Visualization 1 – Overseas Military Bases

The first visualization I created taps into the rich data from the HKU Data Repository on overseas military bases, providing a concrete snapshot of the military's spread and global presence by scale. By leveraging tools like Plotly and Mapbox, I crafted an interactive map that not only pinpoints the location of these bases but also brings in a layer of strategic insight through color coding. The colors reflect the bases' orientation towards the US and China, offering an at-a-glance perspective on global military alliances and rivalries.

My choice to use this dataset was driven by the need to quantify one aspect of the DIME framework—the Military dimension. The interactive elements, such as the hover text, allow for a deeper dive into the data, giving names and operators without overwhelming the viewer. It is a careful balance between information density and clarity.

I opted for this visualization approach because it bridges the gap between raw data and the story it tells. The distinct colors—bold reds and blues, alongside more subdued yellows, and light blues—cut through the potential complexity, simplifying the narrative of power projection. It is a practical method to illustrate not just the 'where' but also the 'who' and 'why' behind the global military footprint of these powers.

This map is a stepping-stone in my analysis, setting the stage for dissecting the intricate dance of geopolitics through military might. It is a representation that I believe will

resonate with viewers, enabling them to grasp the scale and stakes of the US-China power dynamics in a straightforward, visually engaging way.

Visualization 2 – Chinese Overseas Investment

Cumulative Investment Size by Region and Sector Over Time (in Millions)
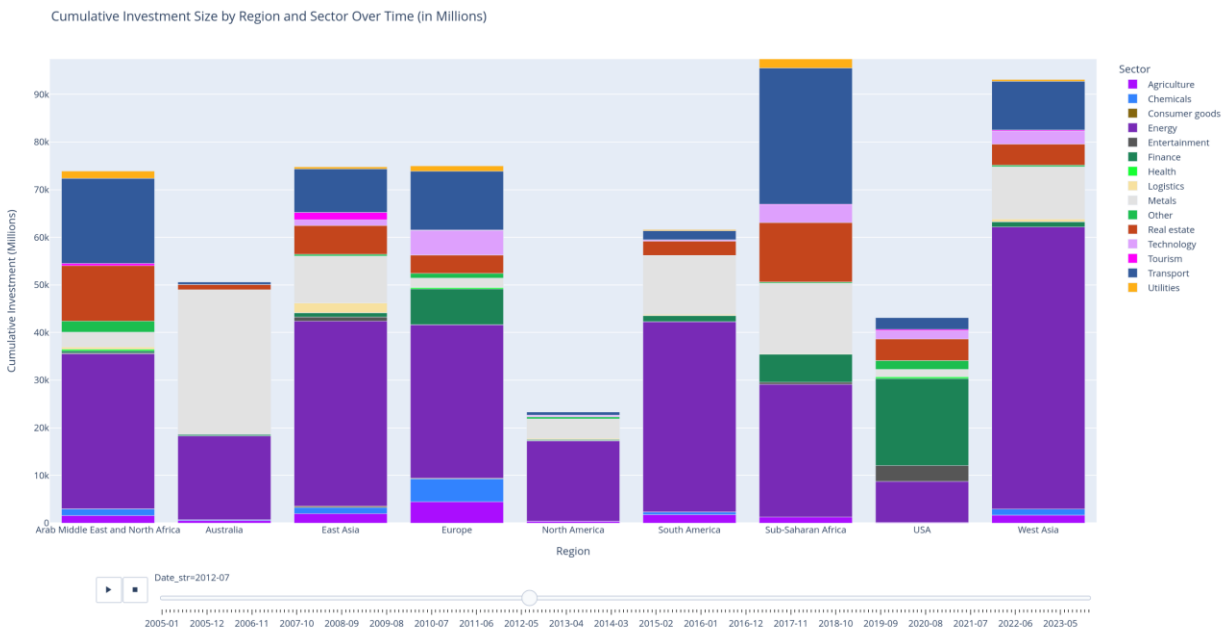
In the second visualization for my project, I utilized the comprehensive dataset from the American Enterprise Institute's China Global Investment Tracker to shed light on China's investment patterns across the globe. The dataset's depth allowed me to explore the economic dimension of the DIME framework by detailing where and how Chinese investments have flowed into different sectors over time.

For this visualization, I harnessed the capabilities of Plotly to create an animated bar chart that chronicles the cumulative investment by region and sector. I meticulously processed the data, ensuring that each investment's impact is accounted for over time. This involved data manipulation techniques like grouping, summing, and cumulative sum calculations, which provided a robust foundation for the animation.

The justification for an animated approach was clear to me: it dynamically represents the evolution of Chinese investments, capturing both the pace and the scale of their economic outreach. The animation breathes life into the data, conveying a narrative of growth and expansion that static visuals could not achieve. Moreover, the bar chart format facilitates a comparative analysis across regions and sectors, allowing for insights into strategic investment patterns and priorities that align with China's broader geopolitical agenda.

In piecing together this visualization, I also considered the user experience. Labels and tick formats were carefully selected to enhance readability, and color-coding was chosen to distinguish between sectors clearly. The animation frames are labeled with date strings for temporal context, guiding viewers through a timeline of investment from 2005 to the present.

