

# ProsperViz

**Exploring Global Well being  
through data..**

# Project Overview

## Vision & Motivation

In an increasingly interconnected world, understanding what truly drives human well-being across nations is more important than ever. Our project is driven by the motivation to uncover the complex and often interconnected dynamics that define quality of life, happiness, and human development on a global scale. By integrating diverse datasets, we aim to provide a broad and engaging exploration of global well-being. The goal of this project is to create an interactive, data-driven tool that allows users to visualize, compare, and interpret measures of well-being across countries, regions, and time periods.

## Data Sources

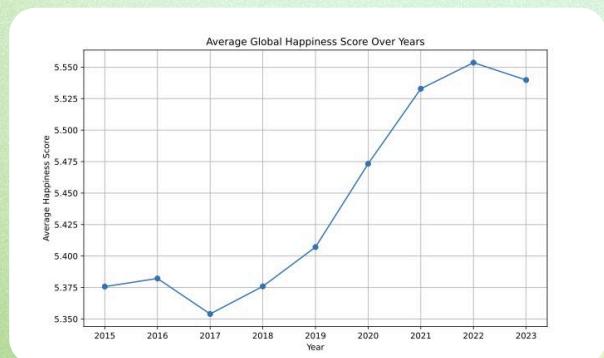
To create a richer view of well-being around the world, we combined three complementary sources. First, the Quality of Life Index brings together country-level data on everything from purchasing power and security to access to healthcare and the cost of living. Then, the World Happiness Report's Global Happiness Scores and Factors dataset adds insights into social support, personal freedoms, and how people perceive corruption. Finally, we used UNDP's Human Development Index, which tracks long-term trends in education, income, and life expectancy. Each of these datasets sheds a different light on what makes a country needs, and together they help tell a more complete story of human development around the world.

## Exploratory Data Analysis

In milestone 1, we began by cleaning and reshaping our three primary datasets (Quality of Life, World Happiness, and Human Development Index). We carried out a series of descriptive and comparative analyses to tease out patterns in well-being, exemplified by the following:

- Global Trends Over Time

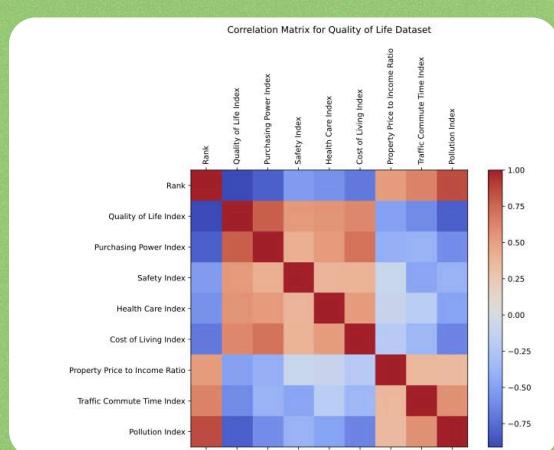
We plotted the average happiness score year by year to spot shifts in global sentiment and identify periods of sharp rise or decline.



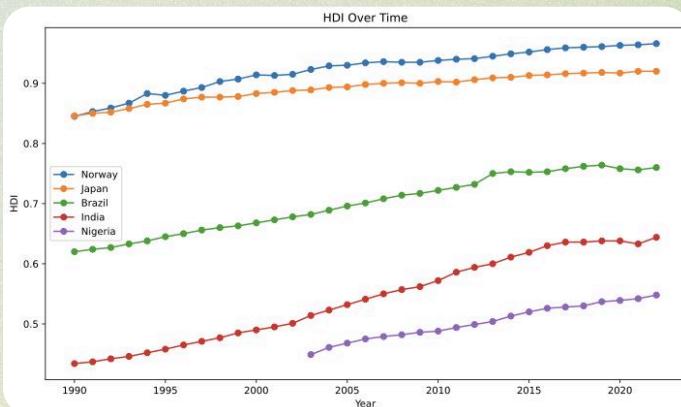
**Figure 1:** Trend in Average Global Happiness, 2015-2023

### Indicator Correlations

- By constructing correlation matrices for each dataset, we examined how variables such as GDP per capita, social support, and life expectancy move together—revealing clusters of closely linked factors.



