standards when space allows it. This plus ISO codes, allows easier merging with the usage of external libraries. Don't be surprised to encounter "Venezuela, Bolivarian Republic of" in the first graph.
- Some of the parameters of our dataset (alcohol consumption for example) are not measured yearly. We considered complete information on the visualizations is more important for our target public than precise measures : therefore we used linear interpolation (across time) to fill empty values. The only remaining "no data" cases are those where no information at all was available for a specific field.
- We then had to merge the world happiness data and the alcohol consumption data to the geo json to be able to represent that data on the maps

TOP COUNTRIES BY HAPPINESS SCORE

Where should I live ?

This is the first visualization appearing to the user. It is somehow lighter than the others, while interactive and instructive. Our aim is to capture interest for diving into deeper information.

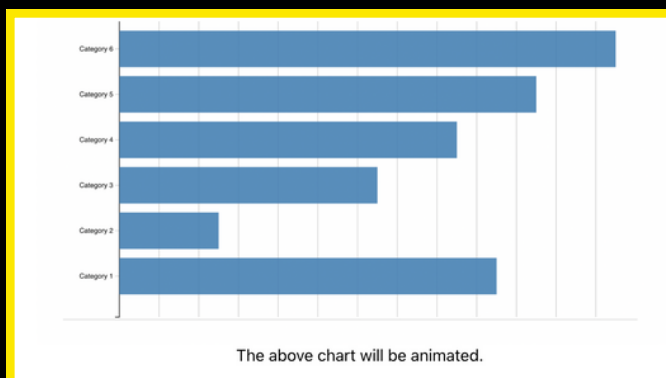


Due to social media influence, our brains have been used to catchy "top 10s".

We used this technique to acquire viewers' attention by presenting the evolution of the happiest countries in time.

As time advances, countries transition to new positions and new ones appear.

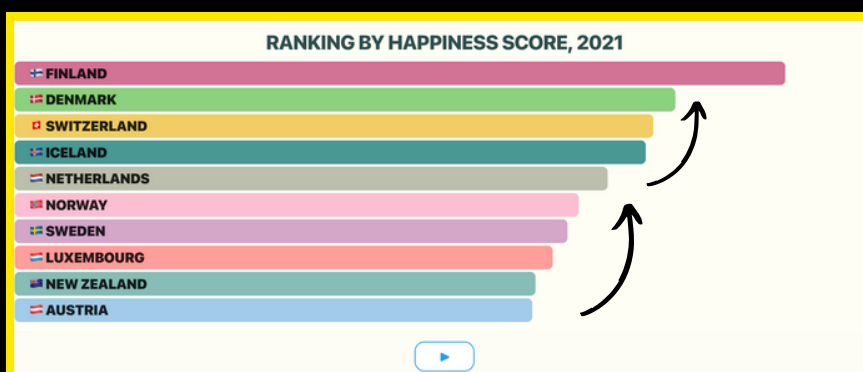
Paper mockup



During the first implementation phase, we realised sorting 195 countries in real time was a bit heavy for the browser. We decided to preprocess it before, by taking a subset - namely only the 21 countries who ever were in the top 10.

This is enough for the required visualization and make it smoother.

Powerpoint mockup



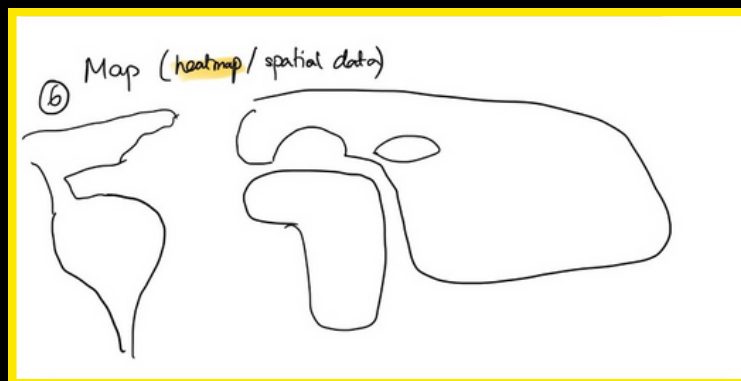
Finally, a small but interesting detail: the default year is set to 2021, meaning starting the animation projects the user directly 16 years back in time. Our goal here was to highlight the similarity, and thus, the cyclic nature of this metric.

