Trend in Military Expenditure (1949 to 2020)

Team Members: (GROUP - 7)

Sai Sahithi Neela -*02082013*

Harsha deep Nallamothu-*02079359*

Pavan Kumar Dupakuntla -*02085819*

Why and How:

The primary objective of this visualization project is to provide a detailed analysis of global military expenditure trends spanning seven decades. By employing Tufte's 6 principles and Munzner's faceting, multi-view, and filtration techniques, the project aims to enhance understanding by utilizing interactive visualizations.

This project delves into the visualization of global military expenditure trends from 1949 to 2020. The aim is to provide a detailed analysis of changes in military spending, comparing countries, exploring expenditure categories, and fostering public awareness. The visualizations, including a trend analysis line graph, a country comparison grouped bar chart, and a geo-spatial heatmap, offer a comprehensive view of the dynamic landscape of global military spending. User interaction features such as hover-over tooltips and zoom functionality enhance the exploration of data points.

In this project, we employed a dynamic and interactive approach to data visualization, leveraging the powerful combination of JavaScript, D3.js, and React to create compelling visual representations. Our primary data source, a CSV file, served as the foundation for our visualizations, enabling us to seamlessly integrate diverse datasets.

To enhance the visual experience, we harnessed the capabilities of D3.js, a JavaScript library renowned for its data-driven document manipulation. The React framework facilitated the seamless integration of these visualizations into our web application, ensuring a responsive and user-friendly interface.

For the generation of a heat map, we utilized Python to transform the CSV data into a JSON format, leveraging the versatility of the language for data manipulation. This transformation process was pivotal in preparing the data for subsequent stages of the project.

Further refinement of the geospatial data was achieved through the implementation of the GeoPath library. By inputting the transformed JSON data, we successfully generated a TopoJSON representation. This step proved instrumental in optimizing the geographical data for integration into our visualizations, offering a sophisticated mapping component to our project.

Overall, our approach seamlessly integrated various technologies to present a comprehensive and visually engaging exploration of the underlying data. Through the strategic use of JavaScript, D3.js, React, Python, and specialized libraries, we achieved a dynamic and insightful visualization platform that enhances the understanding and interpretation of complex datasets.

Introduction

1.1 Background

Military expenditure is a critical aspect of global economics and politics. This project aims to provide a comprehensive visual representation of changes in military spending over the past seven decades.

1.2 Objectives

1. Analyze Trends and Patterns: Utilize a line graph to illustrate the trend in worldwide military spending over the years.

2. Compare Countries/Regions: Present a grouped bar chart comparing military expenditure among major countries for the latest available year.

3. Analyze Expenditure Categories: Deploy a geo-spatial heatmap to showcase the distribution of military spending across categories (e.g., personnel, equipment, operations).

4. Enhance Public Awareness: Present the information in a way that raises public awareness regarding the magnitude and changes in global military spending.

Data Visualization:

2.1 Visualization 1: Trend Analysis

Viz1: This figure displays a line graph illustrating the trend of worldwide military spending from 1949 to 2020. The x-axis represents the years, while the y-axis represents military expenditure.

2.2 Visualization 2: Country/Region Comparison

Viz2: This figure presents a bar chart comparing military expenditure among major countries for the latest available year. The x-axis represents countries, and the y-axis represents military expenditure.

2.3 Visualization 3: Geo-spatial Heatmap

Viz3: This figure showcases a geo-spatial heatmap illustrating the geographical distribution of military expenditure across categories (e.g., personnel, equipment, operations) for the most recent available year.

Relation Between Visualizations:

- The three visualizations collectively offer a comprehensive view of global military spending:
- Trend Analysis: Provides insights into how military spending has evolved over time globally.
- Country/Region Comparison: Enables users to compare military expenditures among major countries, identifying disparities and trends.
- Geo-spatial Heatmap: Illustrates the geographical distribution of military expenditure, shedding light on priorities and resource allocation.

User Interaction:

Hover-over tooltips, click for more details, and zoom functionality enhance user interaction. These features allow users to explore specific data points, compare countries, and gain deeper insights into global military spending trends.

Conclusion

Goals Achieved: The visualizations successfully accomplished the goals outlined in Phase 1B, providing a comprehensive exploration of global military spending. The trend analysis offered insights into the evolving patterns, the country comparison chart facilitated the identification of disparities, and the geo-spatial heatmap shed light on the distribution of military spending categories.

Obstacles: The integration of diverse datasets, especially across multiple decades, posed challenges in data processing and cleaning. Additionally, ensuring optimal performance for user interaction features required careful optimization.

Limitations: The project's accuracy is contingent on the quality and completeness of the underlying dataset. Limitations also exist in the granularity of data, especially for certain regions and specific expenditure categories.

Future Work: Future improvements could include real-time data updates, incorporation of more detailed expenditure categories, and the integration of predictive analytics to forecast future trends in military spending.

Despite challenges, the project successfully visualizes global military expenditure trends, providing valuable insights for policymakers, researchers, and the public. The interactive features enhance user engagement and contribute to a more informed understanding of the complex dynamics surrounding military spending. This project employs data visualization to offer a comprehensive understanding of the change in military expenditure from 1949 to 2020. The visualizations aim to assist policymakers, researchers, and the general public in gaining insights into the dynamics and patterns of global military spending.

Dataset Under Consideration: *OurWorldinData*