**Figure 2:** Correlation Heatmap on Quality of Life dataset

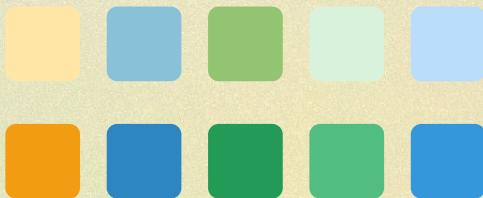


**Figure 3:** Evolution of HDI in Selected Countries

### Top-Country Comparisons

- We highlighted the trajectories of the five top-ranked countries in each domain (happiness, quality of life, HDI) and compared their trajectories against the global mean.

## Website Colour Scheme



Each chapter in the dataviz is defined by a distinct colour pair: a soft main hue for backgrounds and visual identity, and a deeper supporting tone for emphasis and interaction. Chapter 01 uses a warm pastel sand (#FFE6A7) with an amber accent for highlights.

Chapter 02 centres on a calm dusty sky blue (#89C2D9) paired with a deeper tint for structure. Chapter 03 features a fresh olive green (#93C572) supported by a forest tone for depth and contrast. Chapter 04 brings in a light mint (#D8F3DC) with a punchy leaf green to highlight regional voices. Chapter 05 concludes with a soft powder blue (#BBDEFB) and a bold cornflower for clear forward-looking emphasis. This pairing system ensures each chapter has a consistent, recognisable visual language that guides the viewer and supports narrative flow.

## Website Layout

The site has a fixed chapter bar at the top and uses CSS scroll-snap so each full-width panel locks into view as you scroll:

- Chapter 1 (Pastel Sand) shows two white cards (“Spin the Globe” and “Did you know?”) alongside a choropleth map—every viz has a short description underneath, and the map’s orange-brown scale matches the sand background.
- Chapter 2 (Dusty Sky) stacks dropdowns above a radar chart and its “Radar Showdown” card—each axis and fill uses the chapter’s blue tones, and a blurb explains what you’re looking at.
- Chapter 3 (Fresh Olive) pairs a “Track Trends” card with a line (and bar) chart tinted in olive and forest green, with captions to guide your reading.
- Chapter 4 (Mint Mist) frames an “Explore Global Well-Being” bubble plot and a PCA scatter in two-column rows, using the mint and leaf greens for data points and legends, plus call-outs that explain the key patterns.
- Chapter 5 is the Drivers & Rankings of Global Well-Being that includes a Sankey diagram and a top 10 according to the chosen metric by the user.
- Chapter 6 is just the full-screen quiz card—an interactive test at the end forces you to hunt through the site for answers.

After the quiz there’s a recap section highlighting the most important takeaways, and an appendix with links to download the raw datasets for your own analysis and a dashboard to explore some raw data.

# Storytelling

Our website guides you through a five-chapter narrative that turns data into discovery, inviting you to explore how well-being has evolved, what drives it, and where future opportunities lie.

The exploration starts with **Chapter 1:** The World in Transition. As a first look to global wellbeing, we give a clear, high-level view of how global well-being has changed between 2015 and 2022, using animated visuals to highlight both overall trends and standout countries along with a world map.

We deepen the analysis in **Chapter 2:** Unveiling the Factors, where we begin to pull apart the overall scores to understand what's truly driving them. Here, we examine key drivers of well-being, such as health, education, income, social support, and more, and look at how these components influence national outcomes.

From there, the story stretches further in **Chapter 3:** A Shifting Landscape, which we add historical depth to our analysis, showing how countries grow steadily over decades, or face abrupt declines during times of conflict or crisis. The aim is to make users to see the resilience and vulnerabilities hidden in the data.

