Choropleth Maps of Asian Countries

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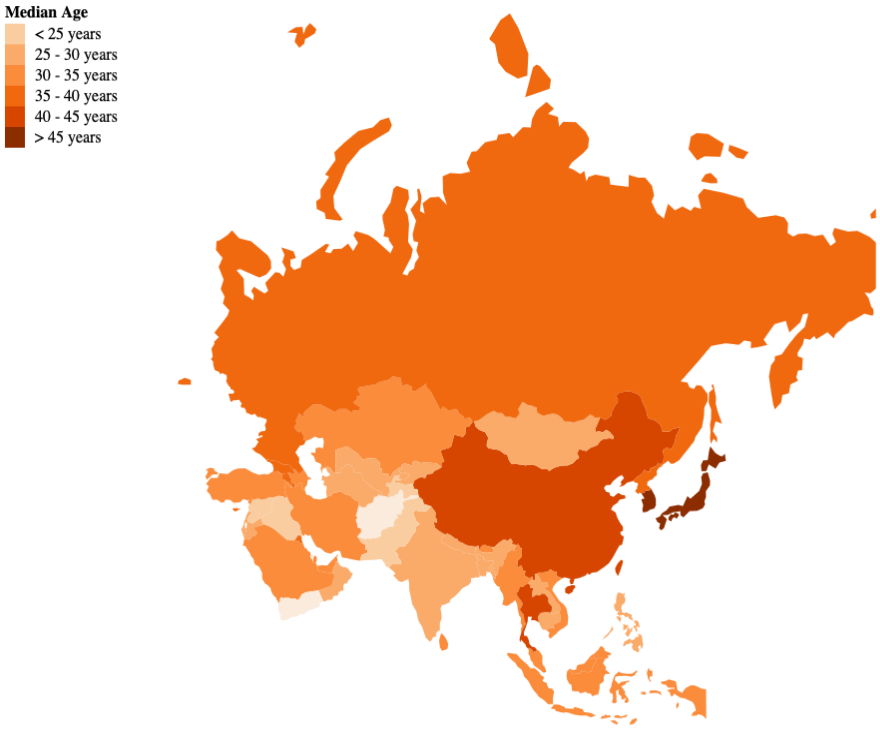
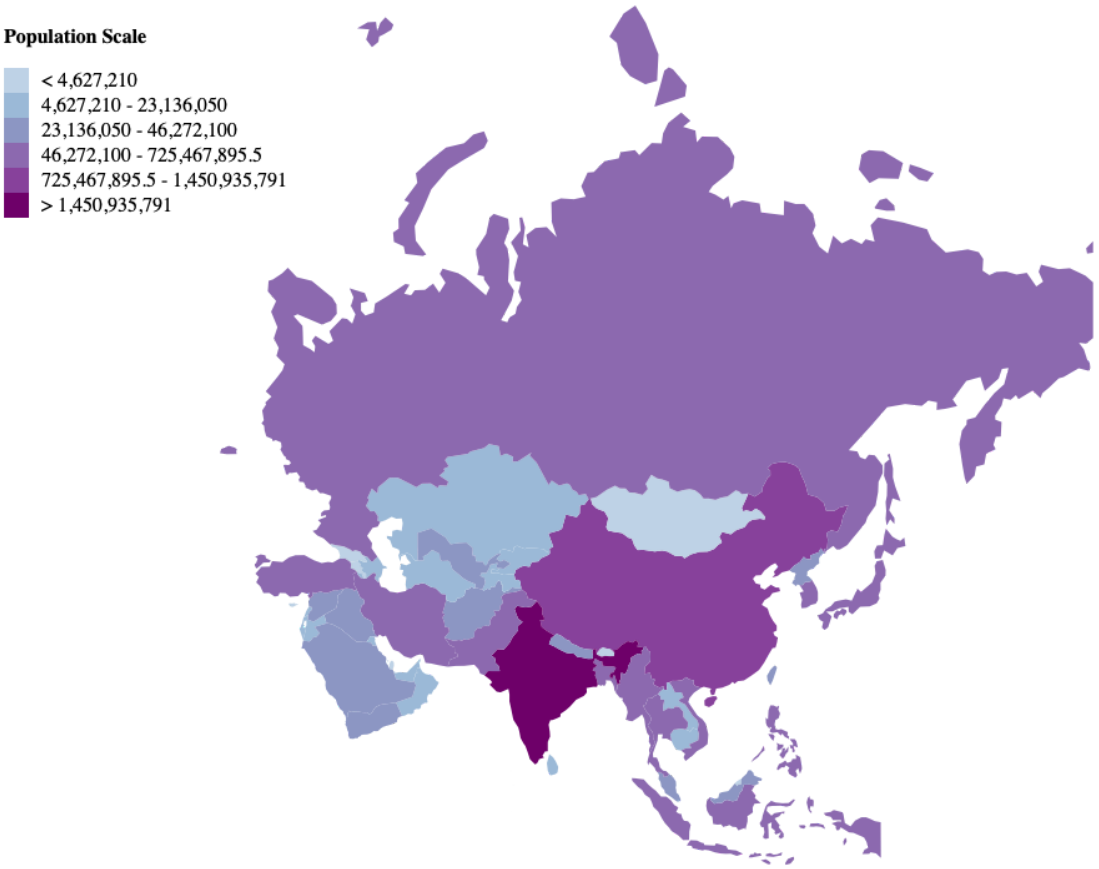
1. Final Visualization

