

Final Project

Group 32: 109705001 陳以瑄 and 110705013 沈昱宏

Motivation

Suffering from the poor life in Hsinchu / excessive homework / expensive food / cold wind, we desire to run away from Taiwan, but we have no idea where to go. Therefore, we want to investigate which countries in the world live the happiest and the main factors of their happiness to decide where to immigrate.



Target user

The target of our project is the people who have the same thoughts about deciding where to travel or immigrate with the happiness attribute of their concern. We will provide an analysis of different aspects of happiness in each country, helping them to make decisions. In addition, as we provide historical data starting from 2015 to 2023, they can observe whether a country is getting more and more happy because the trend of countries is an important factor that should be taken into consideration.

Dataset

world happiness dataset (2015 – 2022) [World Happiness Report up to 2022 | Kaggle](#)

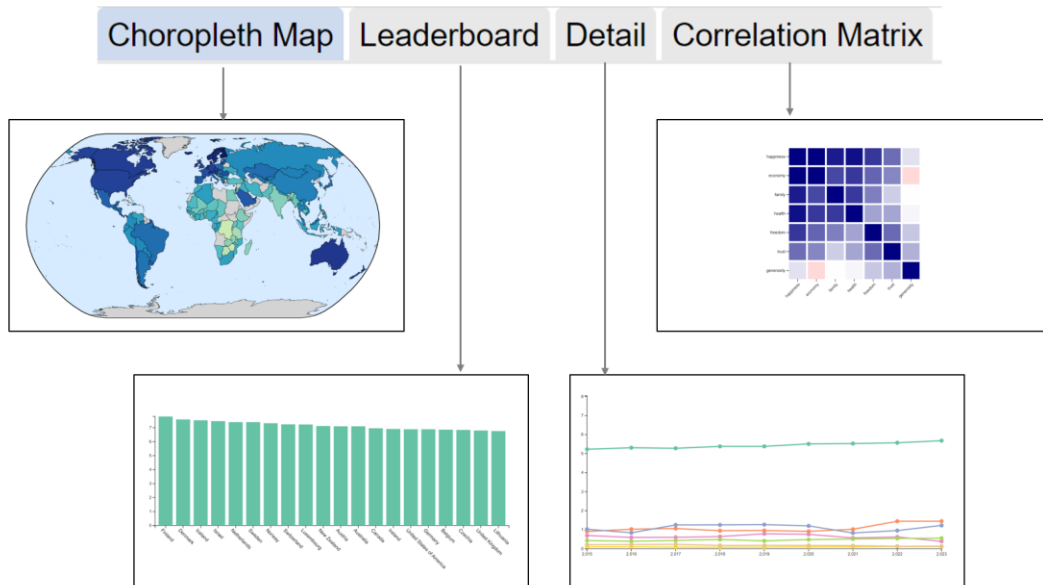
world happiness report (2023) [World Happiness Report 2023 | Kaggle](#)

Description: This dataset covers the happiness rank and happiness score for 165 countries from 2015 to 2023. Additionally, it includes various indicators related to happiness, including the economy (GDP), family, health (life expectancy), freedom, trust (government corruption), and generosity.

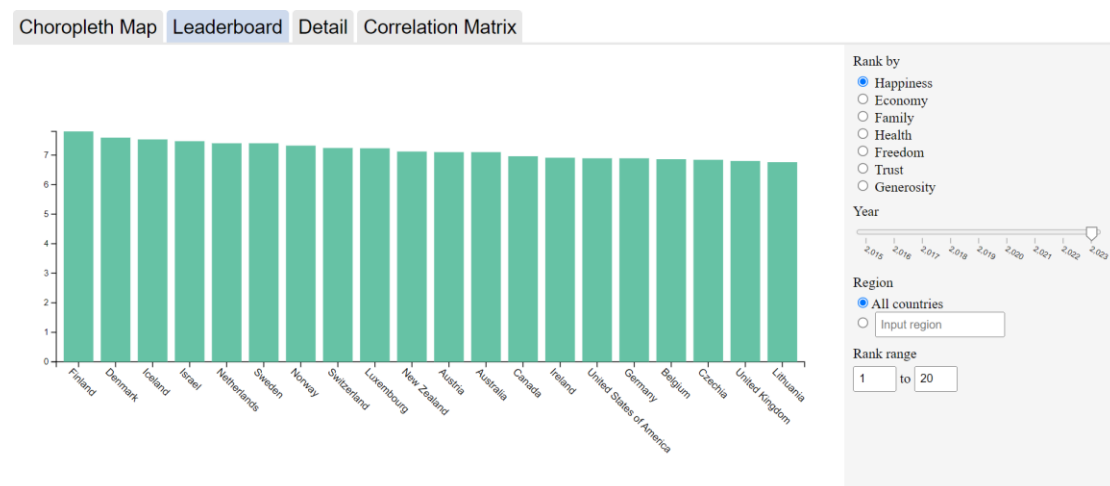
A Country	A Region	# Happiness Rank	# Happiness Score	# Standard Error	# Economy (GDP p...)	# Family	# Health (Life Expe...)	# Freedom	# Trust (Governme...)	# Generosity	# Dystopia Residual
158 unique values	Sub-Saharan Africa 25% Central and Eastern... 18% Other (88) 56%										
Switzerland	Western Europe	1	7.587	0.0388	1.459	1.23895	0.8821	0.66972	0.36583	0.34699	2.46531
Iceland	Western Europe	2	7.561	0.03550	1.32629	1.32261	0.9853	0.63297	0.32957	0.45811	2.45176
Denmark	Western Europe	3	7.527	0.0314	1.29825	1.31826	0.88911	0.64168	0.41372	0.23351	2.61955
Norway	Western Europe	4	7.522	0.02759	1.32944	1.28817	0.89284	0.61576	0.31814	0.4761	2.4687
Canada	North America	5	7.427	0.03157	1.33171	1.29987	0.91887	0.6598	0.43844	0.36262	2.37119
Finland	Western Europe	6	7.486	0.03371	1.25818	1.31867	0.98827	0.63938	0.42922	0.47581	2.28425

Introduction of our system

Our system consists of four components: Choropleth Map, Leaderboard, Detail, and Correlation Matrix. We can freely switch between these pages using the navigation bar at the top of the screen.



Function 1. Leaderboard



(1) Purpose

For users seeking to find the happiest countries, the leaderboard is crucial. By comparing and ranking the scores of different countries, it helps users gain a clearer understanding of what makes a country truly happy. The above chart depicts the top 20 happiest countries as of the year 2023.