Moving outward in **Chapter 4:** Regional Voices & Outliers, we zoom out beyond borders to explore continental and sub-regional patterns. We illustrate how countries cluster together, or stand apart in this chapter. Here, you'll see which regions tend to move in unison, and which have outliers carving their own path.

Finally, in **Chapter 5:** Insights & Future Paths, we bring everything into focus. A dynamic Sankey diagram traces the flow of investments through to real changes in life satisfaction. And, to close, we offer a brand-new snapshot of the world's top performers in well-being, setting a benchmark for what's possible.

## Visualizations

Below is a tour of every interactive visual you'll find on the site, laid out in rough "story order."

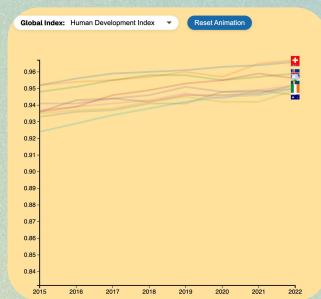
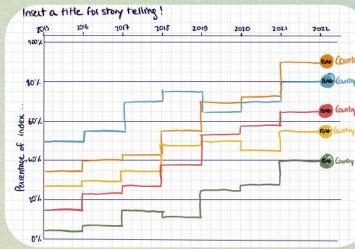
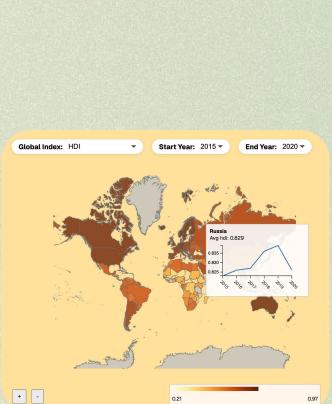
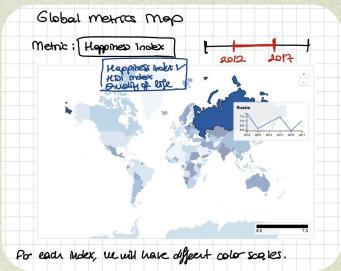
Feel free to skim, or jump straight to the chart that sparks your curiosity—each one was built so you can poke, prod and remix the data in a single click.

### Spin the Globe

This map lets you see how countries score on Happiness, Quality of Life, or the Human Development Index (HDI). You choose the measure and slide the start-year and end-year controls. As soon as you move the sliders, the colours on the map update, so you can watch countries improve or decline through time. Point at any nation and a small pop-up shows its exact numbers for every year in the range. Zoom buttons under the map help you look more closely at small places, and a colour bar underneath reminds you which shades mean high or low scores.

### Global Index Rollercoaster

Here the top 10 countries appear as a moving line on one chart. Pick an index—HDI, GDP per person, or Happiness—and press Reset Animation. The lines race from 2015 to 2022, ending with a tiny flag that marks each country's final value. You can reset the motion at any moment to read the numbers or hover over a single line to highlight it. This view makes it easy to spot who rises, who falls, and who stays level across the years.



Figures of design sketches vs web implementations for **Chapter 1** charts (World Map & Dynamic Line Chart)

