



Ecole Polytechnique

Project INF 552 Report

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INF552 Project report

Abstract

This report describes the results and the implementation of the project we guided about the visualization of pieces of art on an Earth map based on their actual position. We decided to display a spherical map, on which the user can observe pins, each pin representing a piece of art. Clicking on a pin, a description of the painting appears, with a small description of it and a Wikipedia link. Below the map, a chronological line is available and allows the user to chose the periods of art to search for. In this report we'll deal with the implementation of the program developped in JavaScript, the API we used to chose our dataset, the reasons of our vizualization choices and some views of the result we obtained.

Introduction

We found interesting to represent and visualize an Piece of Art dataset as each element of the data gets numerous very different features to exploit : geographical position, period of creation, main colors, artists, collection. We decided then to combine all of the features we found relevant to exploit for a person interested in art, and use it in an animated and easy to use interface. To begin, let's start with a schematic description of the interface we wanted to obtain.

1 Description and first ideas

1.1 Description

The aim of this project is to visualize pieces of art on an interactive earth, and allow the user to chose the information he wants about some features. First, we have a main part of the interface which is a spheric earth, mobile, on which pins represent the presence of paintings making reference to this country. For instance, as Ivan Aivazovskii painted "Constantinople la Mosquee de Top-Kahne" (1884), we'll see a pin on Turkey. The size of each pin depends on the number of pieces making reference to each country, in order to be more representative.

We have below the map a chronological line : the user can move it to select a precise period of time and filter the pieces shown.

On the right side of the interface, artists names are written : it's possible to click on them in order to display their creations and the location they are associated with.

1.2 What could be the aim of this project ?

It could be interesting for expository commisionner to have easy access to linked creations, in order to organize easily expositions, make complementary choices, and have easy access to the current location of the pieces. For instance, if the Cheverny castle communication direction decides to organize a retrospective exposition of the representations of the castel (or even the pieces linked with it for less figuratives pieces), all the commisionner has to do is to zoom in on France, select Cheverny castle and select from the list that appears the most relevant pieces useful for its exposition.

2 The datasets and library we used

2.1 The datasets

We needed a set of data that provides very detailed information about pieces of art : title, name, birth and death of the artist, associated location, museum, techniques, thumbnail, date of creation. The fact we wanted a globe forced us to get the location information under the shape of latitude and longitude. We decided to use the art dataset provided by the Réunion des musées nationaux - Grand Palais (RMNGP), which is a free access database with a simple to use API. The results concerned the pieces of french museum, so it's certainly a data vizualization useful for french culture actors, but it could be extended in the case we diversified the dataset in a future time. For the selection of pieces, we decided to do a first filtering to get sure the previous elements were available for the piece in the database. Then, we sorted the result by popularity and got the 1000 first most popular pieces.

As a lot of pieces obtained with this technic were only related to France and from a recent period, we completed the dataset with complementary and more precise researches of ancient periods without the constraints of author identification, and date precision. We treated this data differently and added it to the representation after guarantee that none of the data respected the previous criteris (in fact we didn't had to suppress data as all the pieces obtained this way weren't corresponding to the constraints).

As the RMNGP dataset provides only the name of the location associated with the piece, we needed another dataset to query latitude and longitude information from the name of the place. The dataset we used is **nominatim's GeoStreetMap data**, accessible through the python package **geopy**. We used it directly in our cleaning process of the data which consisted in removing the fields irrelevant in the used we wanted to make with the data.

2.2 The library we used

Our code was both coded in Python and JavaScript, and we used libraries in these 2 programming languages codes. For the visualization, we used D3 in JavaScript, and we used geopy in the python code to get the latitude and longitude of our location data.

3 The choices of visualization we made

3.1 The global structure visualization

We chose to separate the interface in two : a spherical map (at the left) and a list of informations (at the right). It allows the user to see both main information : the location linked to the art piece and the technical information related to it (author, actual location, techniques...). Below, there is a chronological line : it clarifies the view of the information and allows to see how repartition evolves according to time period (that's what it's under the earth and not the information about the art pieces).