(2) Interaction

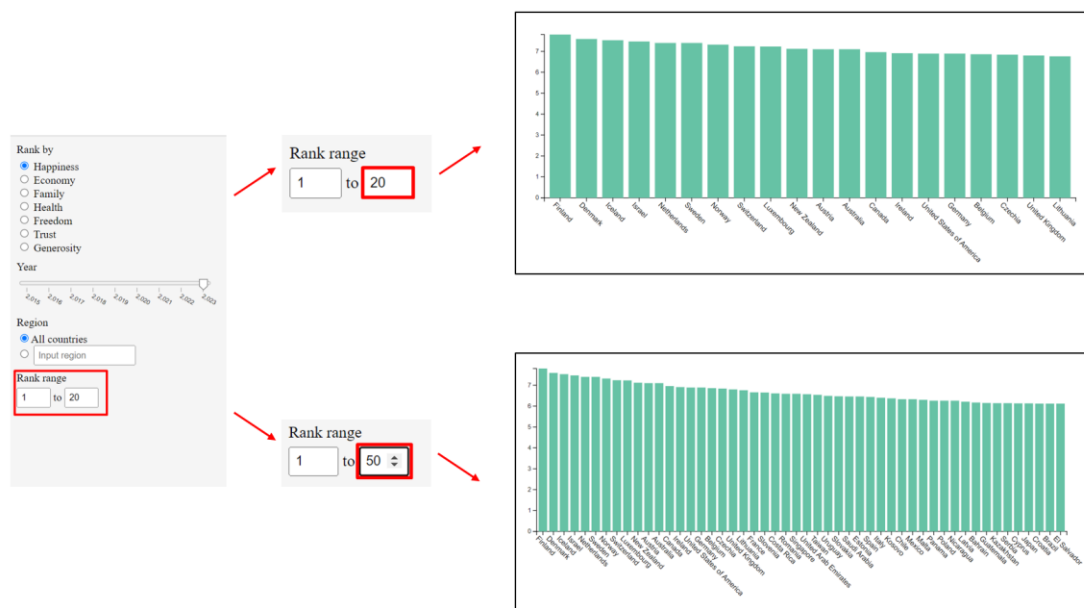
a. Year slider

Users can determine the ranking for a specific year by sliding the year slider on the right-hand side.



b. Rank range

Users can input the minimum and maximum values to determine the range of rankings they want to display.



c. Focus on specific region

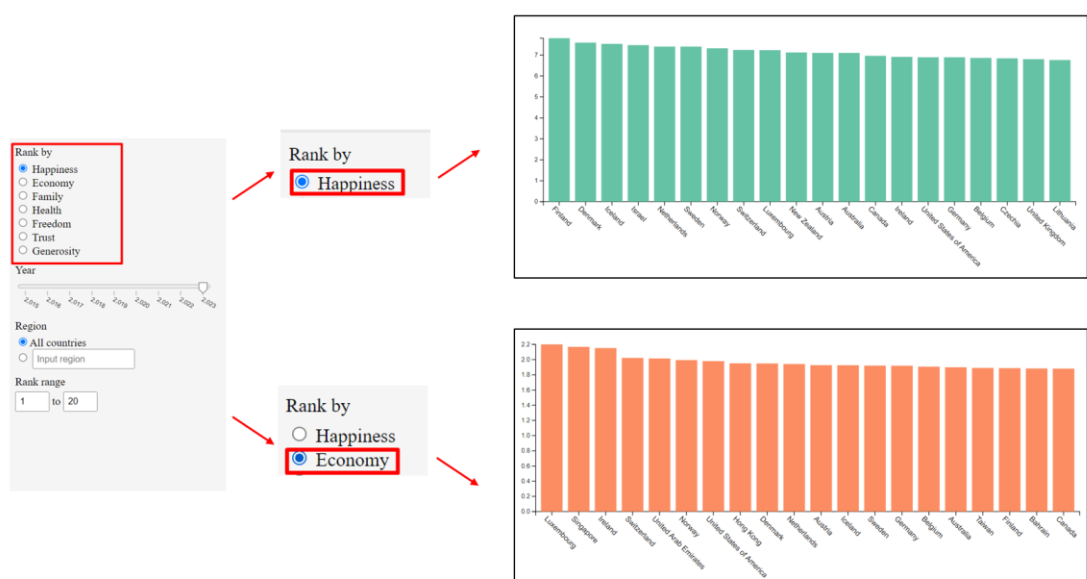
Compared to global rankings, sometimes users may prefer to focus on regional rankings. For instance, Taiwanese users often enjoy comparing with East Asian countries. Therefore, we have specially designed an option to choose regions. To improve user experience, we provide recommendations based on their input, indicating the

available options for selection.



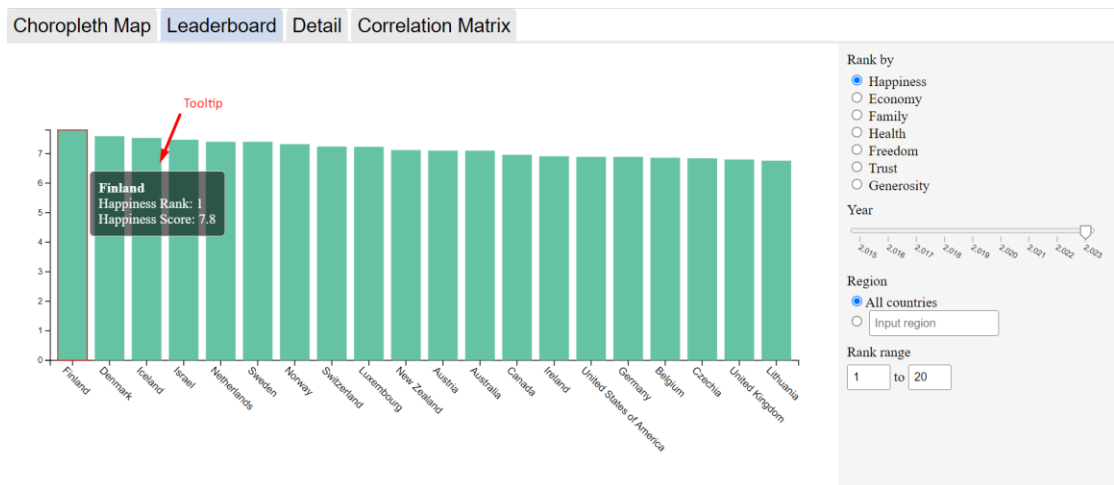
d. Plot with different features

The World Happiness Report not only provides the happiness score for each country but also includes other indicators related to happiness, such as economy, family, health, etc. Consequently, we can create bar charts based on these data. The reason for not using a stacked bar chart is that the happiness score is derived from the Gallup World Poll questionnaire, while other indicators, such as GDP representing the economy, are factors that may influence happiness but are not directly scored data. Therefore, there is no inherent weighting relationship.



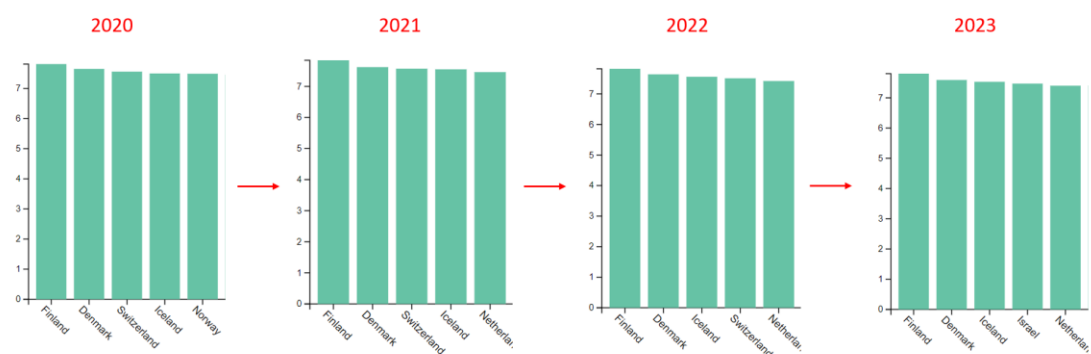
e. Hover to see the detail

Users may be interested in the values, so a tooltip will be displayed when hovering over each bar, containing information such as the country, happiness rank, and feature value.



