Data visualization process book

Together Against Cancer

Abir Hammoumi - Hamza Abid - Thibaut Hennel

I - Introduction

According to the World Health Organization, nearly every family globally is affected by cancer, with 1 in 5 people being diagnosed during their lifetime. This statistic underscores the importance of making cancer information easily accessible and understandable to everyone. Traditionally, cancer education is often perceived as dreary and overwhelming. We aim to change that by creating a playful and interactive learning environment that makes the information more digestible and encourages more people to learn about cancer's impact. Targeting the general population, our website is aiming to present cancer information in an easily understandable way for those without a medical background.

In this process book, we document the journey of creating our interactive cancer awareness website, detailing each step from conceptualization to design and implementation.

II - Conceptualization

During our first meeting, we quickly agreed on choosing a cancer dataset for this data visualization project. Looking for ideas on the web to fuel our inspiration, we came across various websites but they all felt very cold and medical. This motivated us to create something that would be playful and insightful at the same time. The first feature idea that we validated was the interactive body map. Something that we had seen in another website and that seemed very user friendly. Thus we decided that we could display data about different organs that are subject to cancers rather than focusing on one only. Since we had our main guidelines determined, we focused on finding a dataset that could provide valuable information. We found one that provides rate, percent and absolute numbers of Deaths, disability-adjusted life years (DALY) and years of life lost (YLLs) for various subpopulations (origin and sex). This led us in adding an interactive map to display some key statistics by country.

III - Implementation

Below we go through the steps of our website's roadmap and discuss the various challenges that we faced in their implementation and the design decisions that we took to overcome them.

- Step 1 : **Cancer statistical facts visualization**

Our core visualization remains in the cancer statistics presented in graphs that we pre-rendered as .html images. These include time series and histograms that we computed from our dataset. These were integrated such that it provides easy to read information, all the while giving detailed insights in the different cancer types that we chose to analyze. In our prototype, the graphs were displayed as a carousel, we transformed the selection to a bar menu with icons that is more intuitive. Also, at the beginning the graphs were accessible upon clicking on buttons with names of the cancers. This menu was rudimentary and we were able to improve it by creating a body map to offer more interactivity and playful features. We will discuss this in step 4.
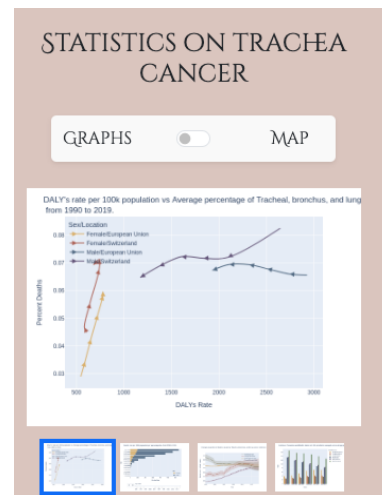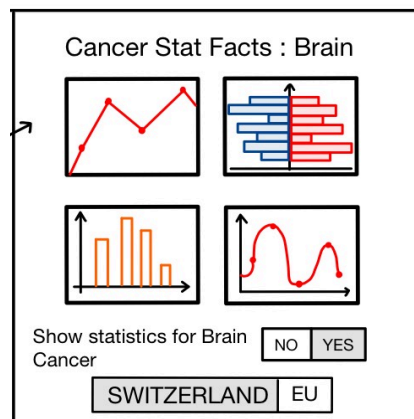
● Step 2 : **Geographic data selection**

We faced some challenges concerning creating separated graphs for EU and Swiss data. We thought that it resulted in graphs that seemed empty and it was not easy to compare curves from one graph to another. Then we thought to keep the graphs with mixed data but to include an interactive geographic map incorporated using Leaflet.js. This allowed us to reduce the number of 'classic' statistical graphs and augment the playfulness of our website. Upon clicking on the regions of this map, the average death rate is displayed for the given country, for both male and female. We enhanced our idea by not only presenting differences between EU and Swiss cancer data, but including several individual countries such as France, Germany and Norway.
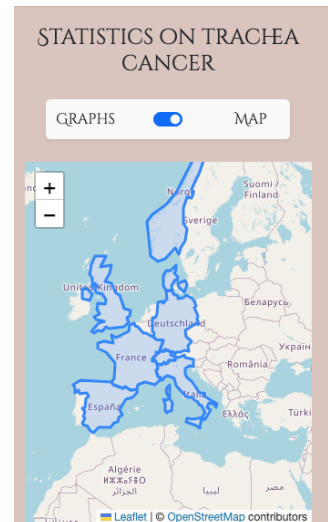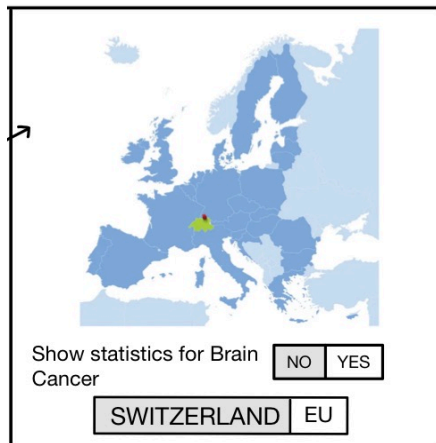
DEATH RATE IN FRANCE ✕

MEN � : 83.99 / 100,000

WOMEN ♀ : 20.67 / 100,000

THIS METRIC REPRESENTS A MEAN OF NUMBERS OF DEATHS OCCURRING IN A POPULATION OF 100,000 PEOPLE FROM 1981 TO 2019.