## 🔍 Personal Radar Showdown

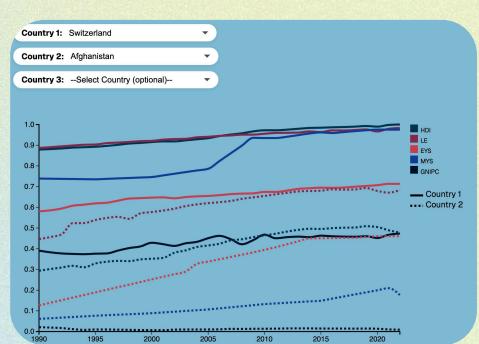
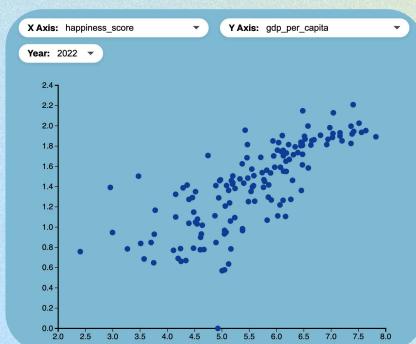
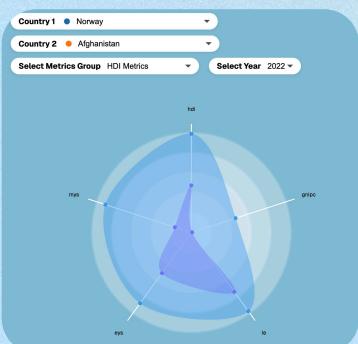
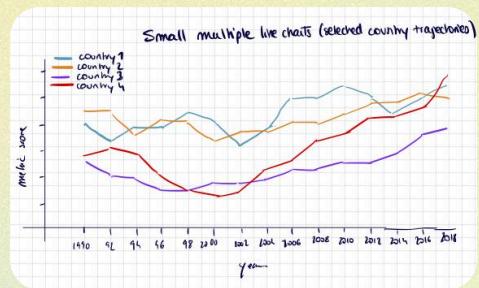
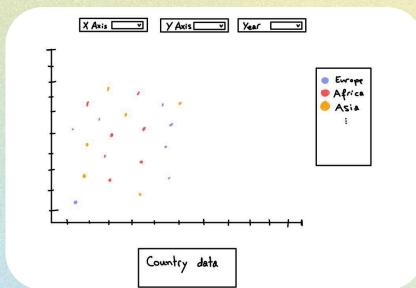
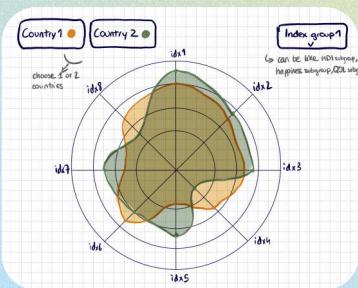
The radar chart compares two countries in a single year. It draws a geometrical shape for each nation, one point for HDI itself and four points for its building blocks: life expectancy, expected years of schooling, mean years of schooling, and income per person. If you select another group of metrics, you will have more points. After you pick the countries and the year, the two shapes appear on top of each other. Where one country's shape stretches farther from the centre, it is doing better on that measure. This quick picture shows strengths and weak spots side by side.

## 🔗 Spot the Correlations

This scatter plot checks whether two things move together. You decide what goes on the X-axis and Y-axis, maybe Happiness against GDP, or life expectancy against CO<sub>2</sub> emissions. Each dot is a country in the year you select. If the dots form an upward or downward line, the two measures rise together; if they scatter without pattern, the link is weak. Point at a dot to see the country name so you can chase any surprise outliers.

## 🧩 HDI Components Over Time

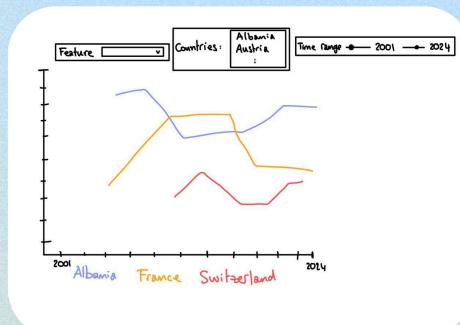
To learn why HDI changes, this line chart tracks its four parts along with the overall score from 1990 to 2022. Choose up to three countries; each one appears in its own line style so you can tell them apart. Watching the five lines together shows whether health, schooling, or income made the biggest difference in each place and year.



