Studying human migration and factors influencing this migration

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ABSTRACT

This intermediate report draws upon mostly on the different brainstorming we had in the data visualization classes. Indeed, this project involves visualization of how the global human migration evolved over the years and the factors causing this migration. The goal was to find relevant data source as well as pertinent data visualization. At the end of this phase we fulfilled our goals, that is, we were able to find much data on human migration and we had different possibilities representing this data in an effective and clear representation. Finally, we assessed the different visualizations and in the end, we chose, despite being complex to implement the World Map representation.

Index Terms: Data Visualization—Human Migration—World map—Factors affecting human migration; Open Data—OECD Stats—Migration statistics—

1 INTRODUCTION

The main goal of this project was to create a clear, precise, simple and yet complete visual representation of worldwide human migration. Indeed, we wanted an in-depth analyzation of human migration, not only economic but also environmental and political. Moreover, we wanted to highlight outbound migration in wealthy countries and their destinations. The intended audience for this representation is for the migration services and NGOs[1] of different countries, with the help of this visualization they may take proper actions to prevent mass migrations.

We were much interested in the flow of migration and we wanted to explain these flows more precisely. In fact, the first and obvious information to put in correlation with migration is the GDP [2][2] of the countries. Clearly, we wont be able to explain migration only with the GDP without being trivialized with stereotypes of people tried to leave poor countries to a wealthier one. Consequently, more data were needed to explain human migration. For instance, we decided to find if a change of government, affects human movement to another country. At this point, we will be able to find whether if a change in political regime affects migration but also if migration increases in a dictatorship country.

This intermediate report is the first step in the implementation of this visualization. This article will discuss the existing and related work on this subject. As a result, to this discussion, we will be able to suggest different designs as well as implement new features that none of the existing works have.

2 RELATED WORK

2.1 Descriptive migration maps

Immigration flows are sensitive political data and therefore, abound in the literature. Many maps are interactive and show global or country immigration flows. [4, 7, 11] displays global default data and allows, after a user's click on a country, the display of migration flows by country.

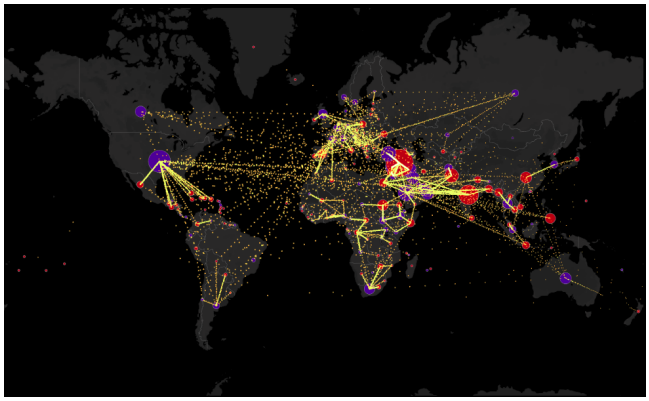

Figure 1: Map of global migration flows between 2010 and 2015 [4]

The importance of migratory masses is often represented by more or less saturated colors on the countries of departure or arrival [7] but this is not a rule. [11] represents these flows by a quantity of points around the country in question, when it comes to inflows, and by a quantity of points on the countries of arrival, for the outflows. [4] represents these masses by a circle of variable diameter.

These flows are sometimes underlined with arrows of constant width [7] or even by flows of points from one country to one another [2]: the quantity of points in these flows of points depends on the importance of the migratory flow.

Other initiatives to represent these population movements use more undisclosed representations. Note the use of chord diagram [10], which is appropriate for the representation of relations between data. This type of representation, however, becomes easily unreadable with the number of nodes to be placed, explaining a restriction of the diagram to ten large geographical areas.

Weighted trees have also been used [14] to represent population flows. The width of the branches indicates the proportion of migrants and the different colors allow a quick visual distinction of influential branches. The main limitation of this type of diagram lies in the need for an large display, which limits the overall understanding of the data presented.

2.2 Roots of migration flows

Population movements are born under the impulse of many parameters. Economic parameters on the one hand, such as the growth of a country, the employment rate, opportunities abroad, political parameters, such as the type of regime of the country, the rate of corruption, family factors or environmental factors, such as rising water levels in very low-lying countries.

