National Intelligence Quotient (IQ) Scores

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08/06/2024

Load Necessary Libraries

```r
library(readr)
library(ggplot2)
library(rworldmap)
```

```
## Loading required package: sp
```

```
## ### Welcome to rworldmap ###
```

```
## For a short introduction type :   vignette('rworldmap')
```

```r
library(RColorBrewer)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

Read the CSV file

```r
avgIQpercountry <- read_csv("~/Desktop/NationalIQScores/avgIQpercountry.csv")
```

```
## Rows: 193 Columns: 10
## -- Column specification -------------------------------------------------
## Delimiter: ","
## chr (3): Country, Continent, Population - 2023
## dbl (7): Rank, Average IQ, Literacy Rate, Nobel Prices, HDI (2021), Mean yea...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
avgIQpercountry
```

```
## # A tibble: 193 x 10
##     Rank Country       `Average IQ` Continent `Literacy Rate` `Nobel Prices`
##    <dbl> <chr>                <dbl> <chr>               <dbl>          <dbl>
##  1     1 Japan          106. Asia                0.99             29
##  2     2 Taiwan         106. Asia                0.96              4
##  3     3 Singapore      106. Asia                0.97              0
##  4     4 Hong Kong      105. Asia                0.94              1
##  5     5 China          104. Asia                0.96              8
##  6     6 South Korea    102. Asia                0.98              0
##  7     7 Belarus        102. Europe              1                2
##  8     8 Finland        101. Europe              1                5
##  9     9 Liechtenstein  101. Europe              1                0
## 10    10 Germany        101. Europe              0.99            111
## # i 183 more rows
## # i 4 more variables: `HDI (2021)` <dbl>,
## #   `Mean years of schooling - 2021` <dbl>, `GNI - 2021` <dbl>,
## #   `Population - 2023` <chr>
```

Let μ = Average National IQ, AF = Africa, AS = Asia, CA = Central America, EU = Europe, EA = Eurasia, NA = North America, OC = Oceania, SA = South America

Let $\alpha = 0.05$ (significance level)

$H_0 : \mu_{AF} = \mu_{AS} = \mu_{CA} = \mu_{EU} = \mu_{EA} = \mu_{NA} = \mu_{OC} = \mu_{SA}$ vs $H_a :$ At least two means differ

Hypothesis Testing

```
# Perform a One-Way Analysis of Variance (ANOVA)
iq_aov <- aov(`Average IQ`~Continent, data = avgIQpercountry)
summary(iq_aov)
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## Continent     7  19196  2742.3   33.93 <2e-16 ***
## Residuals   185  14952    80.8
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
TukeyHSD(iq_aov) # pairwise comparison test
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = `Average IQ` ~ Continent, data = avgIQpercountry)
##
## $Continent
##                                 diff        lwr       upr     p adj
## Asia-Africa                17.238029 11.7210620 22.754996 0.0000000
## Central America-Africa      6.546697 -0.3555053 13.448900 0.0768176
## Europe-Africa              26.338532 20.5818725 32.095191 0.0000000
## Europe/Asia-Africa         20.630321  4.2643521 36.996289 0.0037697
## North America-Africa       25.973654 11.6720412 40.275266 0.0000025
```

