World Happiness Geographic Visualization

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1 Introduction

Since 2012, the World Happiness Report, an annual publication of the Sustainable Development Solutions Network based on data collected from the Gallup World Poll, has ranked countries based on how happy their citizens perceive themselves to be [4]. These extensive reports have been read and analyzed by world leaders at United Nations meetings as evidence of the emerging science of happiness. Although these reports are read by some of the most powerful people on earth, they are available to the public and may offer insight to the common man as to what makes up happiness and what actions can be taken to increase happiness.

Although there exists many visualizations that depict data from the World Happiness Report, we observe few do so in an approachable manner to spread basic awareness and knowledge of the report. We believe that a data visualization should be developed using visualization technologies such as d3 to inform those unfamiliar on the science of happiness by combining and revising effective parts of existing World Happiness Report related visualizations. By performing user testing on our visualization with our target audience, users will be aware of what is the World Happiness Report, what factors contribute to happiness, how these factors compare to one another, and how countries differ from one another.

2 One-sentence description

Using data from the World Happiness Report, we plan to develop a data visualization using d3 to effectively spread awareness and knowledge about the world happiness score to users through a combination of easy-to-understand idioms that allow for data consumption and comparison.

3 Project Type

Comparative Data Visualization for Analysis

4 Audience

Our audience consists of college-aged people who are curious about the world happiness score and how their country compares to others.

Given the lack of happiness over 2020 due COVID-19, college students and older may feel compelled to see what makes up "happiness" and how contributing variables compare to one another. We will create a visualization that answers these questions. In addition, the visualization will also allow users to explore how countries stack up to one another on happiness score and related variables.

5 Approach

5.1 Details

Due to the geographic nature of our dataset, we plan on implementing an interactive global map that allows users to discover countries' happiness scores by selecting countries that are colored differently depending on their score (see Figure 1-1). In addition, the use of a tooltip on hover over a country will be developed to provide a quick preview of the country's data (see Figure 1-2). To allow users to examine the factors that contribute to happiness, we will also add filters that isolate certain factors and determine how countries rank on that specific factor (see Figure 1-3). We will also implement a ranking list with representative bar graphs for the given filter to allow for a non-geographical comparison of countries (see Figure 1-4). Our dataset contains records from 2015 to 2019 which will allow users to compare how countries have changed over time for the given filter. As a result, we
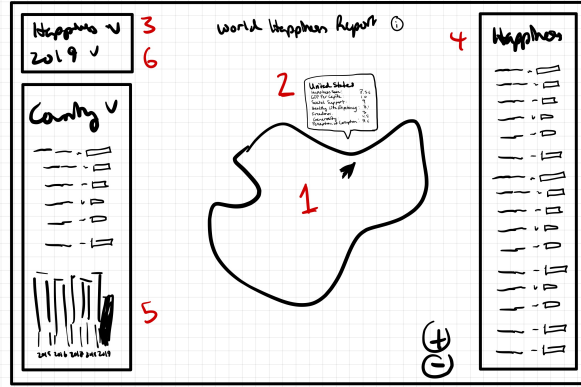
Figure 1: Sketch of Data Visualization Interface

will produce an interactive bar graph timeline that will be used to view a country's score over time (see Figure 1-5). If the user selects a year that is not currently selected, the application will update the map and rankings for that selected year similarly to a filter (see Figure 1-6).

To verify that the visualization is a success, we will perform usability testing with our target audience and ask users questions such as what the world happiness score is, what factors influence it, and how countries' happiness scores and factors different from one another.

5.2 Evidence for Success

As our data visualization's purpose is mainly for consumption purposes in addition to simple comparison, we predicted that much of the effectiveness of the data visualization will depend on its usability. Thus, we based our design on an existing work that studied usability among happiness score data visualizations. The work relays many insights such as which type of bar graphs achieved greater usability for comparing contributing factors between countries and what users look for when analyzing at a rankings list [1]. These various insights will be considered and implemented to achieve maximum effectiveness.