Figures of design sketches vs web implementations for **Chapter 2** charts (Radar Chart/Scatter Plot/Small Multiples Chart)

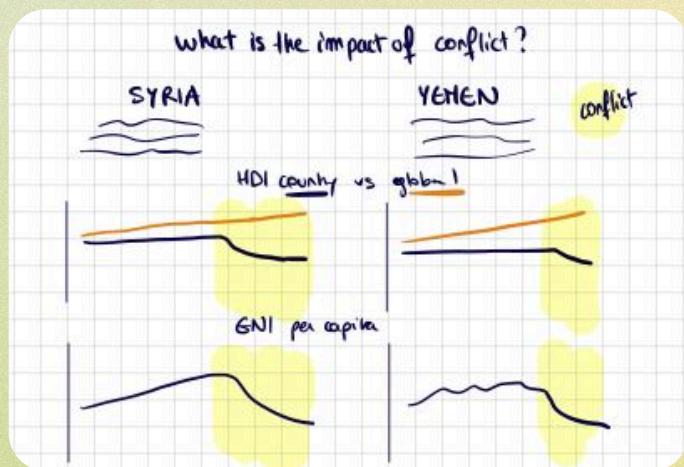
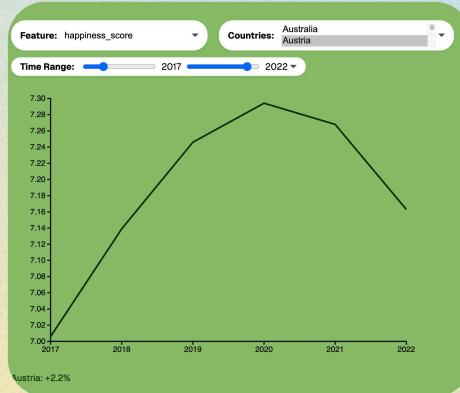
## Country Trend Slider

Sometimes you only care about one country. In that case the trend slider draws a single clean line for the feature you pick—say Happiness or GDP per person. Drag the start and end handles to set any period you like. The timeseries redraws right away and a note below tells you the percentage change across the chosen years, so you can see instantly whether the country improved or slipped back.

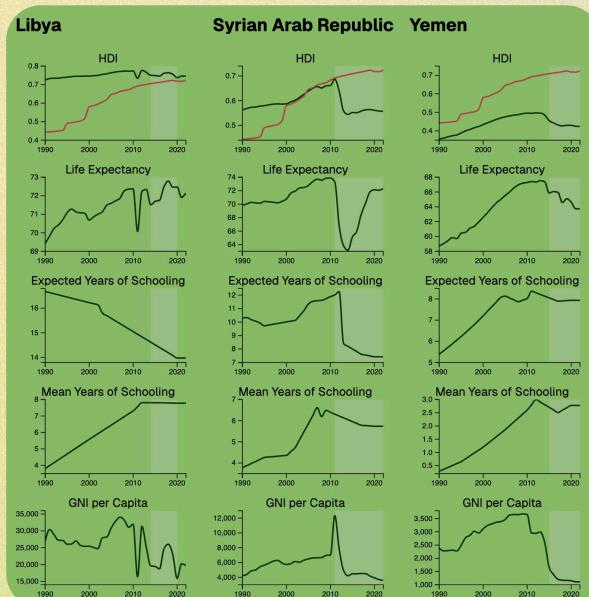


## Impact of Public War

Libya, Syria, and Yemen have lived through recent wars, and this dashboard shows the cost. For each country you get four small charts—HDI, life expectancy, expected school years, and mean school years. Shaded bands mark the war years. The drop in each curve during the shaded time and the slow climb after it make the damage clear at a glance.