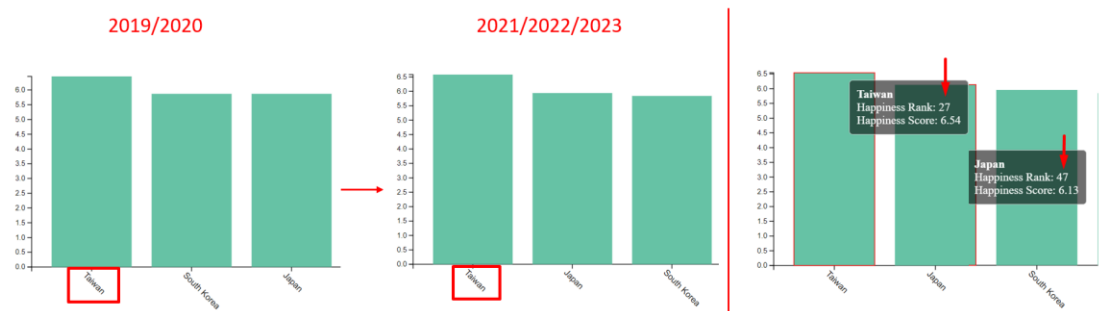
(3) Findings

- a. By comparing leaderboards from different years, we have found that in recent years, Finland consistently ranks as the happiest country in the world. Following are Denmark, Switzerland, Iceland, Netherlands, and others – countries well-known for their high standard of living and well-established social welfare systems. Therefore, this result is not particularly surprising.

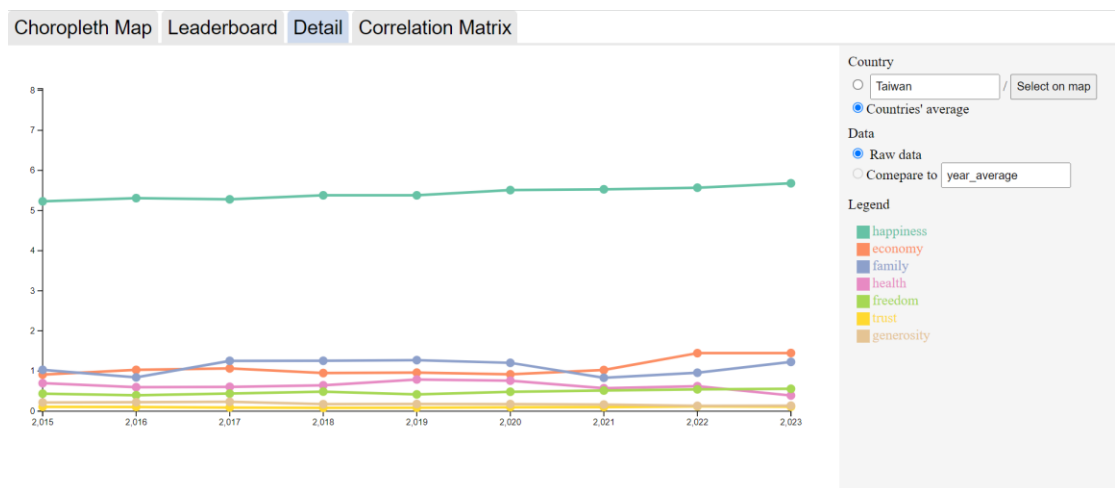


- b. We compare the East Asian region. Much to our surprise, we discovered that Taiwan consistently ranks as the happiest country in East Asia each year. Contrary to our initial textbook impression that Japan might be happier than us, it turns out that Taiwan is much happier than Japan, even surpassing it by nearly twenty

places in the rankings.



Function 2. Detail



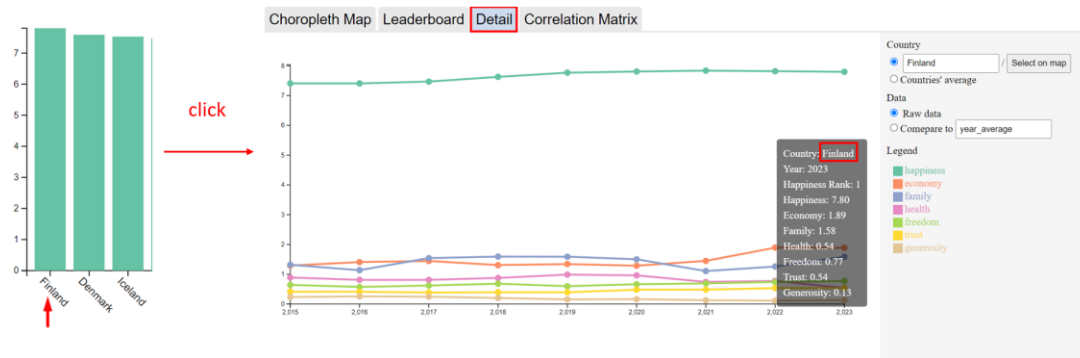
(1) Purpose

The leaderboard has some limitations. Firstly, because the graphs for each feature are independent, it is not possible to make cross-feature comparisons. Additionally, while it can depict charts for different years, unless a country maintains a consistently stable ranking, for example, Finland, users might find it challenging to quickly locate the ranking of the specific country they are curious about.

Therefore, we have designed this detail page. Through a line chart, users can clearly see the trend of each feature for a specific country each year, also enabling comparisons between features. In addition, on the detail page, users can compare two countries' data to determine which country aligns more with their expectations of a happy nation.

Despite using the button on the navigation bar, users can switch to

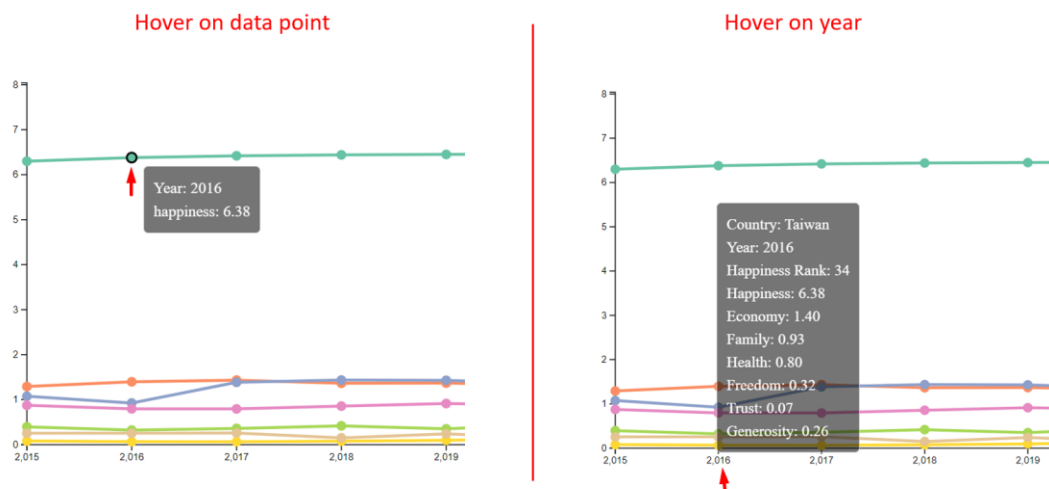
this page by clicking on the country of interest on the x-axis of the leaderboard.



(2) Interaction

a. Hover to see detail

Users can either hover over a data point to view its value or hover over the x-axis label to access complete information, including the country, year, rank, and feature values.