We found that placing the earth on the left and information on the right gave a better feeling of "space" and "freedom" in driving through the interface, that's why we kept it that way. The colors are now again a source of discussion among us, as the white background is more sober but not very elegant. As the aim of this project is to be used by people at work and for a long time, black or darker background could be more comfortable for a long-time use.

3.2 The earth and pins

We chose a 3D representation of the earth, as it's more interactive. It eventually respects distance and angles compared to other visualizations but it's not the reason of our choice. The earth is as said before interactive, and allows the user to select easily the country of its choice, as on terrestrial globe. The disadvantage of this choice is that to switch between opposite countries (if the theme of the exposition is "Japan influence on french art of the beginning of 20th century, the commissioner would have small difficulties to compare the results of the two countries). Nevertheless, we privileged the interactive aspect of our map and chose to do this concession. A resolution to this problem could be for the user to open 2 instances of the program and compare with screen share (it would have been necessary in every case for more than 2 countries).

We kept the original color of earth representation of the globe as it's easier to read and understand the map with oceans in blue and countries brown or green. On each concerned country, there's a precise pin on the location linked to each piece. When there are a lot of pieces for the same place, we got a bigger pin (quantity well represented by the size of a symbol). As it's sometimes necessary to access of elements about a very specific place (for instance a retrospective exposition of the ceramic work of Limoges, it's useful to be able to select Limoges's linked pieces, as access to France's ones alone would lead mainly to the pieces of the Versailles castle or Bastille representations).

The pins are interactive and clicking on it displays a list of the pieces sorted by desc popularity : the user can then chose the pieces that he's interested in and get useful concise information about it.

3.3 Chronological line

The chronological line is placed beneath the earth map, and function with the principle of sliding interval. The user can chose a date of beginning and a date of end that correspond to the period he is searching to represent, between -2000 and 2022.

3.4 Authors name and art pieces

For authors and art pieces we chose very concise information to simplify the view and speed up the work of a professional. Nevertheless, we added a thumbnail to get a previous viewing of the art piece and a wikipedia url in the case the user is searching for more direct information.

4 Code description

We decided to divide the page in several sections, one for each feature of the visualization. It allows us to manage independently the different data channels. The code is structured in the following

way: First we create the structure and the SVG associated with the different features with the free software "figma". Then we call "load_data" to load the json file and to parse it. After the dataset is ready we initialize the different sections of the page by using "load_map", "create_works", "create_authors"... After initializing the page, each change in the data selection (through the timeline or the buttons for example) updates the filters ("ctx.author", "ctx.start_date", "ctx.country"...), and call the function "populate" that apply these filters on the data. Finally this function "populate" call other functions ("update_map", "update_works"...) that update the visualization itself.

// Here are a few technical explanations about the different sections:

- the globe: we used the d3 geoOrthographic projection to map the countries and the pins representing the artworks on the globe. We also add a few events to manage dragging and zooming the map and to allow the selection and deselection of countries, artworks and authors by clicking on the map. These events modify the global context variables, and therefore allow changes to be made in the other sections.
- the timeline: the timeline is made from a simple oval, that is colored when selecting a time period (we used clipping to prevent the color from going beyond the edges of the figure). We uses events on mouse to know the boundaries of the selection, and through a d3 linear scale were able to find the start and end dates. We also added html buttons to enter precise dates if needed.
- authors section: we order the selected authors by decreasing popularity, and with "click" events we performed the author selection/deselection
- artworks section: we display the 10 first selected artworks, and when clicked we print the information about the selected work, and the picture too (from the url).

5 Conclusion and future of the project

In conclusion, we could improve upon our project in different ways, for example, the country selection feature could have been much more meaning-full if we had the country associated with each pin on the map as we could have used this information to display the most popular works associated with a given country but our limited access to the nominative library did not allow us to ask for that much complementary data. There are also a lot of anomalies in our data as the localisation is deduced based on a single string, which can lead to a false estimation of the latitude and longitude as multiple places have the same name, we therefore have to filter them manually.

Finally, we could improve on the display of the pins, to make the map more easily readable by grouping pins into larger ones and avoid the loss of information when pins are sharing the same position.