

## DS 4200 Visualization Ideas

Link to Website: [https://arumehta97-sys.github.io/final\\_project/](https://arumehta97-sys.github.io/final_project/)

### Visualization 1 (GDP & GDP Per Capita by Continent (2013 vs 2023)) -

We wanted to examine global wealth distribution and see which regions have developed the most over a 10-year period (2013 vs 2023). I thought a choropleth map was the best choice because the gradient color scale lets you quickly compare countries and spot outliers without reading exact numbers - darker shades immediately show higher GDP. I added a dropdown menu to switch between GDP per capita and total GDP, and also between 2013 and 2023. This is important because while total GDP shows a country's overall economic power and depends on population size, GDP per capita better reflects the actual standard of living for people in that country. To make it easier to use, I color-coded GDP per capita as blue and total GDP as green so you can immediately tell which metric you're looking at. The map is built with Plotly and is fully interactive - you can zoom into specific regions and hover over countries to see their exact GDP values, which makes it easy to explore whatever areas you're interested in.

### Visualization 2 (GDP Growth vs Income, Labor & Social Factors) -

For this visualization, I wanted to compare GDP growth and income levels while also highlighting how labor and social conditions factor into economic performance. I chose a scatterplot because it lets each country stand on its own while still revealing macro-level patterns, and I applied a logarithmic x-scale so that both low-income and high-income nations could be plotted together without compressing the data. I used circle color to represent unemployment rates and bubble size to reflect labor force participation because I felt these variables added meaningful context to growth outcomes. My goal was to make the visual informative but not overwhelming, so I kept the styling minimal and used soft color gradients and consistent scaling to make patterns easier to identify. This design lets the viewer explore multiple economic factors simultaneously and encourages them to consider how income, employment, and workforce engagement connect to broader development trends across regions.

### Visualization 3 (GDP per Capita vs Government Effectiveness by Region) -

Government policy plays a huge role in economic development through labor regulations, healthcare systems, and monetary policy, so we wanted to see whether better government effectiveness leads to higher GDP per capita and whether this relationship differs between developed and developing countries. I designed a small multiples scatter plot with separate panels for each region (Africa, Americas, Asia, Europe, Oceania), so you can compare how regions developed over the 10 years and also see differences between regions. I used blue for 2013 and orange for 2023 with lower opacity so you can easily see the changes over time.

The visualization has three interactive features: First, there are year checkboxes that let you filter the data to show just 2013, just 2023, or both years at once - this gives you flexibility in how you want to analyze the trends. Second, when you hover over any dot, it shows you the country name, government effectiveness score, and GDP per capita. This feature is really useful if you spot an interesting country on the choropleth map and want to quickly find it here. Third, if you click any point, it highlights that country across all regional panels, turning everything else gray. This makes it super easy to track one country's position relative to all the regions - for example, you could click on the US to see how it compares to countries in each region. You can reset everything by double-clicking the background.

#### Visualization 4 (Birth & Death Rate Correlations with Economic Indicators) -

For this visualization, I wanted a clear, intuitive way to explore how the significant variables in my dataset relate to one another, so I created a correlation heatmap covering all 20 numeric indicators from both 2013 and 2023. I chose this design because it lets me see the strength and direction of relationships at a glance, using color to quickly distinguish strong positive, strong negative, and weak correlations. I also applied hierarchical clustering so that variables with similar patterns would naturally group together, making larger trends easier to spot. For example, seeing birth rates from 2013 and 2023 cluster tightly with a correlation of 0.98 reassured me that the data behaved consistently over time, while the moderate negative correlations between birth and death rates aligned with demographic intuition.

#### Visualization 5 (Interactive World Birth Rate Map (2013 vs 2023)) -

In analyzing this visualization, I wanted to highlight how demographic patterns connect to broader economic outcomes. What stood out to me is that countries with declining birth rates are typically established countries such as Japan, South Korea, and Italy, tend to have high GDP per capita but also face the pressures of an aging population. In contrast, countries with very high birth rates, such as Niger, Chad, and Somalia, generally have much lower GDP per capita and face a very different set of development challenges, especially in education, healthcare, and youth employment. By comparing these extremes side by side, the visualization helped me see how demographic trends shape the economic priorities and constraints different countries face, reinforcing the core idea of our project: that population dynamics and economic development are deeply interconnected.