

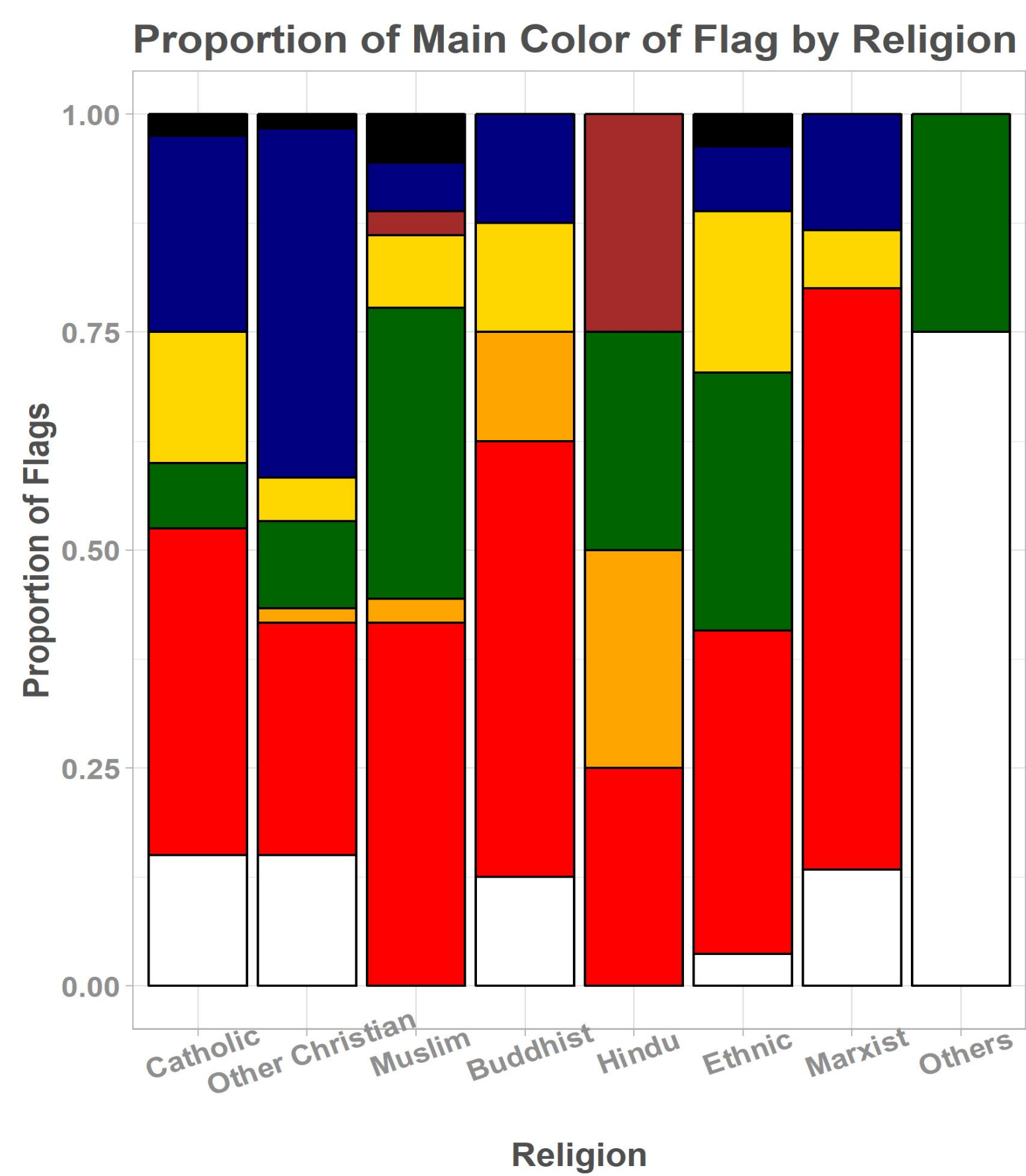
What Can a Country's Flag Tell Us?