```
## Oceania-Africa                   19.567654  10.0502864 29.085021 0.0000001
## South America-Africa              15.216987   6.3898402 24.044134 0.0000096
## Central America-Asia             -10.691332 -17.6811726 -3.701490 0.0001417
## Europe-Asia                        9.100503   3.2390523 14.961954 0.0001043
## Europe/Asia-Asia                   3.392292 -13.0108300 19.795413 0.9983531
## North America-Asia                 8.735625  -5.6084888 23.079739 0.5751507
## Oceania-Asia                       2.329625  -7.2514898 11.910740 0.9954280
## South America-Asia                -2.021042 -10.9168834  6.874800 0.9970077
## Europe-Central America            19.791835  12.6112996 26.972370 0.0000000
## Europe/Asia-Central America       14.083623  -2.8357704 31.003017 0.1807113
## North America-Central America     19.426957   4.4952092 34.358704 0.0023860
## Oceania-Central America           13.020957   2.5805907 23.461322 0.0043718
## South America-Central America      8.670290  -1.1449778 18.485557 0.1266383
## Europe/Asia-Europe                -5.708211 -22.1934959 10.777073 0.9637814
## North America-Europe              -0.364878 -14.8028767 14.073121 1.0000000
## Oceania-Europe                    -6.770878 -16.4919873  2.950231 0.3962607
## South America-Europe             -11.121545 -20.1679918 -2.075098 0.0053104
## North America-Europe/Asia          5.343333 -15.7080704 26.394737 0.9940425
## Oceania-Europe/Asia               -1.062667 -19.2066949 17.081362 0.9999997
## South America-Europe/Asia         -5.413333 -23.2050168 12.378350 0.9824633
## Oceania-North America             -6.406000 -22.7123472  9.900347 0.9297745
## South America-North America      -10.756667 -26.6700321  5.156699 0.4366802
## South America-Oceania             -4.350667 -16.1523343  7.451001 0.9493748
```

f = 33.93; p-value = <2e-16 (i.e. 0.0000000000000002)

Reject H0; there is no evidence to support the claim that the average IQ among each continent is equal. Viz., there is a 0.00000000000002% probability this difference occurred by chance. The difference occurred through observations of IQ scores.

In the pairwise comparison test, it is found the following continents are significantly different in average IQ scores: Asia-Africa, Europe-Africa, Europe/Asia-Africa, North America-Africa, Oceania-Africa, South America-Africa, Central America-Asia, Europe-Asia, Europe-Central America, North America-Central America, Oceania-Central America, South America-Europe.

The following continents are not significantly different in average IQ scores: Central America-Africa, Europe/Asia-Asia, North America-Asia, Oceania-Asia, South America-Asia, Europe/Asia-Central America, South America-Central America, Europe/Asia-Europe, North America-Europe, Oceania-Europe, North America-Europe/Asia, Oceania-Europe/Asia, South America-Europe/Asia, Oceania-North America, South America-North America, South America-Oceania.

Pairwise comparison determinations are based upon the "p adj" column. If p adj < 0.05, there is a significant difference. If p adj > 0.05, there is no significant difference. That is not to say there are no smaller differences.

Define Global Variables for Graphing

```r
# Save the value of the column header "Average IQ" to the variable Average_IQ
Average_IQ <- avgIQpercountry$`Average IQ`

# Pass Average_IQ into the iq_colors function
iq_colors <- function(Average_IQ) {
  if (is.na(Average_IQ)) {
    return("gray")
    }
  else if (Average_IQ < 50) {
    return("#8B0000")
```

```r
    }
  else if (50 <= Average_IQ & Average_IQ < 60) {
    return("#FF4500")
    }
  else if (60 <= Average_IQ & Average_IQ < 70) {
    return("#FFA500")
    }
  else if (70 <= Average_IQ & Average_IQ < 80) {
    return("#F5DEB3")
    }
  else if (80 <= Average_IQ & Average_IQ < 90) {
    return("#ADD8E6")
    }
  else if (90 <= Average_IQ & Average_IQ < 100) {
    return("#7B68EE")
  }
  else {
    return("#0000CD")
    }
} # end iq_colors

iq_labels <- function(Average_IQ) {
  if (is.na(Average_IQ)) {
    return("N/A")
    }
  else if (Average_IQ < 50) {
    return("<50")
    }
  else if (50 <= Average_IQ & Average_IQ < 60) {
    return("50-59")
    }
  else if (60 <= Average_IQ & Average_IQ < 70) {
    return("60-69")
    }
  else if (70 <= Average_IQ & Average_IQ < 80) {
    return("70-79")
    }
  else if (80 <= Average_IQ & Average_IQ < 90) {
    return("80-89")
    }
  else if (90 <= Average_IQ & Average_IQ < 100) {
    return("90-99")
  }
  else {
    return("100+")
    }
} # end iq_labels

iq_breaks <- c(-Inf, 50, 60, 70, 80, 90, 100, Inf) # Define the breaks
```

Global Map of Average IQ per Country

```r
# Set graphical parameters to use Times New Roman for the title
par(family = "serif")

# Join the country data to the map
sPDF <- joinCountryData2Map(avgIQpercountry, joinCode = "NAME",
                            nameJoinColumn = "Country")
```

```
## 189 codes from your data successfully matched countries in the map
## 4 codes from your data failed to match with a country code in the map
## 54 codes from the map weren't represented in your data
```

```r
# Apply the color function to create a color palette for the map
sPDF$color <- sapply(sPDF$`Average IQ`, iq_colors)