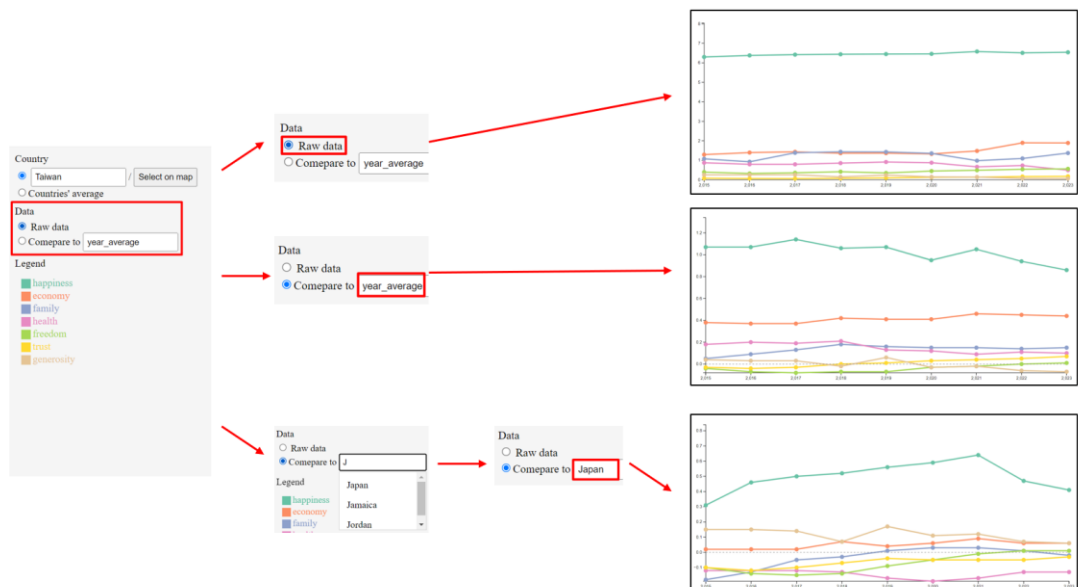
b. Specify a country or present the global average

Users can easily specify the country they want to study through the search box, or they can choose to display data for the global average to observe worldwide trends.



c. Display raw data or compare with other countries.

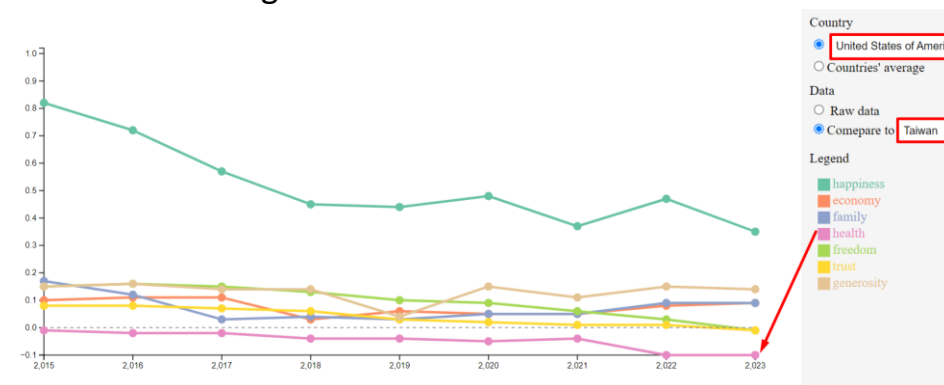
Compared to raw data, users might be curious about how their country's data compares to global trends, or they may wish to conduct cross-country comparisons. Therefore, in the "Data" radio button set, users can decide whether to display raw data directly, compare it with global averages, or select a specific country for comparison. In the example below, the top section shows Taiwan's raw data, the middle section compares Taiwan to the global average, and the bottom section compares Taiwan to Japan.



(3) Findings

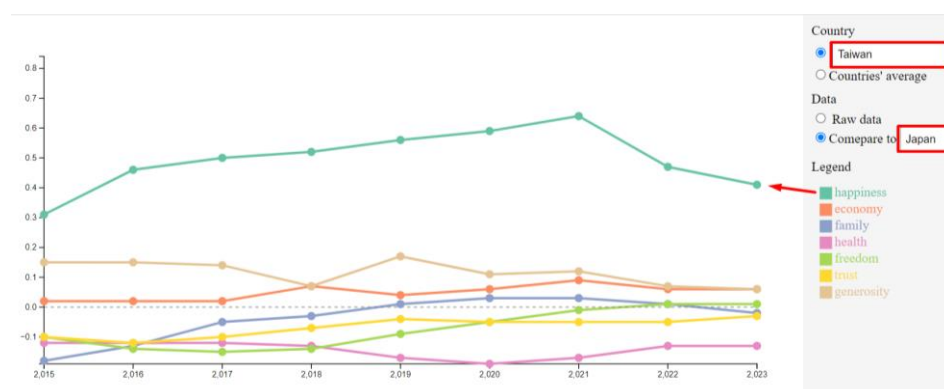
a. USA v.s. Taiwan

By utilizing the comparison feature in detail, we compared the data between the United States and Taiwan. We found that overall data, including the happiness score, is higher in the United States than in Taiwan. However, there is a lower health score in the United States. This suggests that for someone who considers longevity as a crucial indicator of happiness, immigrating to the United States might not be a favorable decision.

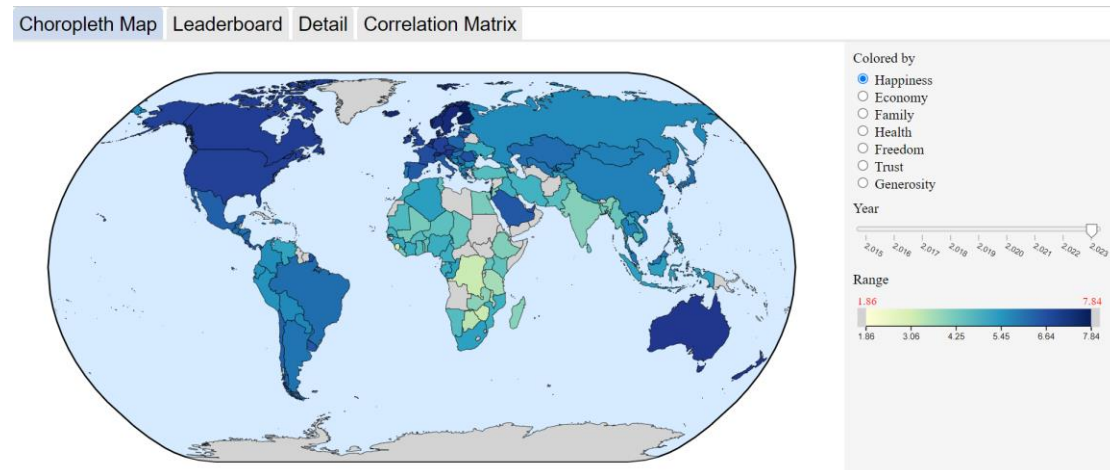


b. Taiwan v.s. Japan

In the leaderboard, we surprisingly discovered that Taiwan is the happiest country in East Asia. Therefore, we decided to explore the differences between Taiwan and Japan in the indicators. The results revealed that when it comes to happiness-related indicators, Taiwan and Japan perform similarly, with some aspects even lagging behind Japan. This confirms that the happiness score is not solely determined by these indicators. Additionally, we speculate that despite facing similar situations, Taiwanese people may have a more optimistic attitude, leading to higher survey scores compared to Japan.



Function 3. Choropleth Map



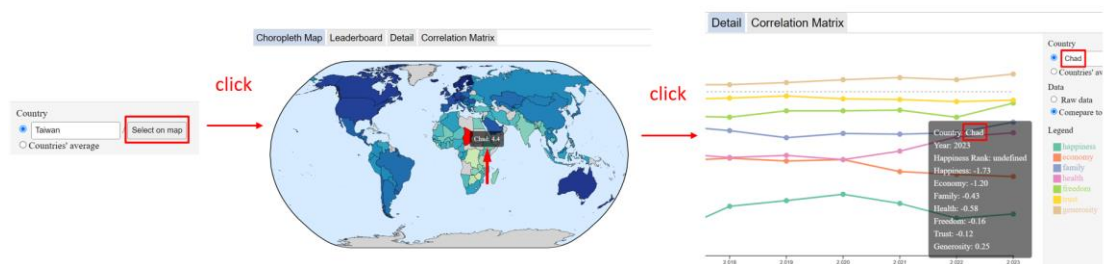
(1) Purpose

a. Efficient country lookup

The detail function has a limitation in that it is challenging to be familiar with the names of all 165 countries globally, so the user may miss many countries. While we provide input suggestions for possible country names, people may not initiate click on countries they are not familiar with. Even if they click on the data and charts, it might not hold much meaning for them because they even don't know where the country is located.