These causes, however, are rarely correlated directly with migration data. One example is [7], which links the main population movements with climate change.

Most maps deal with economic, political, and environmental issues regardless of migration flows, such as [1] for example.

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[1]NGO: Non Governmental Organizations

[2]GDP: Gross Domestic Product is the total value of everything produced by all the people and companies in the country.

2.3 Comprehensive maps of migration flows and migration factors

Our research has led to no satisfactory match for extensive maps about migration and its causes, even though comprehensive reports have written about it [6, 12].

3 Design suggestion

The goal is to succeed in making a graph readable by the general public. In order to do this we will try to display as much relevant information as possible and highlighting the most useful one. As a result, the use of color codes is very important as well as different shapes, sizes and selectors.

Firstly, when the user will arrive on our web page he will be able to see a world map with a well defined boundary between the countries. Each country will be colored according to their immigrant/emigrant ratio. This ratio will be calculated between the year 2000 and 2015. There will be also a duration selector i.e. the viewer will be able to select the starting and finishing years on which the ratio will be calculated. Finally, to explain the ratio there will be a legend as you can see on Figure 2.

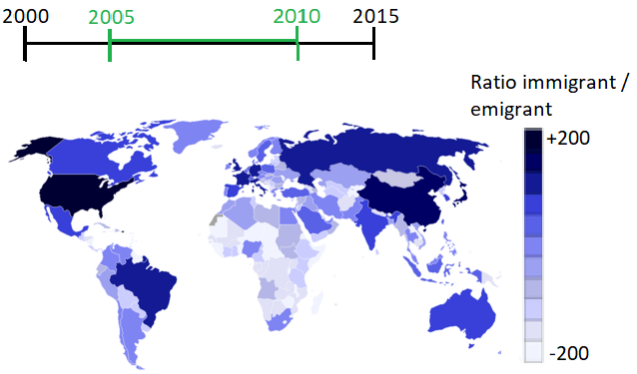

Figure 2: First Layout

Since we are displaying a world map In order to add more information an interaction is possible with this first card. It is possible to click on a given country which makes you change the display as in Figure 2. This figure shows always of the same selection by period. But the legend is changed. So we represent all destinations of emigrants by arrows with different size depending on the importance of the movements). And the arrivals of immigrants by another arrow (colors direction different). In addition our primary goal being to determine the factors of the movements populations. To do this we will color the countries affected by the selected country and country itself with a color. This color will be calculated based on GDP. It is possible to select to color non-functioning countries GDP but according to demographics, Regime, Climatic disaster. The legend will adapt in function of the selected parameter.

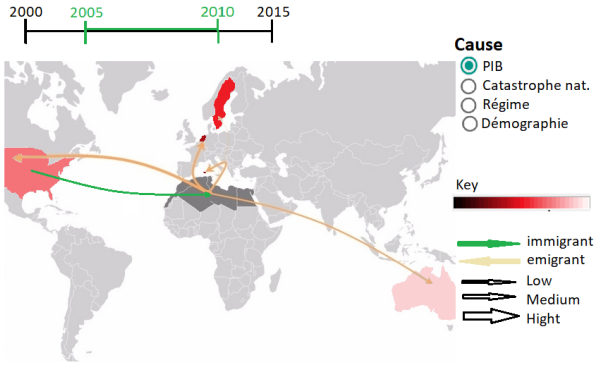

Figure 3: Second layout

We made the choice to separate these two figures not to overload information. Moreover when implementing our visualisation the user will be able to change different parameters according to the desired information. In order to have simple, intuitive and useful graphics.

4 Data sources

Many governments do not want to put their migration rate on open data however, we found that OECD [8][3] have put their international migration database completely open. So our main data source will be from OECD. For the different data to correlate with the migration rate, we used the GDP of the different countries on the World Bank Open Data database [13]. Moreover, we found data on the elections results in each country on the Open Data Index [5]. At this point we decided to work with these data already collected in order to get the first visualization.

5 Conclusion

To summarize, this report is the first glimpse on our data visualization project. We have a clear picture of the remaining tasks to carry out to fulfill our objectives. Furthermore, we were able to define a KPI and have all the main resources (4) to frame a coherent and acceptable response to this KPI. Currently we do not have the required level in the D3.js tools to implement the desired representation. However, we intend with the help of the data visualization classes to develop rapidly our skills.

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