Report: Post-Pandemic Global Refugee Flow

1 The Application

1.1 Background Information

The application shows the global flow of refugees from 2020 to 2024, based on country of origin, on a world map. The statistics include people with refugee status, as well as those in refugee-like situations as defined by the UNHCR, from and within UN member states. These years were chosen to illustrate the flow of refugees since the onset of the Covid-19 pandemic. The application includes three filters for year, country of origin, and country of asylum. To select a year, a slider (sliderInput) is used to select either a single year or a time frame. For the other two filters, a SelectInput is used. For the country of asylum, a region can be selected instead of a single country. If a region is chosen, data for all countries in this region will be shown.

1.2 Who and for what purpose

The application should make existing data easier for professionals to use. With the three filters, specific refugee numbers could be filtered by country of origin, country of asylum, and year(s). It can be used to gain an understanding of global refugee flows over the past few years and visualize them on a world map. It has been developed for humanitarian specialists, decision makers, and others working in humanitarian aid, refugee or migration contexts, for example in global or governmental organizations, NGOs, or other aid organizations. Private individuals can use the application if they are interested in the topic.

It can be used to gain an understanding of the distribution of refugees from a single country within a defined time frame, providing insight into the current situation. This can help with decision-making for implementing new projects, financing humanitarian aid, or increasing or decreasing the actual workload, as well as providing more information about the current situation. Forecasting the future situation is also possible when other aspects are considered. The distribution of refugees from a specific country or region can also help to understand cultural aspects and possible reasons why people flee a country/region.

2 The development

2.1 Dataset

I started by searching for a large dataset that I could use to programme a Shiny application. I wanted to do something in the humanitarian sector because of my bachelor's degree in emergency and Disaster Relief. I used the UNHCR Refugee Data Finder, which I was already

familiar with from my bachelor's study. In this database, I selected the years 2020–2024 to include all post-pandemic years after the Covid-19 pandemic. 2025 is not included because the application was created before the data for 2025 was published. I also only focused on refugees and persons in a refugee-like situation so that the dataset wouldn't be too big for the task and so that I could achieve a clear definition. Additional information for some individual data is listed in the above-mentioned UNHCR database.

I decided to create a Shiny application with this dataset because the UNHCR Refugee Data Finder has some overview figures and charts (e.g. bar or line chart), but no visualization on a map, which would provide a better overview than the existing one.

2.2 Cleaning, visualization and filters

The dataset contained information that I didn't need for my application. I started by cleaning all the lines where the country of origin and the country of asylum were the same, as I wanted to show refugee flows outside the country of origin. After that, I removed all lines where the number of refugees was zero because zero refugees are not counted as no data. However, in my case, if there are no refugees from one country to another, no lines should be shown. I also deleted all territories that are not UN member states (officially recognized by the UN). After that, I renamed some countries to make them easier to use within the application and RStudio. I also grouped some data so that the application could show not only data for a single country, but also for a region. I decided to group the countries by geographical continent.

For the visualization, I chose a map showing traces between the country of origin and the country of asylum. The thickness of the line depends on the number of refugees. The thicker the trace, the higher the number. I also added a hover showing the following information: Country of origin, country of asylum, total refugees, and years. This appears when the cursor hovers over the country of asylum.

The filters used for the Shiny application are SelectInput for the country of origin and the country of asylum, and SliderInput for the years. The years use AND logic. If two or more years are selected, the number of refugees is the sum of the selected years.

2.3 Challanges and solutions

Writing code in RStudio and creating a Shiny application were both completely new to me. I had never programmed before and didn't have much knowledge about technology. The classes helped me to understand the process a little bit, but I still had to read additional information, ask classmates and use ChatGPT to achieve a working result.

I encountered various challenges while writing the Shiny application. Sometimes it was easy to identify errors, such as typos. I often forgot to close a brace or added an extra one. Other typos occurred when the country names were different in the code and the data set. Correcting these errors was easy.

Another challenge was knowing which codes to use for cleaning, adding filters, etc. But with the help of the R Handbook and ChatGPT, I got used to it. After understanding that, it was easy for me to rename additional countries that I had forgotten at first, regroup countries, or delete lines containing specific countries. The more time I invested in understanding the programme, the easier it became to make small changes with external help.

Furthermore, I struggled with the filter for the years because initially, when I chose a timeframe, only the number of refugees from the last year mentioned was given. I solved the problem by adding logic to include the numbers of refugees when more than one year was chosen.

The biggest challenge was visualisation. Firstly, the map had to be shown in the shiny application. This didn't work at first because some packs had been installed. After that, it worked fine. I tried to make the Shiny application look nicer than the final app, but every time I tried to change something in the design, the application had problems and the data didn't show up. I spent hours trying to improve it and asked ChatGPT about the errors and how to solve them, but I couldn't resolve it. Another thing I wanted to do was to make the filters on the left take up less space and be displayed in a coloured box. I also wanted the map to be fixed in the top right corner rather than floating somewhere on the right. I tried to solve it by using the codes from the first class and asking ChatGPT, but after adding some code, the application stopped working.

One small additional problem was my computer. The storage isn't that big, and sometimes I struggled to open the application because my computer couldn't process it.

Overall, I had a lot of difficulties when I started writing the code. However, I invested a lot of time not only in copying ChatGPT, but also in understanding how RStudio works and why errors occur. Trying to understand the code was helpful in identifying and solving errors. After a while, I no longer needed ChatGPT to solve small problems and could do it myself. However, I am still learning and am an absolute beginner when it comes to programming. I couldn't solve all the problems I wanted to, but I think I will improve with more practice.

References

UNHCR (n.D.). Refugee Data Finder. https://www.unhcr.org/refugee-statistics/download.

United Nations. (n.D.). Member States | United Nations. https://www.un.org/en/about-us/member-states.