# Define the legend text based on the IQ values
legend_labels <- unique(sapply(sort(unique(sPDF$`Average IQ`)), iq_labels))
legend_colors <- unique(sapply(sort(unique(sPDF$`Average IQ`)), iq_colors))

# Plot the map
mapParams <- mapCountryData(sPDF,
                            nameColumnToPlot = "Average IQ",
                            mapTitle = "Global Map of Average IQ per Country",
                            colourPalette = legend_colors,
                            catMethod = iq_breaks,
                            oceanCol = "#FFFFFF",
                            missingCountryCol = "gray",
                            addLegend = FALSE,
                            borderCol = "#000000",
                            xlim = c(-180, 180), ylim = c(-90, 90))

# Add "N/A" to the legend manually
legend_labels <- c(legend_labels, "N/A")
legend_colors <- c(legend_colors, "gray")

# Add the legend manually at the bottom
legend("bottom",
       legend = legend_labels,
       fill = legend_colors,
       title = "IQ Range",
       horiz = TRUE,
       cex = 0.8,
       inset = c(0, -0.16),
       xpd = TRUE)  # Allow legend to be drawn outside plot area

# Add caption
mtext("Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.",
      side = 1, line = 2.5, adj = 0.5, cex = 1, family = "serif")
```
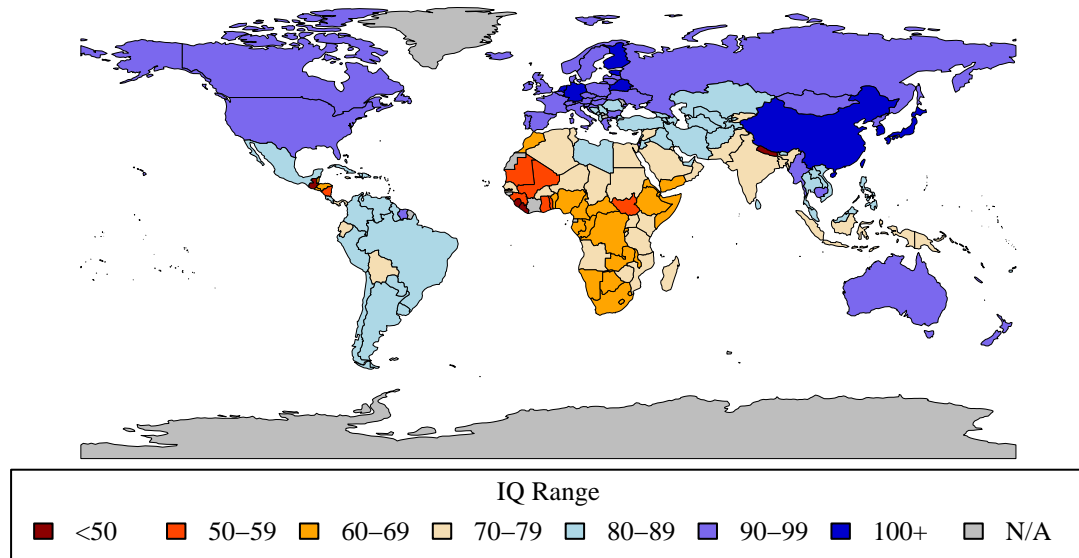
Global Map of Average IQ per Country

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

The global map provides a broad overview of what IQ scores look like per country.

Compare Average National IQ Across All Continents

```
# Calculate average IQ for each continent
avg_continent_iq <- avgIQpercountry %>%
  group_by(Continent) %>%
  summarize(Average_IQ = mean(`Average IQ`, na.rm = TRUE)) %>%
  mutate(Color = sapply(Average_IQ, iq_colors),  # Call global function iq_colors
         Label = sapply(Average_IQ, iq_labels)) %>%
  arrange(desc(Average_IQ))  # Sort continents in descending order of Average IQ
avg_continent_iq # print the calculated results
```

```
## # A tibble: 8 x 4
##   Continent        Average_IQ Color   Label
##   <chr>                 <dbl> <chr>   <chr>
## 1 Europe                 94.9 #7B68EE 90-99
## 2 North America          94.5 #7B68EE 90-99
## 3 Europe/Asia            89.2 #ADD8E6 80-89
## 4 Oceania                88.1 #ADD8E6 80-89
## 5 Asia                   85.8 #ADD8E6 80-89
## 6 South America          83.8 #ADD8E6 80-89
## 7 Central America        75.1 #F5DEB3 70-79
## 8 Africa                 68.6 #FFA500 60-69
```