Show statistics for Brain Cancer | NO | YES

SWITZERLAND | EU

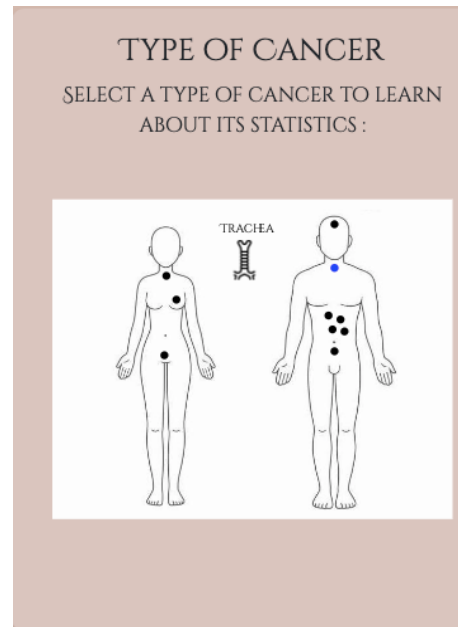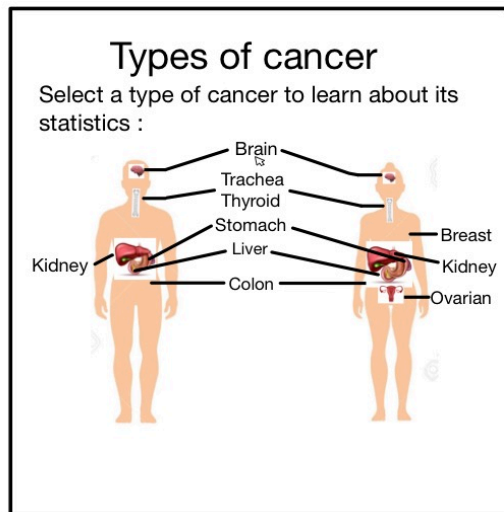STATISTICS ON TRACHEA CANCER

GRAPHS ⬤ MAP

- Step 3 : **Interactive exploration**

We were not able to include options to filter data by metrics such as year, age or gender. This mainly because of issues related to dynamically generating graphs based on user selections. Concerning the display of the interactive map, we changed our minds and did not integrate it as the default visualization when clicking on an organ. We implemented a toggle button to switch from the graphs to the interactive map. This enhances the user experience, providing a more intuitive interface and allowing an easier journey through the various visualizations.

- Step 4 : **Human body interactive image**

We decided to introduce the sketches of two human bodies, one of a male and one of a female, as the main entrance portal to access our data visualization. Interactive markers were positioned on the bodies to match the location of the corresponding organs. We chose to not display any data at this point to keep it user friendly and encourage the user to click on these markers. This body visualization is the gateway for deeper diving into information. Upon clicking on a marker, it displays an icon of the corresponding organ along with its name and it opens the visualization panel allowing access to the graphs and the interactive map.

Types of cancer

Select a type of cancer to learn about its statistics :

Brain
Trachea
Thyroid
Stomach
Kidney
Liver
Colon
Breast
Kidney
Ovarian

TYPE OF CANCER

SELECT A TYPE OF CANCER TO LEARN ABOUT ITS STATISTICS :

TRACHEA

● Step 5 : **Supplementary data visualization**

As we were satisfied with the implementation of the various visual features we included, we realized that most of them are mainly there to offer a playful interface but in the end the data displayed was reduced to the graphs that we first included. Our initial statement was to create a user-friendly, interactive and 'accessible to all' website. Although we assume to prefer less data and more stylized interactions to a more accurate and exhaustive data displaying website. We thought it would be great to add another data visualization for diversity purposes. For now we had access to each cancer statistics separately. Hence, the one thing missing was to directly compare all cancers between each other. We achieved this by including a word cloud chart, where the size of a word reflects the average rate of the disease in both the EU and Switzerland.

● Step 6 : **Aesthetics**

After all the features required for an efficient and insightful data exploration were included. We improve the aesthetic of our website with a home page to welcome the user and a color theme for the whole project. This was achieved to create an identity for the website and something that could be recalled of.

IV - Limitations

The main limitation to our project comes from the dataset. Unfortunately the data it provides is not very easy to understand. For example the percent of deaths is actually the proportion of deaths for a particular cause relative to deaths from all causes. Thus the numbers provided we show are very low. Actually the statistics that people can most easily represent themself is the rate per 100.000 individuals in the population.

V - Peer Assessment

- Hamza :
  - Core website implementations, set up of the environment, putting it all together, user friendly interface, aesthetics.
- Abir :
  - Interactive map, Exploratory data analysis, Graphs, report.
- Thibaut :
  - Body map, Exploratory data analysis, Graphs, report.

VI - Conclusion

Since we started on the project and for all its duration, we kept a critical thought to abandon or modify any idea on the run if it no longer suited our intentions. Even though we faced several challenges, we successfully overcame them and were able to adapt our original plan to the reality of implementing it. However, we are aware that our product could be optimized and enriched. One area for improvement is to diversify the data visualizations with other types of graphs. Also the data could be augmented to include other information and show correlations. For example it would be interesting to compare our data with public health budgets. In the end the final product we deliver is a website with its own identity, dedicated to raise awareness about cancer diseases. We have combined several features to offer a good experience to the user, being able to get insights on valuable information in multiple ways. We have stayed true to our first intention that was to present dreadful information in a playful manner.