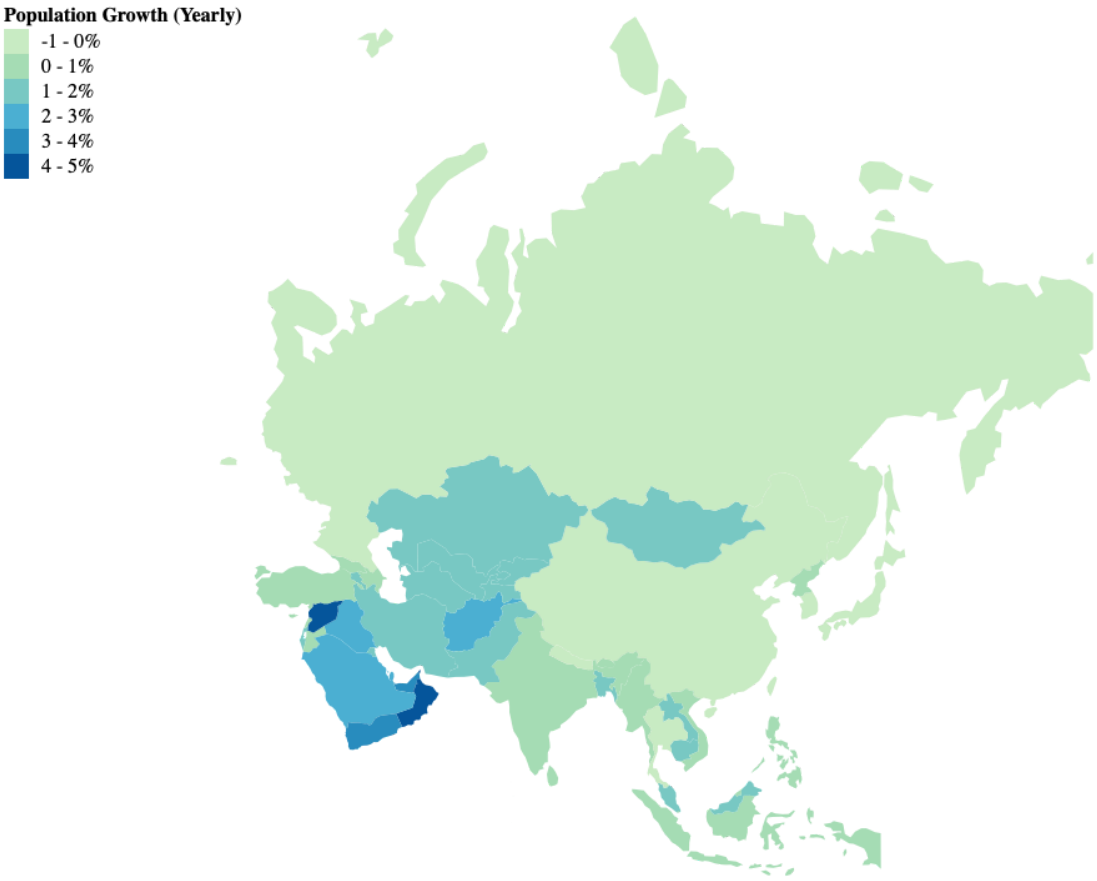
1.1 Median Age in Asia (2024)