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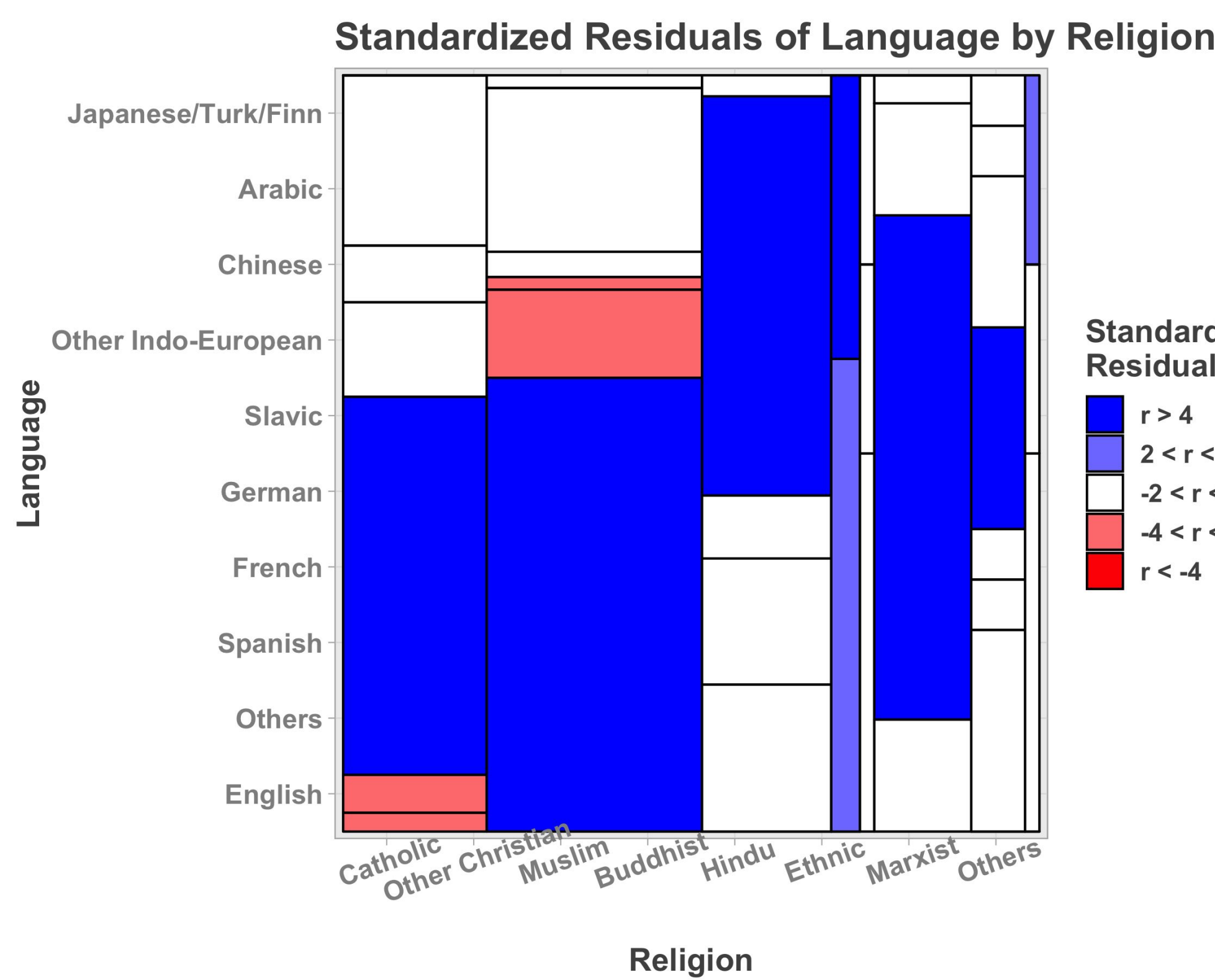
Background

A national flag represents “the nation as an umbrella over a collective citizenry,” giving its citizens something to identify with. Most flags have their own unique combination of “colours and designs [with] symbolic meanings and [are even sometimes used] to carry ideological and political messages.” In fact, national flags have many uses, one of which is to ascertain a person's perception of a particular nation; this is because flags are often very effective at evoking certain feelings from people. These reactions can vary widely, from highly positive to highly negative, depending on the flag in question.¹ With this in mind, we would like to determine whether or not we can specify a nation's demographic qualities from its flag's qualities and symbols. In particular, what connections can we make between a flag's distinct characteristics and its country's demographics? Does a relationship exist? In a broader sense, what does a nation's flag tell us about the country that it represents?