Figures of design sketches vs web implementations for **Chapter 3** charts (Time Series Line Chart/Comparison Chart)



## Explore Global Well-Being (Bubble Plot)

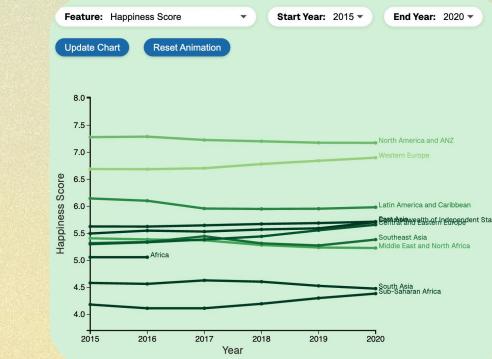
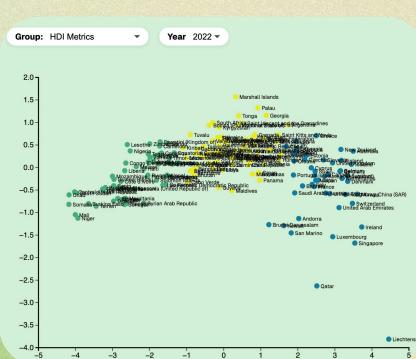
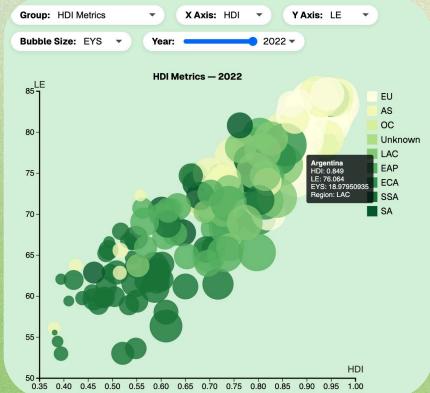
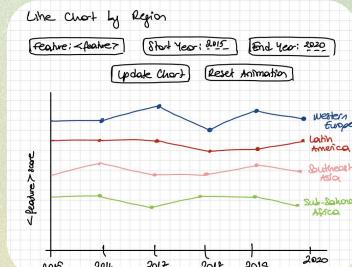
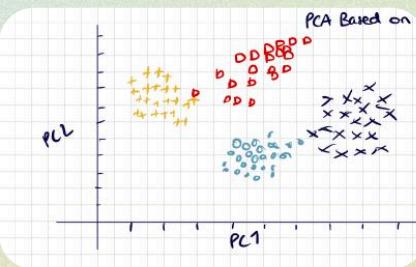
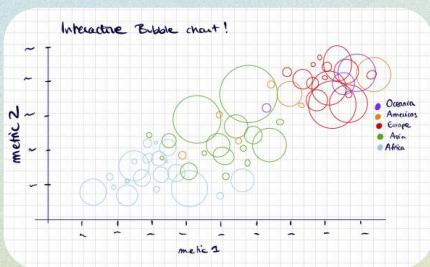
This bubble chart packs three facts into one picture. First pick a group of measures—HDI, Quality of Life, or Happiness. Then decide what goes on the X-axis, the Y-axis, and what controls bubble size. Each bubble is a country coloured by world region. Slide the year bar and the bubbles glide to their new places, so you can see regions bunch together or drift apart over time.

## Hidden Clusters with PCA

Right below the bubble plot, another scatter chart groups countries by similarity. We use PCA projection to group metrics together and K-mean clustering after. Countries that land close together have alike profiles for the selected measure and year. Switch the year or metric group and watch the pattern shift; it is a quick way to spot natural clusters you might not expect.

## Regional Trends Over Time

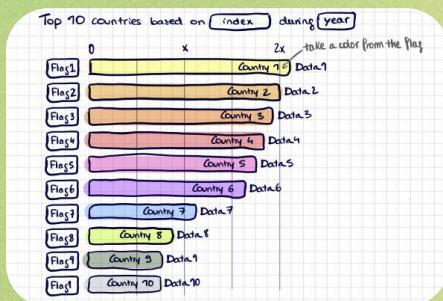
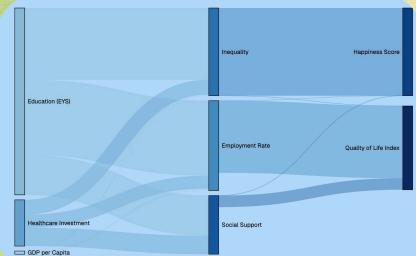
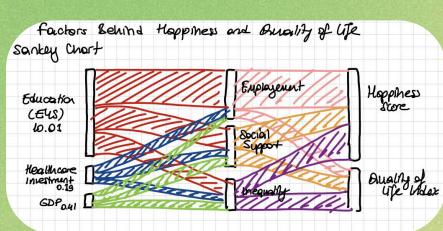
Instead of countries, this chart shows whole regions—Western Europe, Sub-Saharan Africa, and so on. Choose any single feature and a time span, then press Update Chart. Lines for each region animate from the first year to the last, making it easy to see which areas climbed fastest and which lagged.