1.2 Population Size in Asia (2024)



1.3 Population Growth in Asia



2. Data Description

This project visualizes demographic data for Asian countries using choropleth maps. The datasets used include population size, median age, and population growth rate for 2024 (last updated on September 19, 2024), sourced from:

2.1 Data Sources

- Asia Population:
(https://www.worldometers.info/world-population/asia-population/#google_vignette)
- World Population:
(https://data.worldbank.org/indicator/SP.POP.TOTL)
- Asian Countries (map):
(https://en.wikipedia.org/wiki/List_of_Asian_countries_by_population)
- SVG Asia Map:
(https://vemaps.com/asia-continent)

2.2 Variables

- **Population (2024)**: Total population of each country.
- **Median Age**: The median age of the population for each country.
- **Population Growth Rate**: The yearly population growth rate (percentage).

2.3 Preprocessing

The preprocessing phase involved cleaning and standardizing the numeric values in the dataset. For example, population values were stripped of commas, and both population and growth rate values were converted to numeric data types. We also had to format median ages by removing any non-numeric characters to ensure proper data alignment during visualization.

2.4 Geographic Data

The geographic data, GeoJSON, was sourced online, but some manual intervention was necessary to ensure accuracy. Specifically, the geographic coordinates of three countries—**Singapore**, **Bahrain**, and **Maldives**—had to be manually added as they were missing or inaccurately represented in the dataset. Additionally, to ensure consistency between the CSV data and the GeoJSON file, country names were adjusted to have matching naming conventions.

2.5 Combining Datasets

The datasets for population, median age, and growth rate were combined with the GeoJSON file representing the map of Asia. This integration was done by matching countries from the CSV file to their respective polygons in the GeoJSON file based on country names. We used a **d3.map()** structure to store and match country-level data, ensuring that each demographic variable was correctly associated with its respective country.

2.6 Transformations

- **Population Data**: Population values were processed to remove commas, and the population extent was calculated to define the thresholds for the choropleth color scales.
- **Median Age**: Values were parsed and standardized, and the data was mapped to a threshold color scale.
- **Population Growth Rate**: Growth rates were processed similarly to population and median age, with custom color scales created to represent growth rates between -1% to 5%.

By carefully cleaning and matching these datasets, we ensured a consistent and accurate representation of demographic data across all the visualizations. The result is a set of maps that effectively communicate the population, median age, and growth trends in Asia for 2024.

3. Design Rationale

The primary goal of the design was to visualize key demographic indicators across Asia in a way that is easy to interpret and insightful.maps because they allow for clear geographic representation of data.

3.1 Total Population

We use a choropleth map to represent the population distribution across Asia, where country position and shapes are determined by their geographical boundaries, and population sizes are mapped to a sequential color scale. The color scale uses a threshold-based approach to map population ranges across countries and the breakpoints are set based on the minimum and maximum population values from the dataset. These thresholds — ranging from smallest population to the largest — help differentiate between small, medium and very large populations. We use a sequential color scheme, d3.schemeBuPu[7] to represent the population size with darker shade purple representing higher population and the lighter shade blue representing lower population. This increases the readability and clarity of the visualization. Lastly, we also added a legend to help viewers interpret and understand the color scale and its corresponding population range.