Relationship with Religion



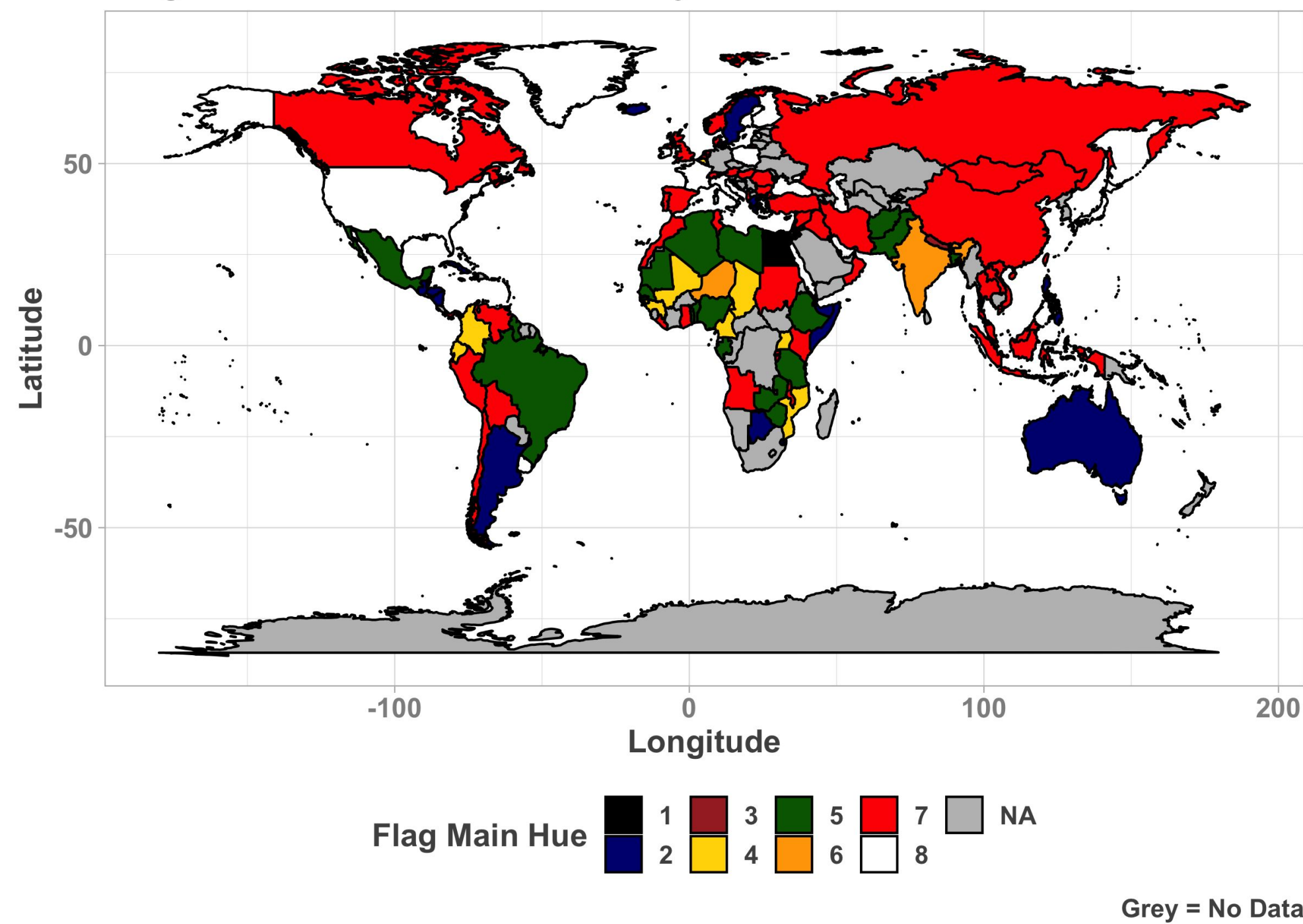
A natural question to ask is whether or not Marxist (defined in the dataset as a religion) countries have red as their flag's main color, or if Muslim countries more often than not have green, a color traditionally associated with Islam, as their flag's main hue color. Clearly, Marxist countries overwhelmingly have red as their main color, but Muslim countries have green as a main color about as often as Hindu or "Ethnic" religious countries. Among the 4 nations with religion in the "Others" category, roughly 3/4 of them have white as their flag's main color.