```r
# Adjusting the labels for better display on the graph
avg_continent_iq$Continent <- gsub("North America", "North\nAmerica",
                                   avg_continent_iq$Continent)
avg_continent_iq$Continent <- gsub("South America", "South\nAmerica",
                                   avg_continent_iq$Continent)
avg_continent_iq$Continent <- gsub("Central America", "Central\nAmerica",
                                   avg_continent_iq$Continent)

ggplot(avg_continent_iq, aes(x = reorder(Continent, -Average_IQ), y = Average_IQ,
                             fill = Label)) +
  geom_bar(stat = "identity", color = "black") +
  scale_fill_manual(values = c("60-69" = "#FFA500", "70-79" = "#F5DEB3",
                               "80-89" = "#ADD8E6", "90-99" = "#7B68EE"),
                    name = "IQ Level") +  # Change the legend title here
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  scale_y_continuous(breaks = seq(0, 90, by = 5)) +
  labs(title = "Average National IQ Across All Continents",
       x = "Continent",
       y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(1)), # x-axis labels
        axis.text.y = element_text(size = rel(1)), # y-axis labels
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1))) # Center caption
```

Average National IQ Across All Continents
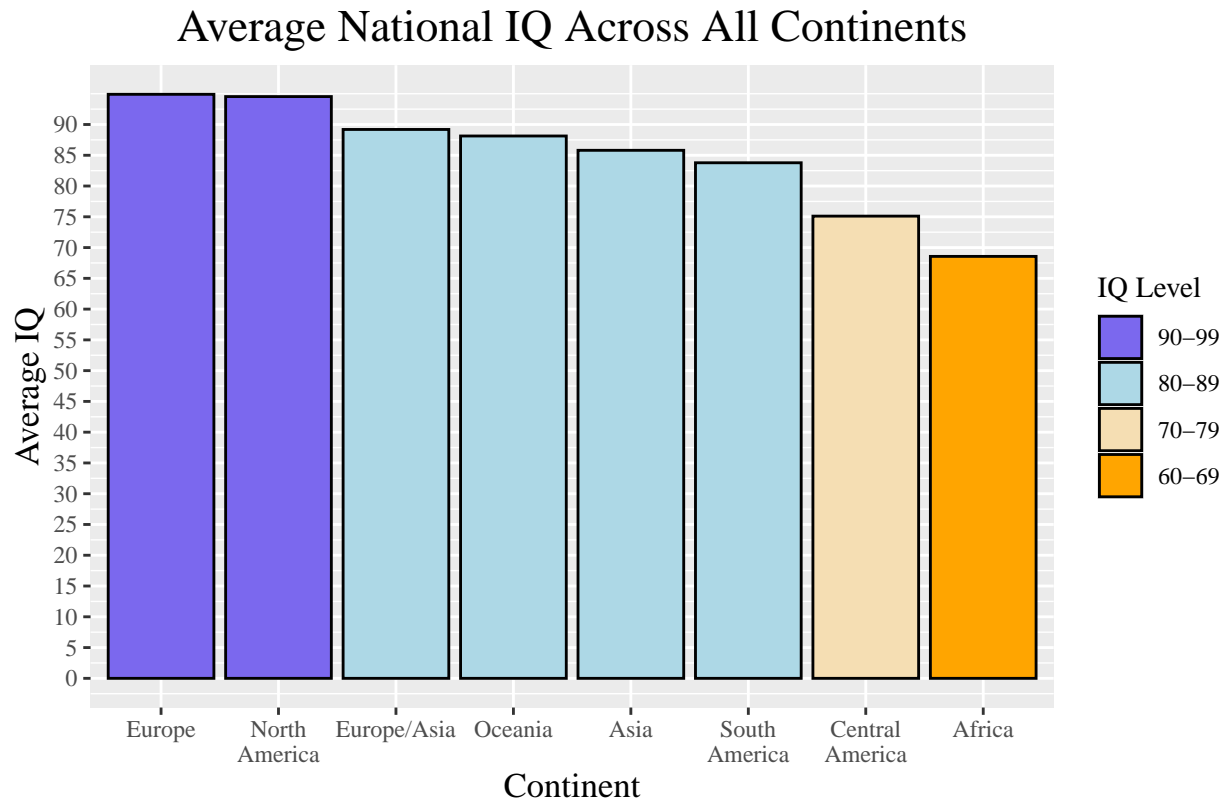
Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Bar Graph of Average IQ per Country In Africa
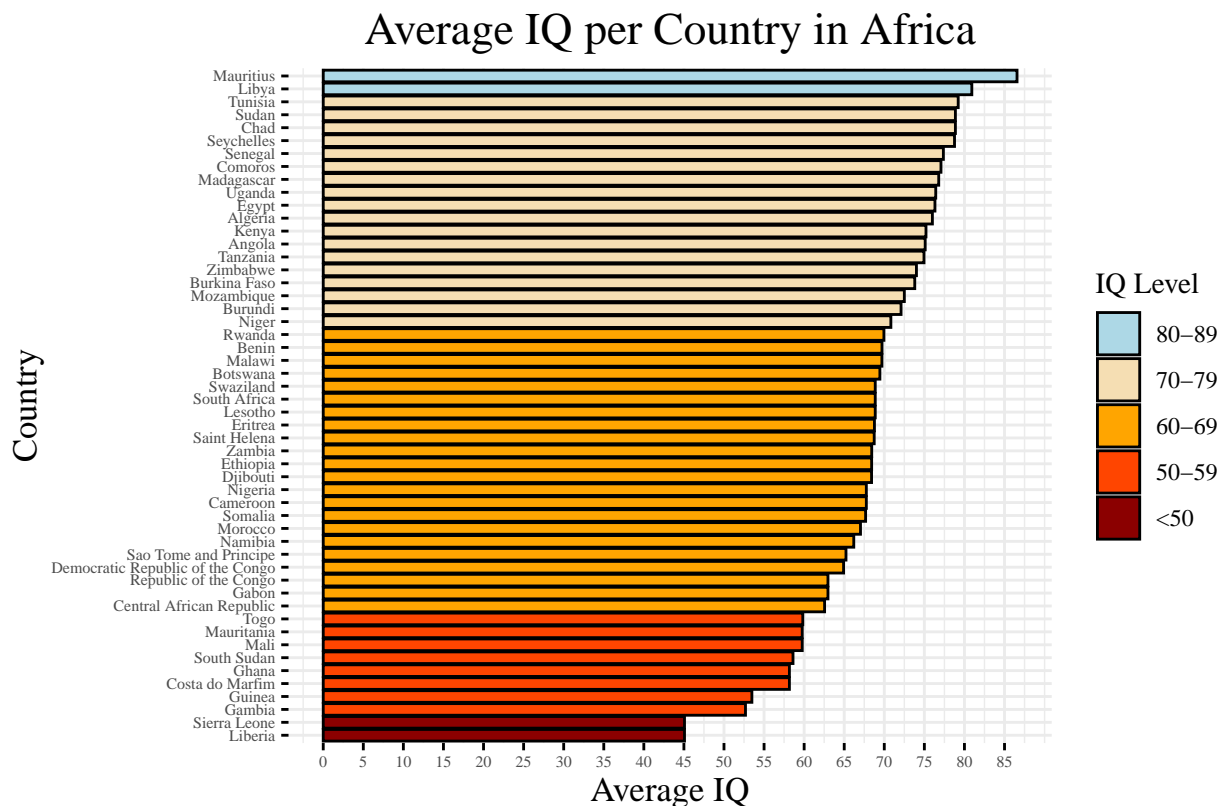
```r
# Filter the dataset for African countries
africa_data <- avgIQpercountry %>%
  filter(Continent == "Africa") %>%
  mutate(IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in africa_data
iq_color_values <- sapply(unique(africa_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(africa_data$IQ_level)