To address this issue, we have introduced a "Map" page, allowing users to locate country names on the map and clearly see which region each country belongs to.

Users can click the "Select on Map" button on the detail page to switch to the map page. From there, they can hover over a country to find out its name. After identifying the country of interest, they can click on it to navigate back to the detail page for more information.

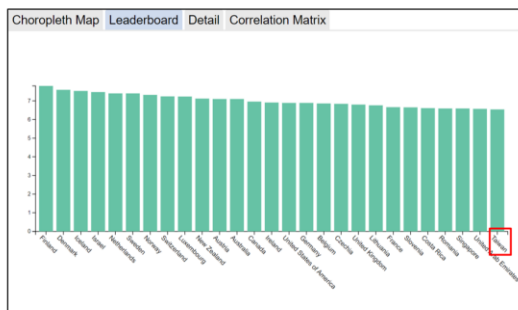


b. User-friendly overview of geographical location

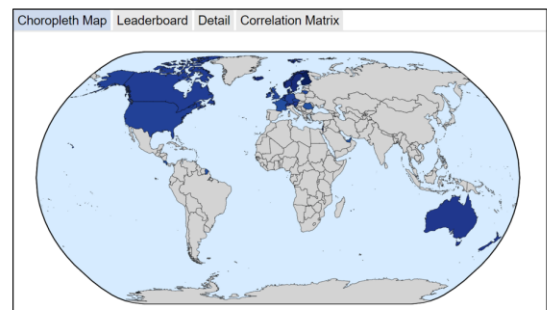
The choropleth map not only assists users in searching country names but also addresses some shortcomings of leaderboards. The main issue with leaderboards lies in the vast number of countries, making it challenging to examine each one in detail. Consequently, people tend to focus on the top few or specific countries of interest, potentially overlooking interesting information. However, maps provide a quick way to grasp the overall situation and present geographical distribution information. This not only allows us to easily understand the rankings of each country but also facilitates comparisons between different regions.

For example, if we want to understand countries with higher scores than Taiwan, one approach is to display the leaderboard with countries ranked above Taiwan (left image), and another approach is to color the countries with higher scores than Taiwan on a map (right image).

1. Leaderboard from top country to Taiwan



2. Color the countries that are happier than Taiwan

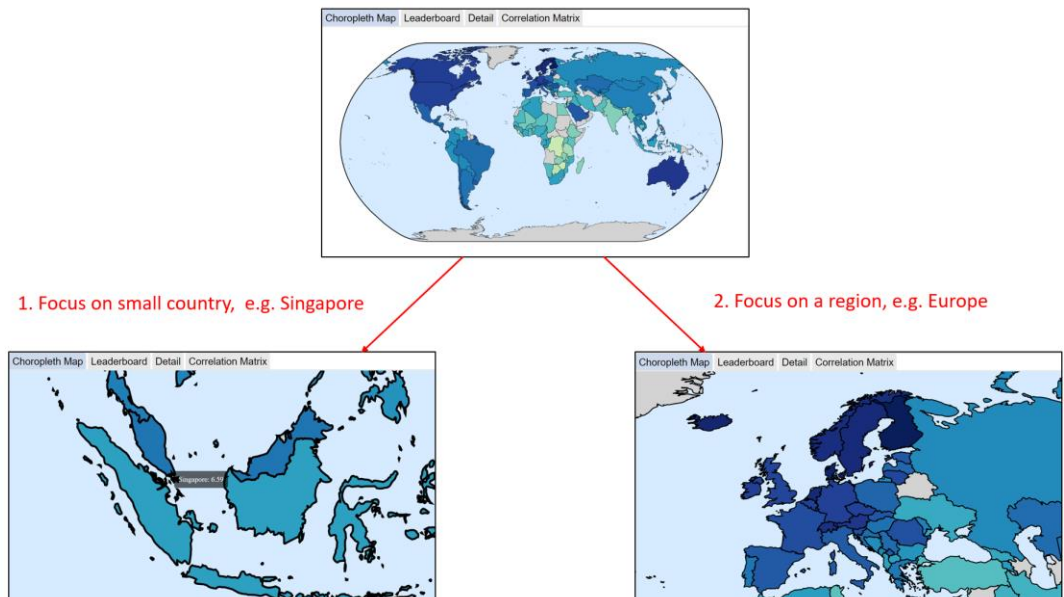


We can observe that while the leaderboard provides detailed country names, the data may be difficult to comprehend. Through maps, we can directly see the locations of these countries, making it easier to compare happiness indices between regions. For instance, countries with higher scores than Taiwan are mainly concentrated in Northern Europe, Western Europe, North America, and Oceania. This visual representation allows us to gain a deeper understanding of regional characteristics and a more comprehensive overview of the overall situation.

(2) Interaction

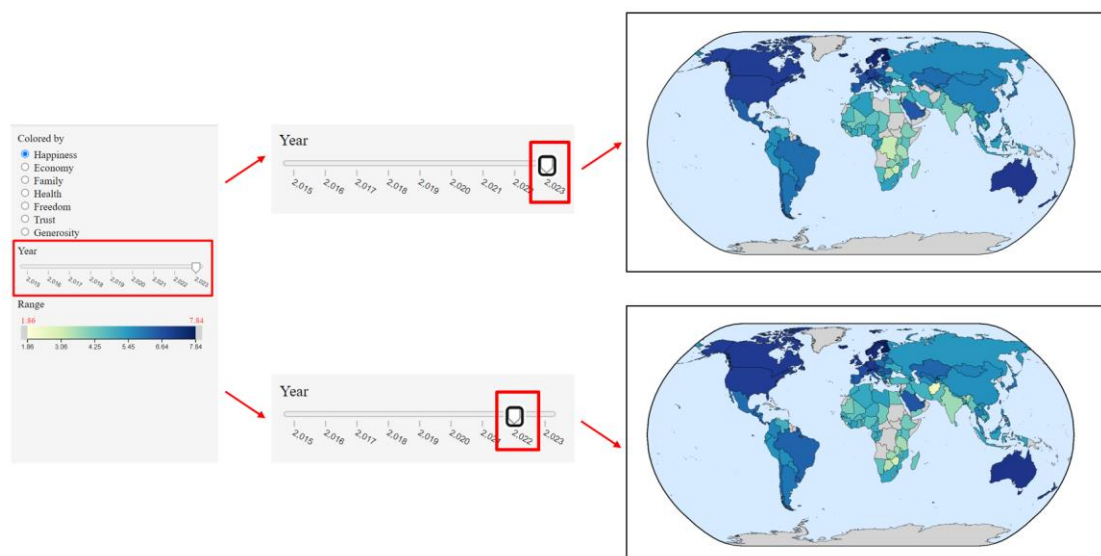
a. Zoom In/ Out

This function is designed for the small countries such as Taiwan or Singapore that may require zooming in for better visibility. Of course, it can also be applied to focus on specific regions. For example, individuals who prefer not to view global data and want to concentrate on Europe can utilize this feature.



