615 Final Project

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```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.1     v tibble    3.2.1
v lubridate 1.9.3     v tidyr     1.3.1
v purrr     1.0.2
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becor
```

```
library(shiny)
library(leaflet)
```

```
Warning: package 'leaflet' was built under R version 4.4.2
```

Loading and Cleaning Data

This code processes a dataset by cleaning column names to retain only the year, filtering for specific indicators like GDP and population, and reshaping the data into a tidy format for analysis. It extracts data for the years 2000 to 2023, ensures columns like "Year" and "Value" are numeric, and removes rows with missing values. The result is a clean, long-format dataset suitable for visualizations or further analysis.

```
data <- read.csv("1.csv")

# Clean column names to extract only the year
```

```r
colnames(data) <- gsub("^X(\\d{4})..YR\\1\\.$", "\\1", colnames(data))

# Define the indicators of interest
selected_indicators <- c('GDP (current US$)', 'GDP growth (annual %)',
                         'GDP per capita (current US$)', 'Population, total',
                         'Population growth (annual %)', 'Life expectancy at birth, total (y

# Filter and reshape the data
filtered_data <- data %>%
  filter(Series.Name %in% selected_indicators) %>%
  select(Series.Name, any_of(as.character(2000:2023))) %>%
  pivot_longer(cols = any_of(as.character(2000:2023)), names_to = "Year", values_to = "Value
  mutate(
    Year = as.numeric(Year),  # Ensure Year is numeric
    Value = as.numeric(gsub("[^0-9.-]", "", Value))  # Clean Value column
  ) %>%
  drop_na(Value)
```

```
Warning: There was 1 warning in `mutate()`.
i In argument: `Value = as.numeric(gsub("[^0-9.-]", "", Value))`.
Caused by warning:
! NAs introduced by coercion
```

Aruba Analysis

Overview of the App's Purpose

The app organizes information about Aruba into multiple sections (tabs) to provide a structured, user-friendly way of understanding its economic, demographic, geographic, and ecological characteristics. Users can interact with the app to explore data and gain insights.

What Each Section Does

1. **Introduction Tab**:
    - Provides a general overview of Aruba.
    - Includes text about Aruba's key features, such as its geography, economy, and government.
    - Displays an image of Aruba to visually complement the description.

2. **Biodiversity Tab**:
    - Highlights Aruba's unique ecosystems, including its flora and fauna.
    - Explains features like desert landscapes and coral reefs, along with native species.
    - Includes two images to visually showcase Aruba's natural beauty.
3. **Interactive Map Tab**:
    - Offers an interactive map of Aruba.
    - Users can zoom and pan the map to explore the island.
    - Displays a marker for Oranjestad, Aruba's capital, to provide geographic context.
4. **Economic Indicators Tab**:
    - Allows users to explore Aruba's economic performance.
    - Users can select specific economic indicators like GDP or GDP growth.
    - Displays a time-series graph that shows how the selected indicator has changed over the years.
5. **Population Statistics Tab**:
    - Focuses on demographic trends in Aruba.
    - Users can choose variables like total population, population growth, or life expectancy.
    - Displays a graph that tracks the chosen variable over time, helping to visualize changes.
6. **Comparison Tab**:
    - Compares Aruba with two other islands: Dominica and Jamaica.
    - Text highlights key differences and similarities, such as GDP, population, economic structure, and vulnerabilities.
    - Includes relevant images to make the comparison more engaging.
7. **SWOT Analysis Tab**:
    - Provides a structured analysis of Aruba's:
        - **Strengths** (e.g., strong tourism sector, high life expectancy).
        - **Weaknesses** (e.g., small population, reliance on tourism).

  - **Opportunities** (e.g., potential for economic diversification).
  - **Threats** (e.g., climate change, natural disasters).
- Summarizes insights into Aruba's position and challenges in an easily digestible format.

What Makes It Interactive

The app allows users to:

- Explore data dynamically by selecting variables (e.g., GDP, population growth).
- Interact with an online map to see Aruba's geographic layout.
- Read comparative analyses and view related images for a better contextual understanding.

```
# Add resource path for images
addResourcePath("images", "C:/Users/cuih1/OneDrive/Desktop/615/Aruba data")

# UI
ui <- navbarPage(
  "Aruba Analysis",
  tabPanel("Introduction",
           fluidPage(
             titlePanel("About Aruba"),
             fluidRow(
               column(6,
                      p("Aruba is a Caribbean island located off the coast of Venezuela, kno
                      p("Capital City: Oranjestad"),
                      p("Currency: Aruban Florin (AWG)"),
                      p("Land area: 180 square kilometers")
               ),
               column(6, img(src = "images/Aruba_1.png", width = "100%"))
             )
           )
  ),
  tabPanel("Biodiversity",
           fluidPage(
             titlePanel("Aruba's Biodiversity"),
             p("Aruba's natural ecosystems include desert landscapes, coral reefs, and unique
             fluidRow(
               column(6, img(src = "images/Aruba_2.jpg", width = "100%")),
```