This animated bar chart serves as a visual summary of vast amounts of data and as an analytical tool to interpret trends and infer strategies within China's global economic engagements. It is designed to be an integral piece of the narrative in my research, providing a clear visualization that parallels the meticulousness of the paper's written analysis.

Visualization 3 – Military Expenditure Over Time
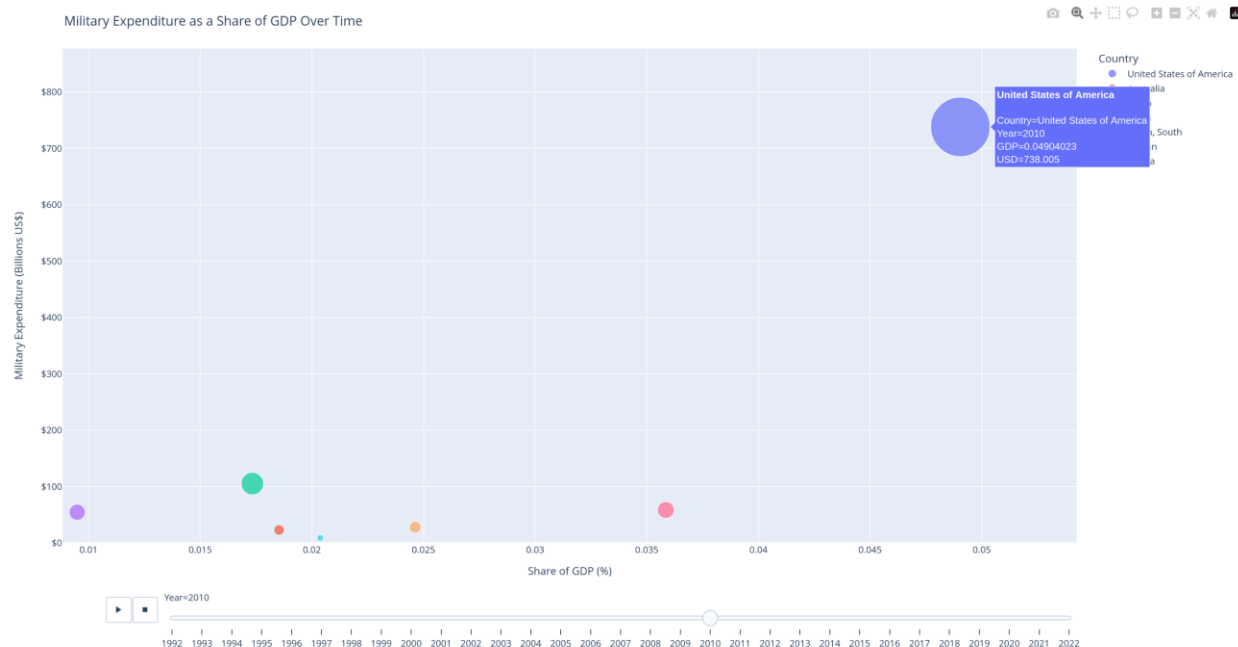
For my third visualization, I delved back into the military sphere of the DIME framework, this time to compare the trajectory of military spending among key players in the Indo-Pacific region, which includes the US, China, and a selection of their allies and rivals. The data, sourced from SIPRI, is pivotal for understanding the military expenditure and capabilities in this strategically critical area.

The preprocessing of the SIPRI data was a significant undertaking. I needed to ensure accuracy and comparability across different countries over an extended period. This step

involved transposing data, aligning it with correct years, and combining datasets to reflect both the current US dollar value and the share of GDP devoted to military spending.

The justification for this approach lies in its ability to illustrate not just the amount spent by each country on its military, but also how this spending relates to its economic size. This relational aspect is critical; it speaks volumes about the priorities and potential reach of each nation's military capabilities. For instance, a smaller share of a large GDP can equate to a considerable military budget, something that raw figures alone might not convey.

In crafting the visualization, I chose a scatter plot with animated transitions to highlight the changes over time. This dynamic element captures the growth or reduction in military spending relative to GDP, highlighting how economic and military dimensions intersect. The size of each plot point correlates with the absolute dollar amount, painting a picture of both proportion and scale.

By converting the expenditure values from millions to billions, the data is presented in a format that is both comprehensible and impactful. The animation invites viewers to watch as each country's military investment evolves, giving life to what would otherwise be static figures in a report. This method of presentation not only enriches the narrative but also invites deeper engagement and analysis from the viewer.

This visualization, like the others, is integral to my research. It allows for an at-a-glance assessment of comparative military expenditures while inviting a nuanced consideration of what these expenditures mean within the broader context of national power, capability, and intention in the Indo-Pacific theater.

References

- HKU Data Repository. "Overseas Military Bases Dataset." https://datahub.hku.hk/articles/dataset/Overseas_Military_Bases/20438805.
- American Enterprise Institute. "China Global Investment Tracker." https://www.aei.org/china-global-investment-tracker/.
- SIPRI (Stockholm International Peace Research Institute). "Military Expenditure Database." https://www.sipri.org/databases/milex.

Requirements

To replicate the analyses and visualizations presented in this paper, the following Python packages and their versions are required:

- pandas~=2.2.1: For data manipulation and analysis.
- openpyxl~=3.1.2: For Excel file handling to read and write data.

- plotly~=5.20.0: For creating interactive and animated visualizations.