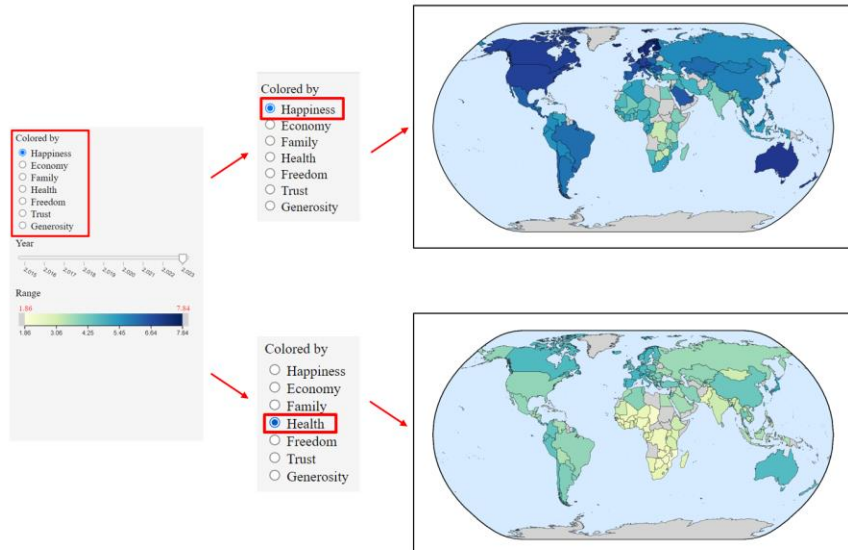
b. Year slider

Similar to the leaderboard, users can also use the year slider to determine which year's data they want to display on the map.



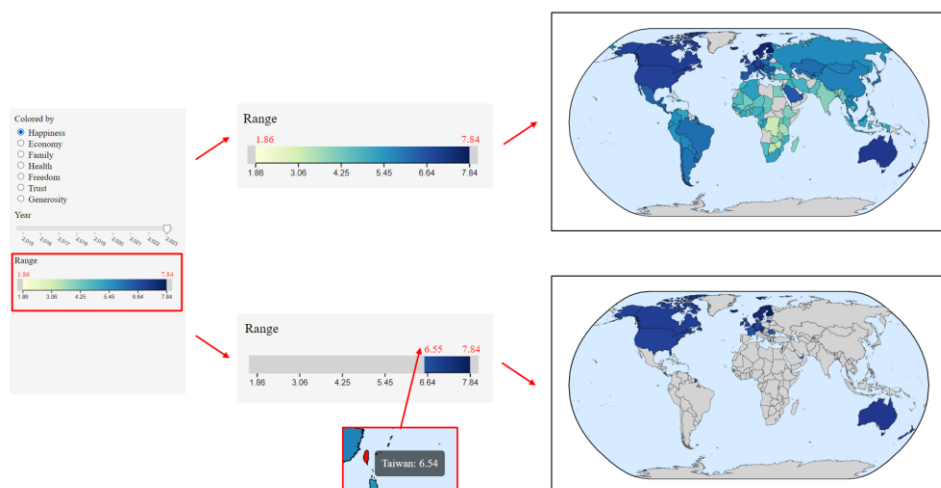
c. Other features

Similar to the leaderboard, users can decide which feature to display on the choropleth map.



d. Colored Range

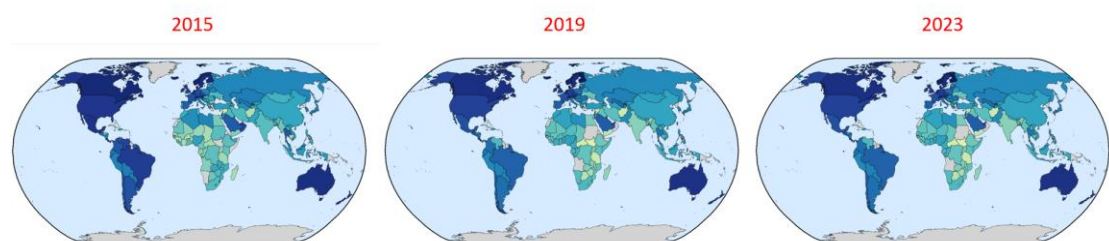
Sometimes users are only concerned with values within a specific range rather than the entire range. Therefore, our system provide a legend slider, allowing users to slide to the minimum and maximum values they care about. For example, as individuals planning to leave Taiwan, we may only be interested in countries with a higher happiness score than Taiwan. So, when we discover that Taiwan's score is 6.54, only countries with a score greater than 6.54 need to be colored on the map.



(3) Findings

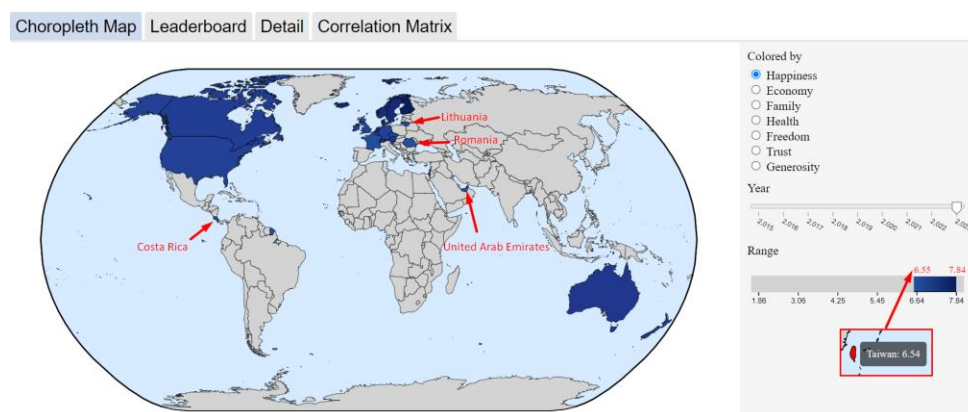
a. The most happiness countries

When we compare the charts year by year, we find that the countries with higher levels of happiness (indicated in dark blue) consistently remain similar each year, such as those in Oceania, Western Europe, Northern Europe, and North America. The sustained high happiness levels in these regions are not surprising, as they are all developed countries with well-established economies, healthcare systems, and other aspects.



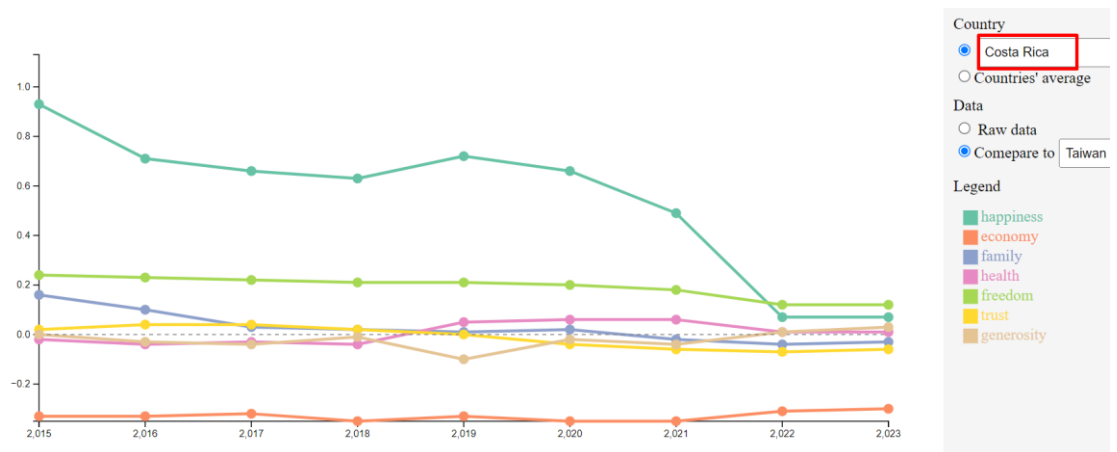
b. The countries happier than Taiwan

Our motivation is to identify countries in the world that are happier than Taiwan. Therefore, we utilized the color range feature to map out countries in 2023 that exhibit higher happiness levels (scores exceeding 6.54) compared to Taiwan.