We know that any of the cells in the mosaic plot that are red or blue indicate evidence against the null hypothesis that the two variables are independent. The widths of the bars in the mosaic plot correspond to a marginal distribution of the indicated religion in the columns. In addition, we know that the heights of the bars correspond to a conditional distribution of language based on religion. They follow the order of the languages on the y-axis, except when we do not have enough data for a certain religion. Finally, we observe that there are many Muslim countries that speak Arabic, while many Christian countries speak Romance and Germanic languages.

Country by Flag Main Hue and Stripes/Bars

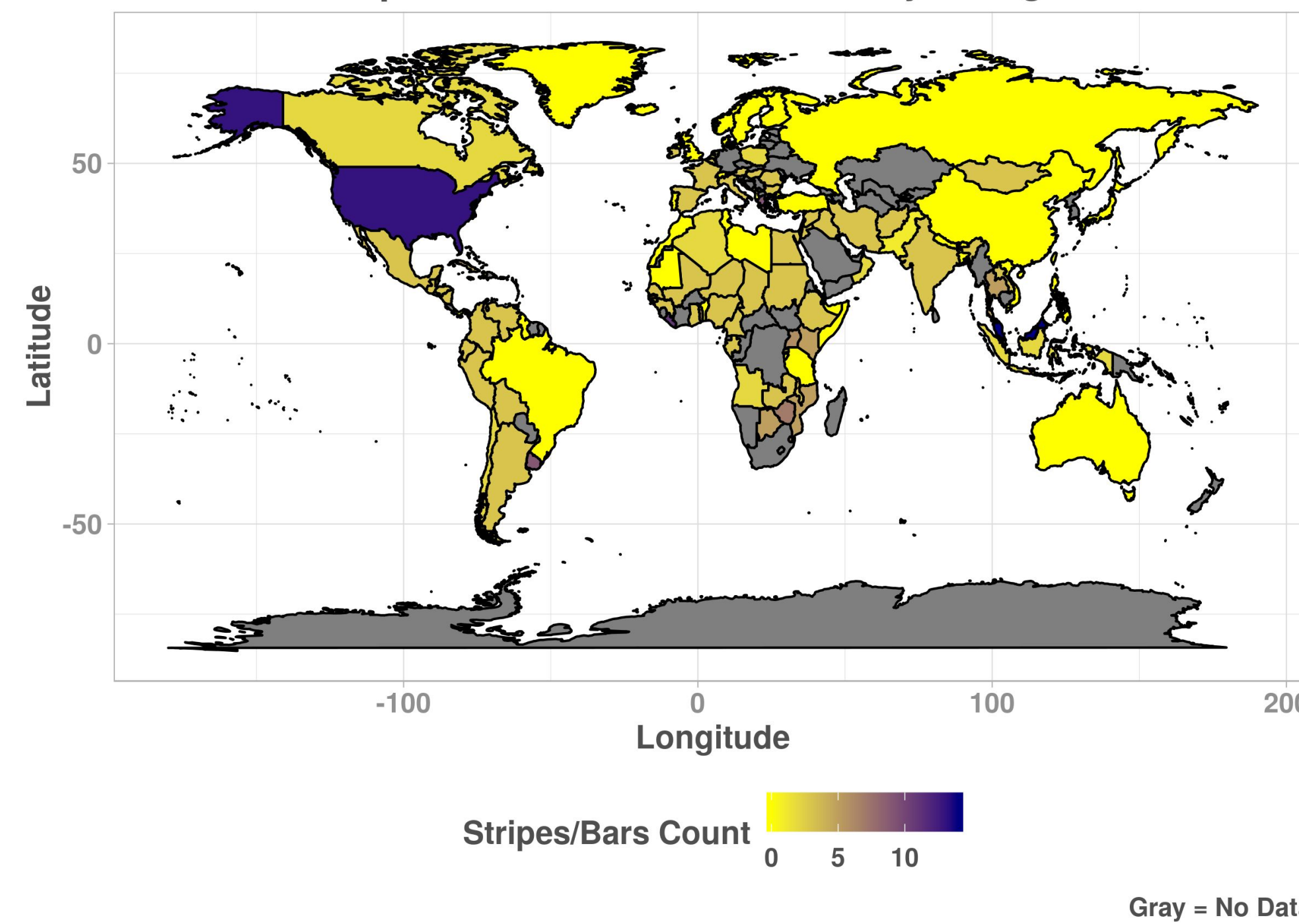
Flag Main Hue For Each Country



Observations:

A very large proportion of Asian countries have flags with red as their flag's main hue color. Africa is notable for having a relatively large proportion of countries with green and gold as their flag's main hue colors. Observe also that many European flags have red, white, or blue as their main hue, as well as Australia and New Zealand. Notice that Mexico and Brazil have green as their flag's main color, as expected.