In addition, our goal is to present to less informed users and bring awareness to the world happiness score, so we also took inspiration from the Refugee Project, a data visualization presenting refugee movements over the past few decades, whose UI has been viewed 15 million times with an average user time of 7 minutes and 20 seconds since its conception in 2014

[5]. The data visualization has been given numerous awards such as the Information is Beautiful Award in 2014. As a result, we will mimic certain aspects of the visualization's layout to achieve an aesthetically pleasing and relatively intuitive UI for our target audience.

6 Best-case Impact Statement

In the best-case, users will be informed on the world happiness score, use their new understanding of what contributes to happiness to increase their own level of happiness, and leave the application with a positive user experience.

7 Major Milestones

- Clean data and process it.

- Develop basic geospatial data visualization with filtering based on category.

- Create a global ranking panel with each country's happiness score and its factors.

- Add map interactivity. Clicking on any country brings up its individual statistics for each category, and the country is highlighted in the global ranking panel. Hovering over a country shows a tooltip listing the contributing factors to the happiness score.

- Add an interactive bar chart displaying happiness from 2015 to 2019 for a given country or the world.

8 Obstacles

8.1 Major obstacles

- With our current design, there is no way to directly compare multiple categories for different countries side by side at the same time. We must ensure that the visualization is intuitive enough that the user can still make conclusions about how different subcategories may be related about how they are correlated with happiness.

- We may determine after visualizing the data that there is a minimal relationship between the contributing factors of happiness. This would result in an uninteresting graphic that doesn't show the user very much.

8.2 Minor obstacles

- The dataset will require some work to prepare for visualization. Every year has a different amount of categories, and each category is in a different location and named slightly differently. We will need to ensure that the data scales are consistent for every year so they can be properly compared.

- The data for the years 2016 and 2017 do not contain a column for trust in the government. We will need to determine whether or not to work around this or to exclude this information from the visualization.

9 Resources Needed

- References for color scheme and visual style.

- Sample code for colored stacked bar charts.

- Sample code for how to make an interactive map.

10 Related Publications

- The World Happiness Report extensively discusses citizens' perceptions of happiness across the globe, as well as how happiness is affected by social, urban, and natural environments [4].

- Durand presents a framework including 11 indicators for defining and measuring well-being [3].

- Ulkhaq and Adyatama clustered countries according to their world happiness scores and identified differences between the clusters [7].

- This report discusses world happiness during a year struck by the Covid-19 pandemic [6]. Although 2021 is not included in our dataset, it would be interesting to compare results from past years with this one to see how much each country's happiness was affected by the pandemic.

- Dixit, Chaudhary, and Sahni use neural networks to determine relationships among the different measures that affect happiness [2].

11 Define Success

The project will be a success if users are able to recognize what the world happiness score is, analyze the measures that influence it, and make comparisons between countries' happiness scores and happiness factors.

References

[1] N. Bazurto-Gomez, J. C. Torres, R. Gutierrez, M. Chamorro, C. Bulger, T. Hernandez, and J. A. Guerra-Gomez. An Information Visualization Application Case to Understand the World Happiness Report. *Human-Computer Interaction*, 2018.

[2] S. Dixit, M. Chaudhary, and N. Sahni. Network Learning Approaches to Study World Happiness. 2020.

[3] M. Durand. The OECD Better Life Initiative: How's Life? and the Measurement of Well-Being. *The Review of Income and Wealth*, 2015.

[4] J. F. Helliwell, R. Layard, J. Sachs, and J. E. De Neve. World Happiness Report 2020. *World Happiness Report*, 2020.

[5] Hyperakt. The refugee project. `https://www.hyperakt.com/work/the-refugee-project`, 2014. Accessed on 2020-04-16.

[6] A. N. Rowan. World Happiness 2021. *WellBeing News*, 2021.

[7] M. M. Ulkhaq and A. Adyatama. Clustering countries according to the world happiness report 2019. *Eng Appl Sci Res*, 2021.