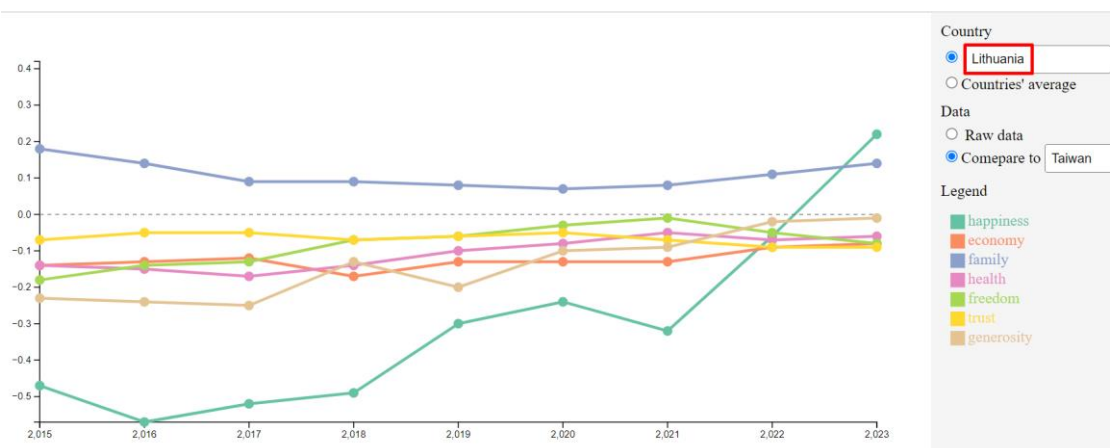
In addition to the previously mentioned happiest regions, we also discovered some unique countries from a geographical perspective. These include Costa Rica in Central America, Lithuania and Romania in Eastern Europe, and the United Arab Emirates in the Middle East. Intrigued by these findings, we decided to delve into the study of these particular countries.

b-1 Taiwan v.s. Costa Rica



The chart above illustrates the data that subtracting Costa Rica's scores from Taiwan's. From the graph, we can observe that the happiness scores of Costa Rica and Taiwan are converging over time. Additionally, Costa Rica's economy is comparatively weaker than Taiwan's. Therefore, for individuals who highly prioritize wealth, Costa Rica might not be an optimal choice. However, it's noteworthy that Costa Rica consistently outperforms Taiwan in terms of freedom. Hence, for those who value personal liberty, immigrating to Costa Rica could be a more suitable option.

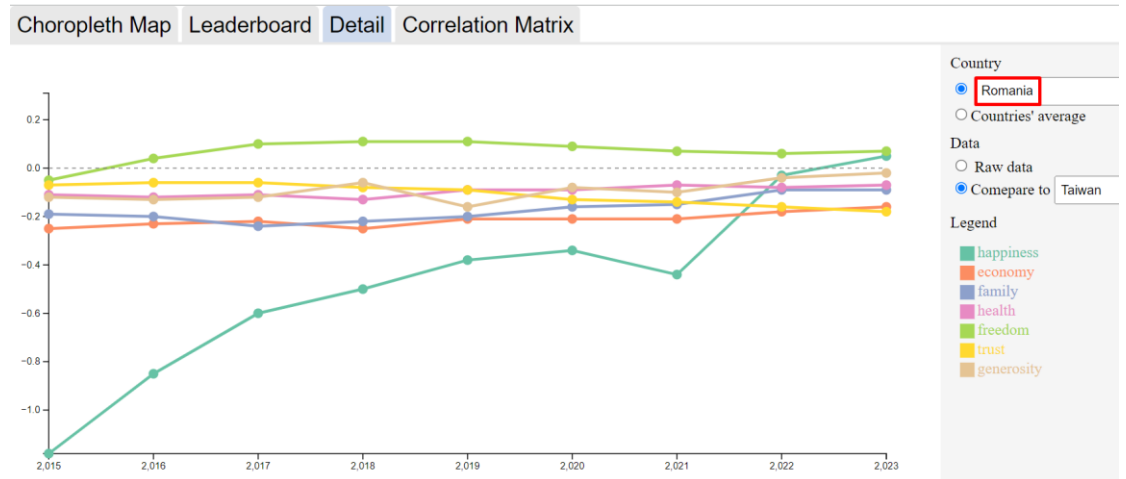
b-2 Taiwan v.s. Lithuania



From the chart, we can observe that Lithuania's happiness score consistently lagged behind Taiwan's in the early part of 2022. However, examining the trend, we can see consistent improvement each year, leading to Lithuania surpassing Taiwan

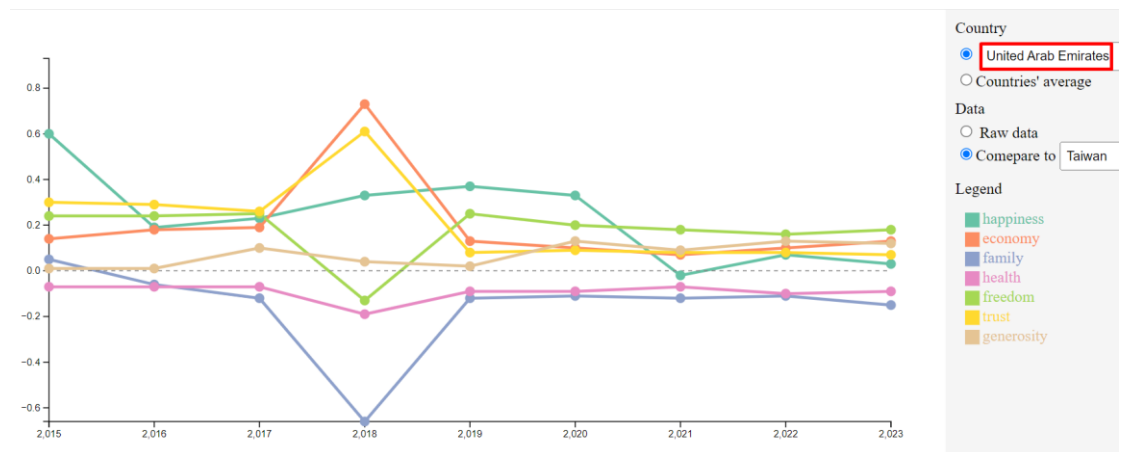
in 2023. Therefore, it might be worthwhile to observe for a few more years as the gap between Lithuania and Taiwan could potentially widen further in the future.

b-3 Taiwan v.s. Romania



Romania is same as Lithuania, both consistently growing and surpassing Taiwan in 2023. Therefore, they are countries worth continuously monitoring and paying attention to.

b-4 Taiwan v.s. United Arab Emirates



Excluding the data in 2018, which might have some noise, the overall data for the United Arab Emirates is similar to Taiwan. Therefore, we believe that the UAE might not be the top choice for relocation.