Figures of design sketches vs web implementations for Chapter 4 charts (Bubble/PCA/Region-based Line Charts)

## What Fuels Happiness & Quality of Life?

The Sankey diagram links starting factors to final outcomes. On the left you see inputs like schooling, health spending, and GDP per person. In the middle come social factors—inequality, jobs, and social support. On the right sit the two end results: Happiness and the Quality-of-Life Index. The wider the flow, the stronger the link our simple model found. Following the bands helps you trace how money and public services travel through society and end up as lived well-being.



## Who's on Top? (Leaderboard)

To finish the story, this chart shows a simple “top-10” list for any year and index you pick—Happiness, Quality of Life, or HDI. Each country is a horizontal bar; longer bars mean better scores, and the exact number appears at the right edge. Change the year or index with the drop-downs, or press Play to let the bars reorder themselves as time moves forward. In a few seconds you can see which nations take the lead, who slips down the table, and how tight the race is at the very top.

Figures of design sketches vs web implementations for Chapter 5 charts (Sankey/Bar Charts)

# Challenges

Working with three separate datasets together comes with its own challenges. We needed to ensure that the country names were aligned across all of them. The Quality of Life and Happiness datasets were well-structured; however, the HDR dataset needed further processing. Since the HDR laid out every year as a separate column (hdi\_1990, hdi\_1991, ...), we pivoted this wide format into a tidy “one row per country-year” table, with dedicated columns for HDI, education index, income index, life expectancy, and so on—while preserving region metadata.

While combining all datasets, we needed to handle NaN values inside our JS files to update our charts without any issues. In addition, because we sometimes had continent info for a country in some rows but not others, we also needed to handle those gaps.

Since we end up with many features after merging, we must select the most impactful and interpretable metrics from each dataset when creating our charts. We analyzed them separately to make the best visualizations for our users. Another challenge we faced was creating a meaningful flow across our chapters; we aimed to present the material in the easiest way to understand and follow.

For some of our charts, we needed to incorporate simple machine learning algorithms directly into our JavaScript code. This included implementing a multilinear regression model to power the Sankey chart in Chapter 5 and a PCA-based clustering algorithm used in the PCA & Clustering chart in Chapters 3 and 4.

After overcoming these challenges, we successfully built a cohesive and engaging website experience, featuring a clear narrative flow across chapters and a variety of meaningful, well-structured visualizations that bring global well-being insights to life.

## Peer Assessment

### **Andrea Miele:**

- Worked on almost all the charts, “did you know”, quiz, dataset introduction and distributions
- Involved in data pre-processing and pre-data analysis
- Almost all UI/UX of the website and process book
- “Visualizations” part of the process book
- Recording and editing of the screencast

### **David Revaz:**

- Worked on scatter plot
- Worked on time series plot for countries

### **Zeynep Tandogan:**

- Worked on almost all the charts, quiz and storytelling on the data visualizations
- Involved in data pre-processing and pre-data analysis & NaN value handling in charts
- Wrote the process book “Challenges”, “Website Layout”, “Vision motivation”, “EDA”, “Data source”, etc.

### **To launch the website:**

```
git clone xxx  
cd docs/
```

```
Run python -m http.server 8000
```

You can now access the website locally by accessing <http://0.0.0.0:8000/> into the browser.