Number of Stripes and Bars In Each Country's Flag

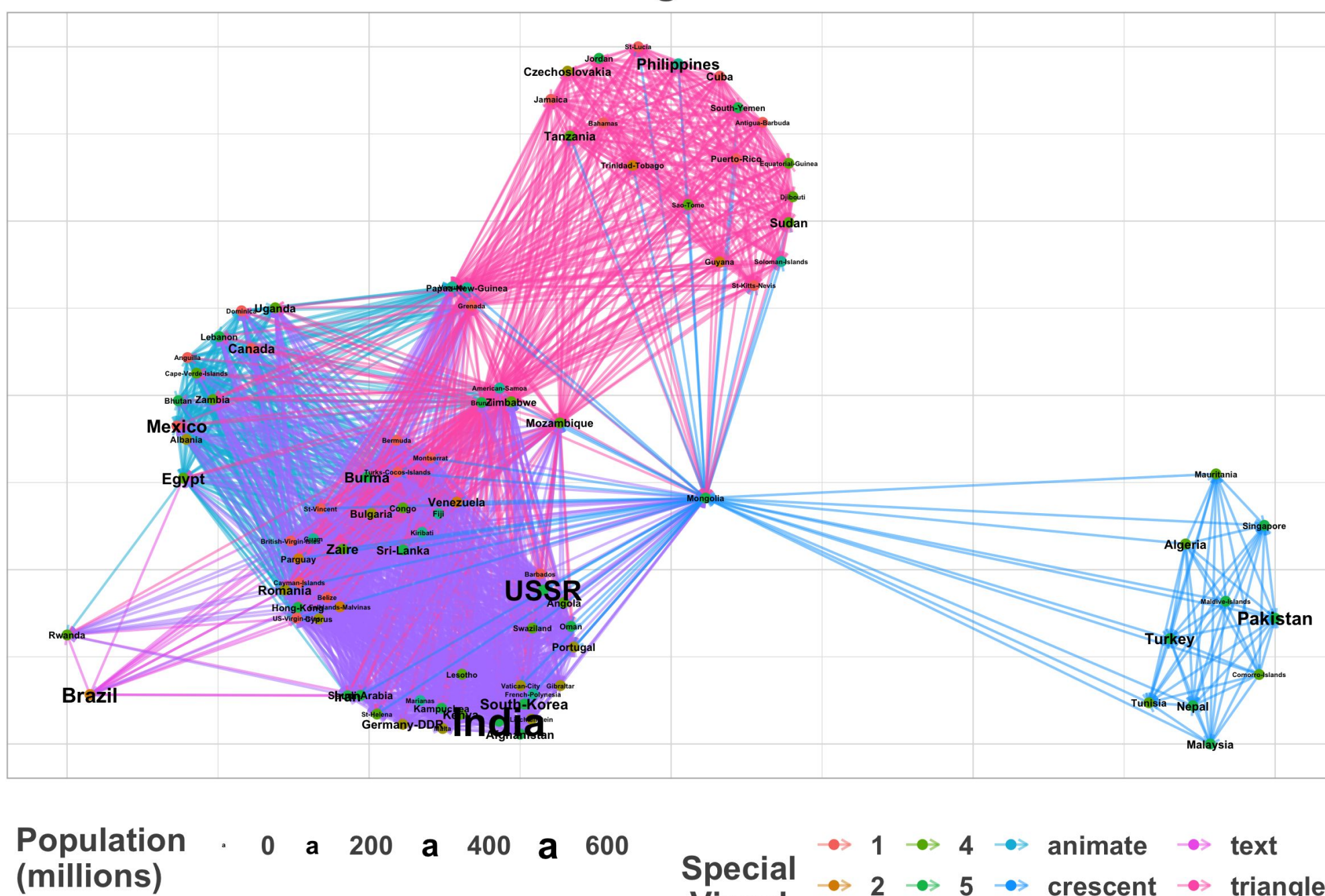


Observations:

Notice that the United States has the greatest number of stripes and bars in its flag. Many of the African countries and some South American countries also have a relatively large number of stripes and bars in their flags compared to Asian countries. In addition, another country with a large number of stripes and bars in its flag is New Zealand.

Clustering Flags Based On Features

World Flags Network



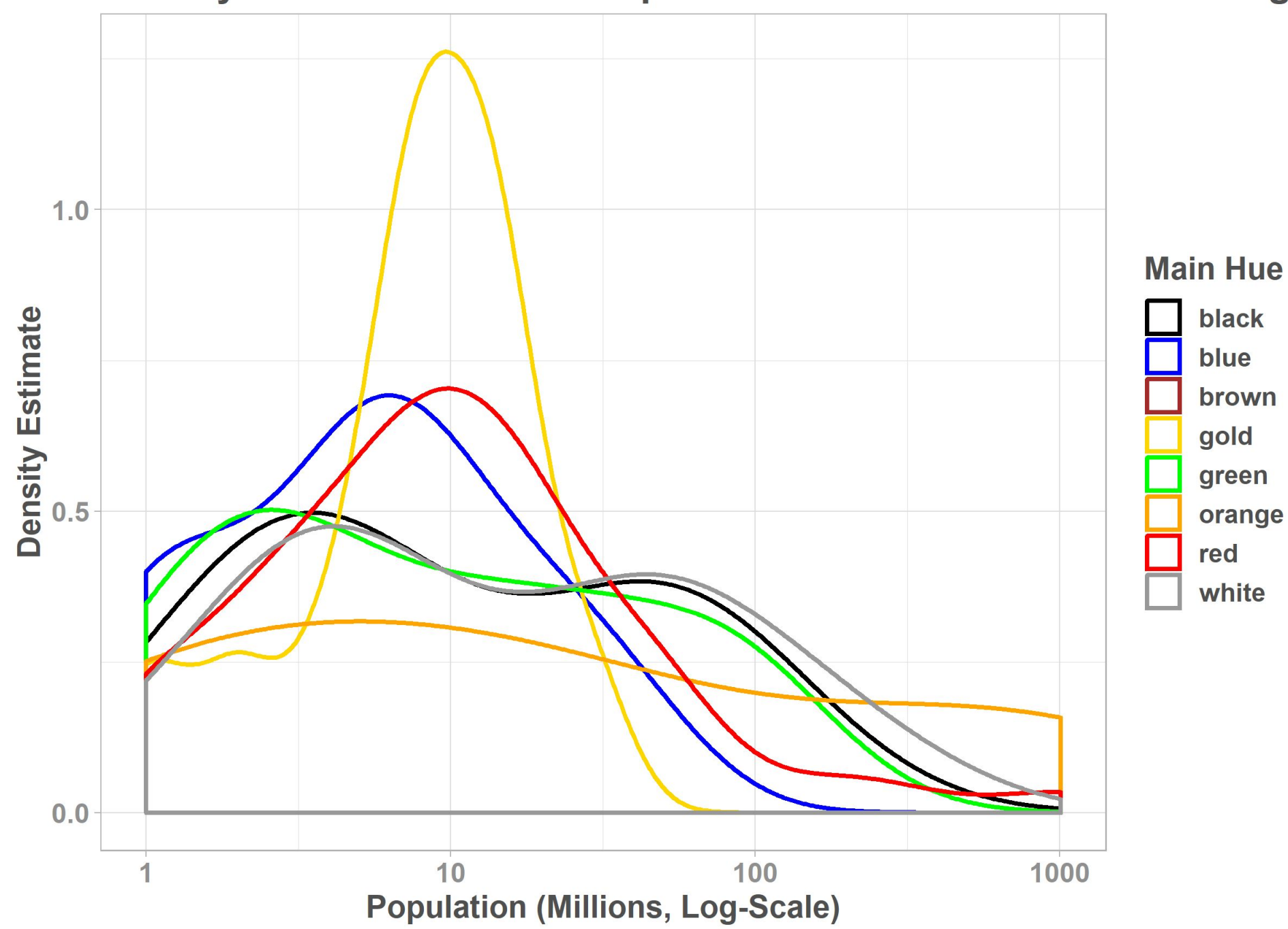
Notice some very strong clustering. In this network diagram, every edge of the same color links two countries that share the same special visual flag trait: one of a crescent moon symbol present, any triangles present, any inanimate images present, any animate images present, or any letters or writing on the flag. Any two nodes of the same color represent two countries on the same continent. The size of the node's text label corresponds to the country's population. Asian countries are more likely to have flags with a crescent moon symbol on them. Oceanic countries are more likely to have more than one special symbol, such as triangles, icons, and animate images. There are very few South American countries with special symbols on their flags.