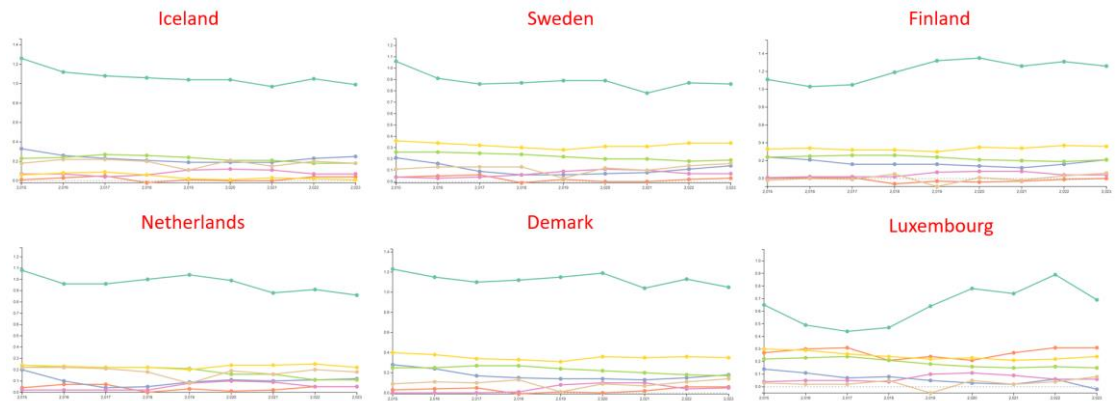
b-5 Taiwan v.s. Other countries

We have compared the data of other countries with Taiwan

and categorized them into three main groups: consistently outperform, yearly decline, and others.

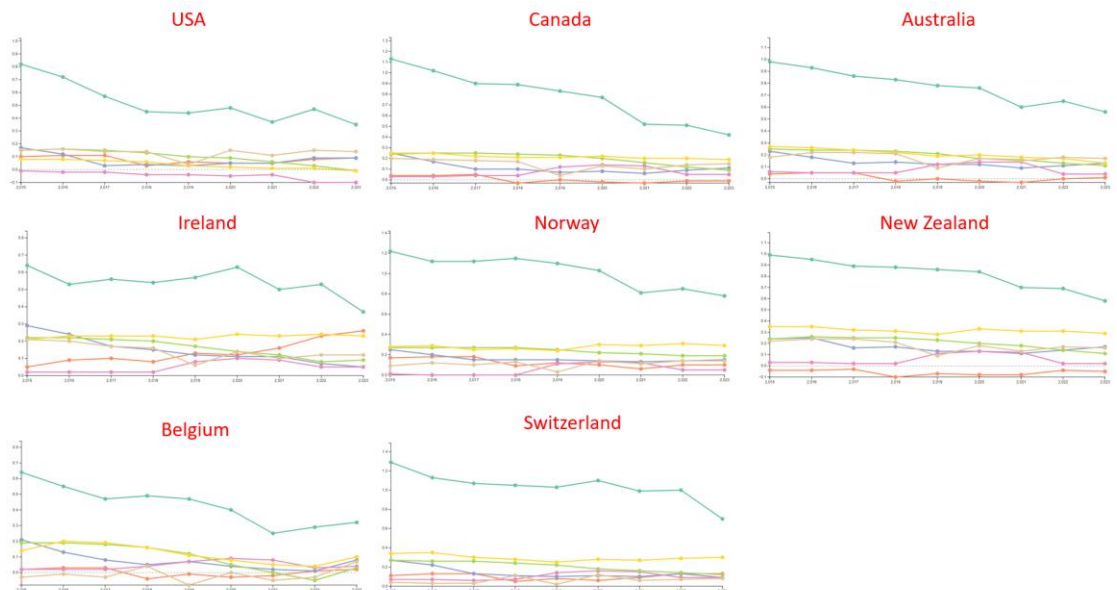
Type1. Consistently Outperform

These countries are mainly from Northern Europe. Even though their annual progress may be modest, it is still far higher than Taiwan's. They are places that are very worthy of consideration for immigration.



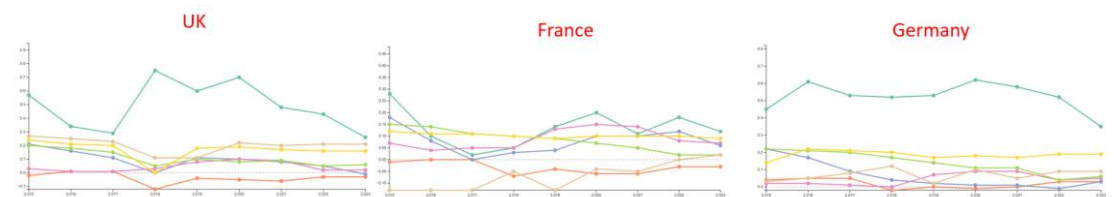
Type2. Yearly Decline

While these countries still happier than Taiwan, their scores have been gradually approaching Taiwan's over the years. Moreover, some indicators are actually worse than Taiwan's, such as the health index in the USA (pink line) and the economic in New Zealand (orange line). Therefore, we believe that these countries may not be the top choice for relocation.

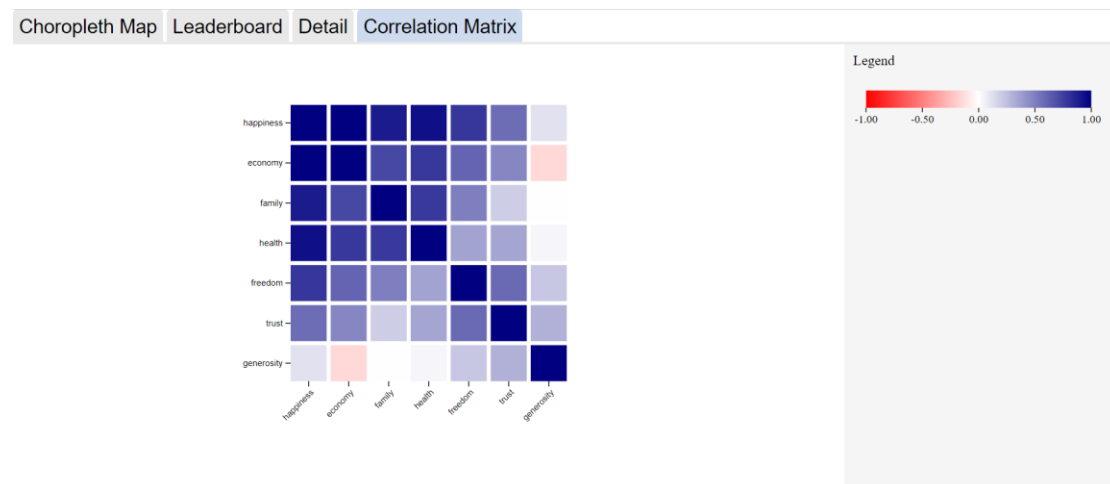


Type3. Others

The UK, France, and Germany do not exhibit a clear trend, so we did not categorize them into the first two types. However, similar to the second category, their scores are not significantly higher than Taiwan's. For instance, in 2023, France only surpassed Taiwan by 0.1, and their economic indicators are also inferior. Therefore, we believe that these countries are not the most desirable destinations for immigration.



Function 4. Heatmap



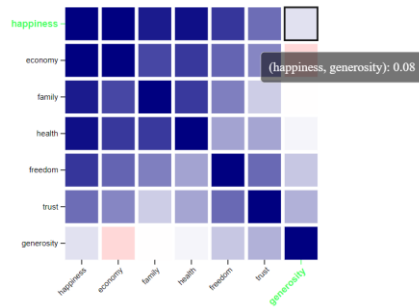
(1) Purpose

As other features are not directly used in calculating the happiness score but rather serve as indicators related to happiness, users might be curious about the interrelationships among these features and whether they correlate with happiness. Therefore, we have designed a "Correlation Matrix" page to address users' inquiries and shed light on these relationships.

(2) Interaction

a. Hover to see the detail value

Users can hover on the cell that they are interested in, to see the correlation value between the selected features.



(3) Findings

As we can see, most indicators are highly correlated with the happiness score. However, the last indicator, generosity, shows only a slight correlation, and it is even negatively correlated with the economy.