Animated chart

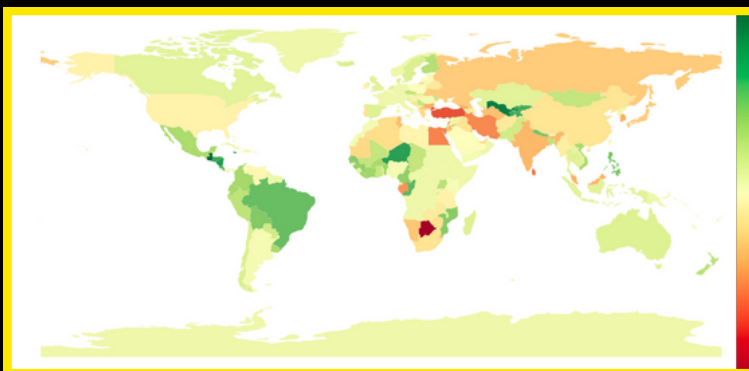
HAPPINESS WORLD MAP & OUTLIERS

Is money the only source of happiness?

Our second visualisation aims to put in evidence the outliers, namely the fact that some countries are happy despite their lower economical production.



Paper mockup



Python version

The D3.js visualization of the World Map is plotted on the second page of the website.

To render the world map using D3.js we had to export the geo json data from the following [website](#).

This format incorporates easily with d3 and the framework is then able to draw the paths that represent the countries borders.

The map is shaded depending on the selected attribute which is set to Happiness Score by default.

Since the dataset contains information regarding countries, we have opted to design a world map plot that would highlight differences between countries based on their geographical location.

In order to test the interest of having such a visualization, our team has first used Python with PyPlot to plot the map with different attributes. It also allowed to gather initial analytical insight of the data which helped compose the text on the website.

D3.js version



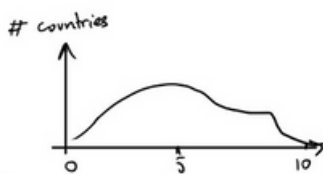
HISTOGRAM, RADAR AND COUNTRY CARD

Main Goals

- How did the distribution of happiness and alcohol consumption change over time?
- Where does the selected country stand in each distribution?

Distribution (easiest)

②

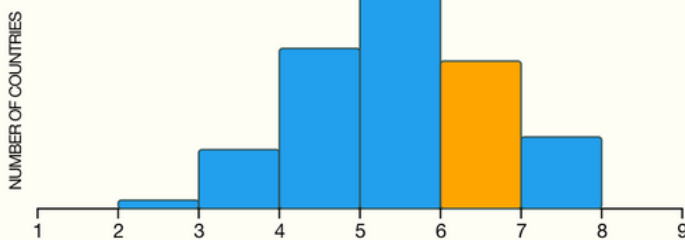


③



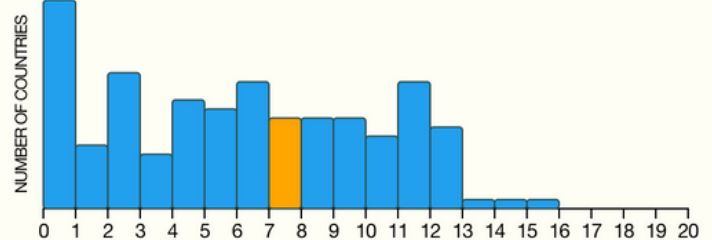
DISTRIBUTION OF HAPPINESS

WORLD HAPPINESS SCORE INDEX



DISTRIBUTION OF ALCOHOL CONSUMPTION

YEARLY ALCOHOL CONSUMPTION PER PERSON (LITERS OF PURE ALCOHOL, PROJ. ESTIMATES, 15+ YEARS OF AGE)



SWITZERLAND, 2021

REGION	WESTERN EUROPE
GEOGRAPHICAL ZONE	
POPULATION	7604467
ESTIMATED NUMBER OF INHABITANTS	
HAPPINESS SCORE	7.571
WORLD HAPPINESS SCORE INDEX	
OUTLIER SCORE	0.6810290546
HAPPINESS/GDP PER CAPITA	
GDP PER CAPITA	11.117
& LOGGED	
ALCOHOL CONSUMPTION	11.53
LITERS PER PERSON PER YEAR	
SOCIAL SUPPORT	0.942
RATIO OF PEOPLE FEELING SOCIALLY SUPPORTED	
HEALTHY LIFE EXPECTANCY AT BIRTH	74.4
YEARS	
FREEDOM TO MAKE LIFE CHOICES	0.919
RATIO OF PEOPLE FEELING FREE IN THEIR CHOICES	
GENEROSITY	
BASED ON MONEY DONATED TO CHARITY AND GDP	
PERCEPTIONS OF CORRUPTION	
RATIO OF PEOPLE PERCEIVING CTRV/BUS. AS CORRUPT	