```
            column(6, img(src = "images/Aruba_3.jpg", width = "100%"))
          )
        )
),
tabPanel("Map",
         fluidPage(
           titlePanel("Interactive Map of Aruba"),
           leafletOutput("arubaMap", height = 500)
         )
),
tabPanel("Economic Indicators",
         fluidPage(
           titlePanel("Economic Indicators"),
           selectInput("econVar", "Choose a variable to display:",
                       choices = c("GDP (current US$)", "GDP growth (annual %)")),
           plotOutput("econPlot")
         )
),
tabPanel("Population Statistics",
         fluidPage(
           titlePanel("Population Trends"),
           selectInput("popVar", "Choose a variable to display:",
                       choices = c("Population, total", "Population growth (annual %)", "Li
           plotOutput("popPlot")
         )
),
tabPanel("Comparison",
         fluidPage(
           titlePanel("Comparison with Dominica and Jamaica"),
           h4("Aruba vs Dominica"),
           p("- Aruba has a significantly higher GDP compared to Dominica due to its develo
           p("- In terms of population, Dominica is much smaller than Aruba with approximat
           img(src = "images/Dominica.png", width = "100%"),
           h4("Aruba vs Jamaica"),
           p("- Jamaica, with a population of nearly 3 million, far exceeds Aruba in terms
           p("- Jamaica's economy is more diversified, including agriculture, mining, and m
           p("- Both Aruba and Jamaica face challenges from climate change, but Jamaica has
           img(src = "images/Jamaica.png", width = "100%")
         )
),
tabPanel("SWOT Analysis",
         fluidPage(
```

```
            titlePanel("SWOT Analysis of Aruba"),
            h4("Strengths"),
            p("- GDP: Aruba's current GDP indicates a relatively strong economy supported by
            p("- GDP Growth: A positive annual growth rate of 3.5% shows economic resilience
            p("- Life Expectancy: At 76.5 years, Aruba has a higher-than-average life expect
            h4("Weaknesses"),
            p("- Population Growth: A modest growth rate of 1.2% may indicate limited workfo
            p("- Population Size: With a small population of 120,000, Aruba faces challenges
            p("- Dependence on Tourism: The GDP structure heavily relies on external factors
            h4("Opportunities"),
            p("- Diversification: Economic diversification into renewable energy and eco-tou
            p("- Sustainability: With a stable GDP growth rate, Aruba can invest in green in
            p("- Life Expectancy: A higher life expectancy can attract retirees, boosting se
            h4("Threats"),
            p("- Climate Change: Rising sea levels and hurricanes pose severe threats to the
            p("- Economic Shocks: Tourism dependency makes Aruba susceptible to external sho
            p("- Resource Scarcity: Aruba's small land size limits natural resources for sel
          )
  )
)

# Server
server <- function(input, output, session) {
  # Interactive Map
  output$arubaMap <- renderLeaflet({
    leaflet() %>%
      addTiles() %>%
      setView(lng = -69.9683, lat = 12.5211, zoom = 10) %>%
      addMarkers(lng = -69.9683, lat = 12.5211, popup = "Aruba: Oranjestad")
  })

  # Economic Indicators Plot
  output$econPlot <- renderPlot({
    req(input$econVar)  # Ensure a variable is selected
    econ_data <- filtered_data %>% filter(`Series.Name` == input$econVar)
    ggplot(econ_data, aes(x = Year, y = Value)) +
      geom_line(color = "blue", size = 1) +
      theme_minimal() +
      labs(
        title = paste("Trends in", input$econVar),
        y = input$econVar,
        x = "Year"
```

```
    )
  })

  # Population Statistics Plot
  output$popPlot <- renderPlot({
    req(input$popVar)  # Ensure a variable is selected
    pop_data <- filtered_data %>% filter(`Series.Name` == input$popVar)
    ggplot(pop_data, aes(x = Year, y = Value)) +
      geom_line(color = "red", size = 1) +
      geom_point(color = "red", size = 2) +
      theme_minimal() +
      labs(
        title = paste("Trends in", input$popVar),
        y = input$popVar,
        x = "Year"
      )
  })
}

# Run App
shinyApp(ui, server)
```

Why This App is Valuable

The app serves as a tool to:

- Educate users about Aruba's unique features and challenges.
- Provide interactive visualizations that make complex data easier to understand.
- Support comparative analysis to place Aruba in a broader context alongside other islands.
- Present a holistic view of Aruba, combining text, visuals, and interactivity for a richer learning experience.

This makes the app useful for education, research, or decision-making related to Aruba's development and sustainability.

Reference

https://databank.worldbank.org/reports.aspx?source=2&country=ABW

https://www.nytimes.com/2020/03/12/travel/what-to-do-36-hours-in-aruba.html

https://www.visitaruba.com/blog/about-aruba/mangroves-and-wildlife-environmental-awareness-from-aruba-pt-ii/

https://www.visitaruba.com/blog/things-to-do/arubas-chasing-coral-event-a-campaign-to-save-our-coral-reefs-and-inspire-action/