3.2 Median Age

For median age data, we again use a choropleth map but with a different color scale (d3.schemeOranges[7]). Here, countries with lower median ages are represented by lighter orange hues, while higher median ages are depicted with darker shades. The breaks in the color scale correspond to natural groupings of the data, helping to emphasize differences in age structure across regions. The use of a Mercator projection, centered on Asia, helps maintain geographic accuracy, while the accompanying legend allows users to map color values to specific age ranges.

3.3 Population Growth

To represent yearly population growth, we use another choropleth map, but with d3.schemeGnBu[7], a scale transitioning from green to blue. This color gradient effectively conveys changes in population growth rates, where negative or minimal growth is represented by lighter green, and higher growth is depicted by darker blue. The decision to represent population growth in percentage ranges offers a more nuanced understanding of how countries are evolving demographically. The choice of color scheme aids in quickly identifying which countries are growing faster, or even shrinking, in terms of population.

3.4 Map Projections and Legends

We employ the Mercator projection for all maps. This projection is particularly suitable for showing the large landmass of Asia with minimal distortion in shape and size. Each map includes a well-placed legend to decode the color scales and help users interpret the demographic data. These legends ensure that viewers can accurately understand the range of values represented on the map, enhancing overall clarity.

3.5 Trade-offs and Transformations

In terms of color scales, we opted for threshold-based scales over continuous ones to create more defined categories, making it easier for viewers to interpret data quickly. However, this also means that finer details in the data may be less apparent. These design choices were made to balance clarity, ease of use, and the ability to reveal broad trends across large datasets.

4. The Story

Our visualizations provide key insights into the demographic trends of Asian countries by mapping population size, median age, and population growth. These maps reveal distinct patterns that help us understand regional differences across the continent.

4.1 Population Size

The population map highlights the concentration of people in large, populous countries such as China and India, which stand out due to their darker shades on the map. Surprisingly, despite their vast land area, countries like Mongolia remain sparsely populated, indicated by lighter colors. This contrast illustrates the population density disparities across Asia.

4.2 Median Age

The median age map reveals a wide variation in the age structure of Asian countries. Countries like Japan and South Korea have higher median ages, indicated by the darker shades of orange, reflecting their aging populations. On the other hand, countries in South Asia, like Afghanistan and Pakistan, show significantly lower median ages, represented by lighter shades, indicating younger populations.

4.3 Population Growth

The population growth map brings attention to the dynamic changes in population trends. While countries such as India and Pakistan continue to see substantial yearly growth, other nations like Japan and Russia are either stagnating or experiencing negative growth. This emphasizes the shifting demographic dynamics, with some countries aging and shrinking, while others experience rapid population expansion.

Together, these maps tell a story of a continent marked by sharp demographic contrasts—aging versus young populations, booming growth versus decline—all of which are critical to understanding the region's future economic and social landscape.

5. Team Contributions

Michael Glenn (mdg258): I contributed to shaping the project's direction by helping decide on the use of a choropleth map and narrowing the focus to visualizing population data for Asian countries. I gathered and cleaned datasets, manually fixed naming conventions, and combined GeoJSON files to resolve missing data issues for countries like Singapore, Bahrain, and Maldives. I also wrote and tested code to verify data accuracy, created the project repository for team collaboration, and helped finalize changes to the project document.

Nathan Zhang (nyz4): I expanded the project idea from just visualizing the populations to adding median age and population growth. I completed the chloropleth map for population growth and refined the color design for all three maps to ensure that the visualization was clear and readable. I also collaborated with the team to outline and write the final report.

Siying Cui (sc2863): I completed most part of the choropleth map for median age and made some adjustments, including revising the legend for all three maps. I also identified and manually resolved naming issues in two data files (geojson and project-data.csv), ensuring consistency. Additionally, I outlined the final report and collaborated with the team to write and finalize the report.

Carter Zhu (yz553): I set up the group chat and proposed the initial project concept and actively contributed to refining it into its current form. Additionally, I worked on developing the choropleth map for total population and collaborated with the team to write the final report.