Hierarchical Clustering of European Nation Flags
By bars, stripes, colors, main hue, and symbol features



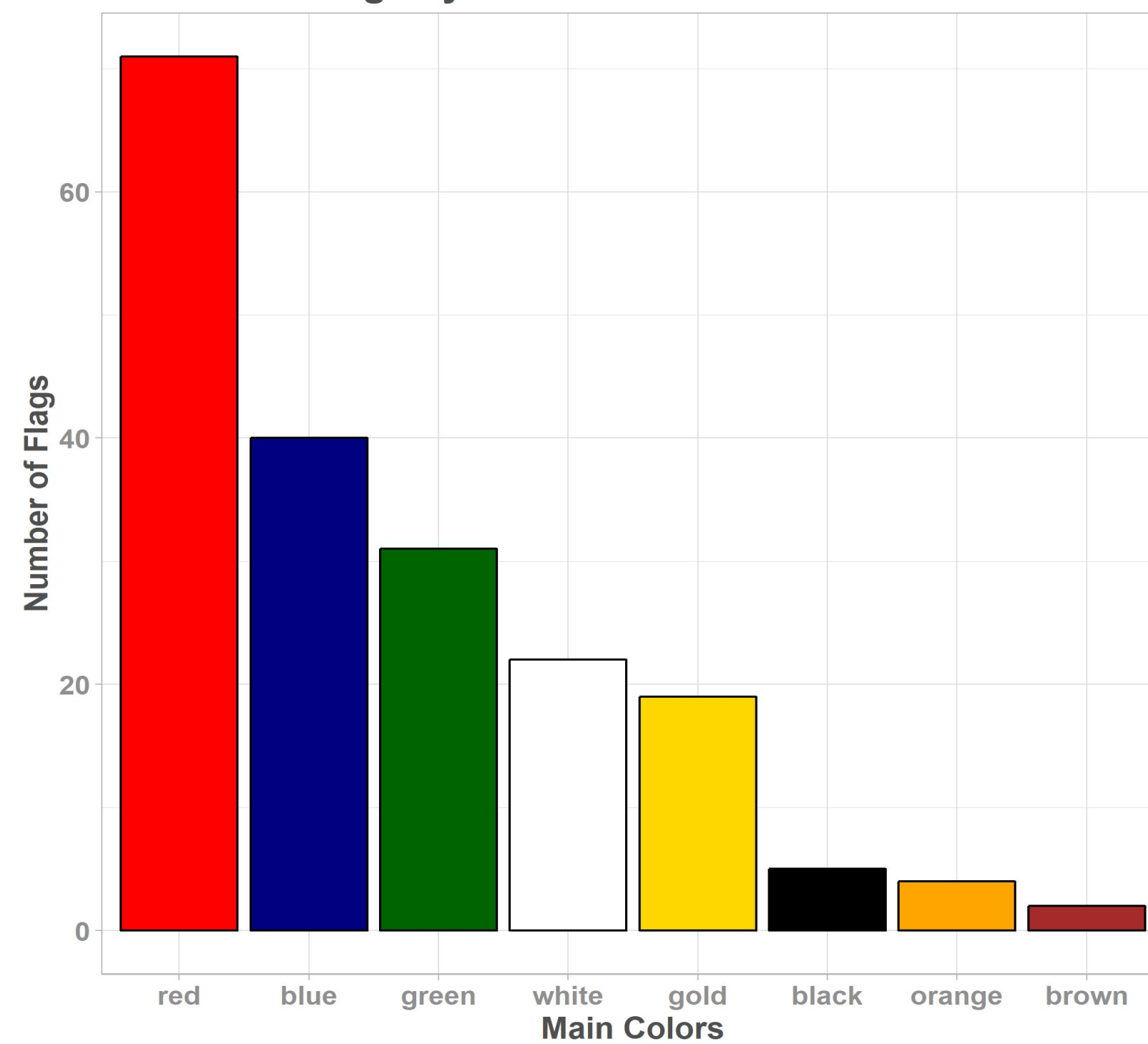
Here European flags are clustered based on features like bars/stripes, colors, main hue, and symbols. The subset of Europe was chosen since it presents a readable number of labels and readers would be more familiar with the flags. For continuous variables, correlation is typically used for hierarchical clustering, but here Gower's Distance, a metric that can use both continuous and categorical variables, is used. As expected, East and West Germany with black, red, and gold have very similar flags, as well as the group of red and white bars flags of Monaco, Austria, and Poland. The UK, Norway, and Iceland share red, white, and blue flags with stripes. The flags of Netherlands and Luxembourg are nearly identical, with a minor hue difference.

Density Estimate of Nation Population Based On Main Hue of Flag



For each main hue of a flag, we can look at the distribution of population of countries with this main hue. Flags with main hue black, green, and white correspond to collections of countries similar population distributions. The same applies for blue and red. Interestingly, among countries with flags with a main hue of gold, a relatively large proportion have a population around 10 million. Countries with a main hue orange flag have a roughly log-uniform population distribution (note the log x-axis), however there are very few countries with main hue orange (notably India). The small sample size for the less common colors means the density estimates are less accurate.

Number of Flags by its Main Color



This bar chart shows the number of flags in our data set, grouped by their main hue, the color that covers the most area. If there is an equal amount of color on one flag, the tie-breaking rule is to call whichever color is represented in the top-left corner to be the main hue. From this graphic we see that the colors are not equally distributed among nations around the world. Red is the most popular color by far, followed by blue and green.

Discussion

It is important to note that our data set is outdated, as it is from 1986. Certain countries that existed then do not exist now, like the USSR, East and West Germany, and Yugoslavia. The countries that were created from the dissolution of these countries the dataset does not have data for. With further analysis of time data, we can look at how flags have changed over time, including usage of color themes and political symbolism.

In conclusion, there exists some informal association between a nation's characteristics (area, population, religion) and its flag's features (e.g. colors, symbols, and/or shapes). Many flags share the same characteristics, such as a plurality in having red as their main hue as well as relatively simple designs with few stripes and bars. However, given the diversity of flags, it is very difficult to generalize flags, especially within a certain region or for a certain religion, for example..

References

¹Nadler, B. (2016, June 24). Where Do Flags Come From? Retrieved from <https://www.theatlantic.com/health/archive/2016/06/happy-flag-day/486866/>