Country Card

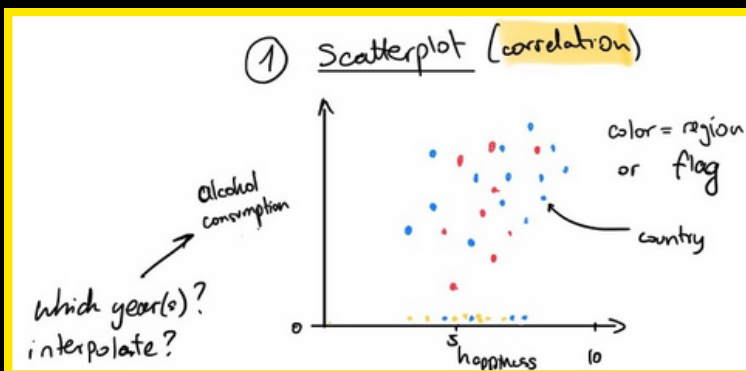
In addition to being able to visualize the distribution plot position of the selected country, the webpage visitor can also navigate to the third page named "Country Card".

The user can view the detailed data about the selected country. Finally, an animated Radar Chart visually plots some of the important attribute values visually, with Happiness Score at the top.

SCATTERPLOT: ALL COUNTRIES

Main Goals

- Is there correlation between happiness and another attribute?
- How did the global context change over time?
- How did the selected country evolve over time?
- Which countries are similar to each other?



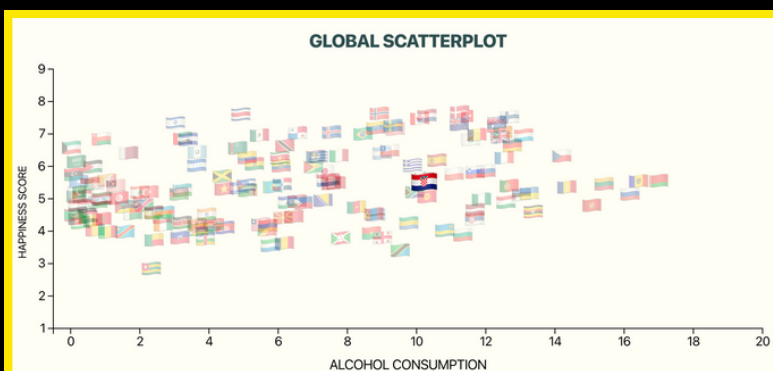
On the left you see our paper mockup of the scatter plot and what kind of visualisation we wanted to achieve, on the y-axis we have the alcohol consumption and on the x-axis we have a variable that we want to correlate with here the happiness score

Paper mockup



We then decided to implement the visualisation in python to see how we can draw this scatter plot in a visually appealing way. On the left you see the scatter plot with the ladder score (y-axis) and the Logged GDP per cap (x-axis) and their correlation. For each country the radius of the circle represents the population of the country.

Python version



The final result in D3 is found at the bottom of the webpage. Each datapoint represents a country and transitions smoothly between years when the timeline year changes. This makes it easy to follow the selected country's path.

The x-axis changes according to the selected attribute next to the World Map (but cannot be set to Happiness or Happiness/GDP p.c.).

D3.js version

WORK DISTRIBUTION

As explained in the "General Project Pipeline" section, our project consisted of many prototyping, peer review, and improvement steps. We met frequently and worked together as a group multiple times. If a summary of the "main" contributions of each one has to be made, it would be as follows:

- **Data Cleaning & Data Processing:** Stefan
- **First handwritten mockup:** Andrey
- **Powerpoint mockup:** Mohamed
- **Python and D3 visualizations:**
 - **Top 10 countries by happiness score:** Mohamed
 - **Map:** Mohamed & Stefan
 - **Histograms:** Mohamed & Andrey
 - **Radar Chart:** Andrey & Stefan
 - **Scatterplot:** Andrey, Mohamed & Stefan
- **Making stuff work well with React:** Andrey
- **Process booklet:** Stefan

Many thanks for your interest in making the world a happier place and many thanks for reading and commenting on this project!

All the best,
NotAFootballTeam