# Create bar graph
ggplot(africa_data, aes(x = reorder(Country, `Average IQ`), y = `Average IQ`,
                        fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000") +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Africa", x = "Country",
       y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(africa_data$`Average IQ`, na.rm = TRUE),
                                  by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(0.7)), # x-axis labels
```

```
    axis.text.y = element_text(size = rel(0.7)), # y-axis labels
    axis.title.x = element_text(size = rel(1.2)), # x-axis title
    axis.title.y = element_text(size = rel(1.2)), # y-axis title
    plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
    plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
    axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
    axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
    legend.position = "right")
```

Average IQ per Country in Africa

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Bar Graph of Average IQ per Country In Asia

```
# Define the order of levels for IQ_level factor
iq_levels_ordered <- c("<50", "60-69", "70-79", "80-89", "90-99", "100+")

# Filter the dataset for Asian countries
asia_data <- avgIQpercountry %>%
  filter(Continent == "Asia") %>%
  mutate(IQ_level = factor(sapply(`Average IQ`, iq_labels),
                           levels = iq_levels_ordered))

# Define the color palette
iq_color_values <- c("<50" = "#8B0000", "60-69" = "#FFA500", "70-79" = "#F5DEB3",
                     "80-89" = "#ADD8E6", "90-99" = "#7B68EE", "100+" = "#0000CD")

# Create bar graph
ggplot(asia_data, aes(x = reorder(Country, `Average IQ`), y = `Average IQ`,
```

```
                     fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000") +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Asia", x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(asia_data$`Average IQ`, na.rm = TRUE),
                                  by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(0.7)), # x-axis labels
        axis.text.y = element_text(size = rel(0.7)), # y-axis labels
        axis.title.x = element_text(size = rel(0.9)), # x-axis title
        axis.title.y = element_text(size = rel(0.9)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```
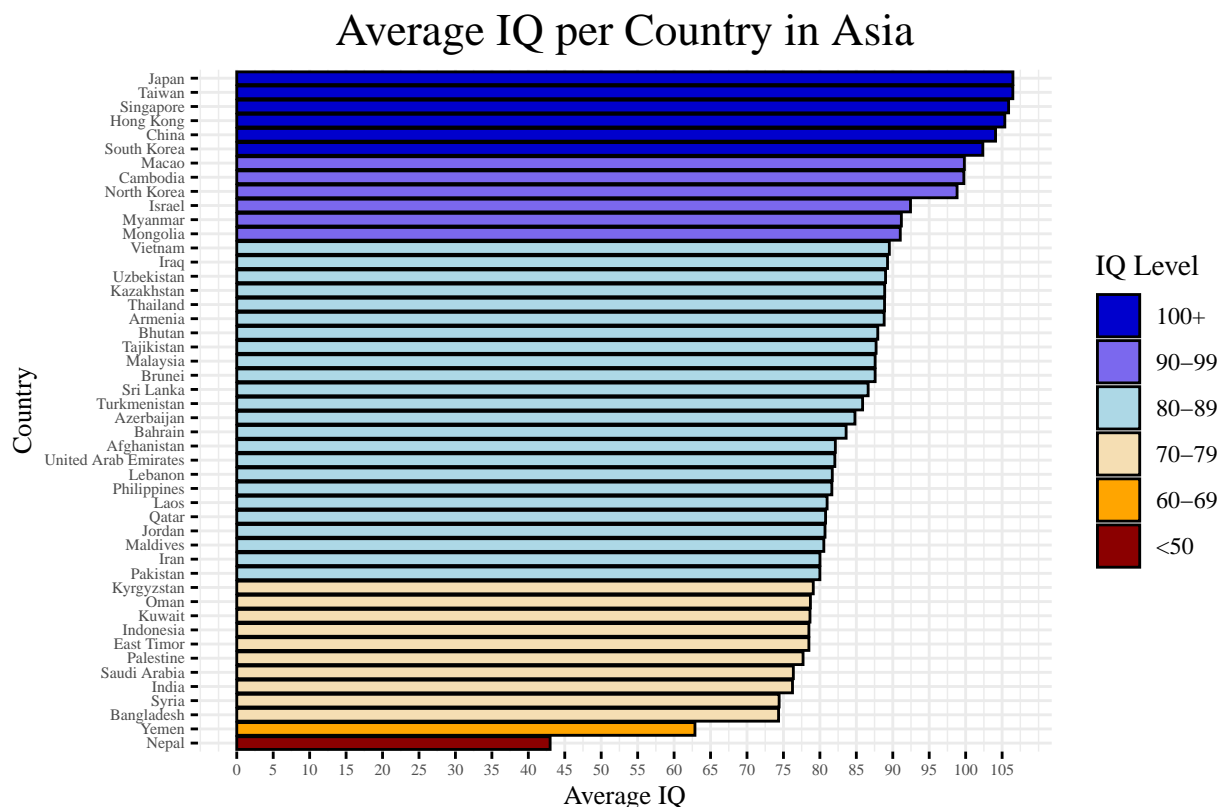

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Bar Graph of Average IQ per Country In Central America

```
# Filter the dataset for Central American countries
centralamerica_data <- avgIQpercountry %>%
  filter(Continent == "Central America") %>%
```
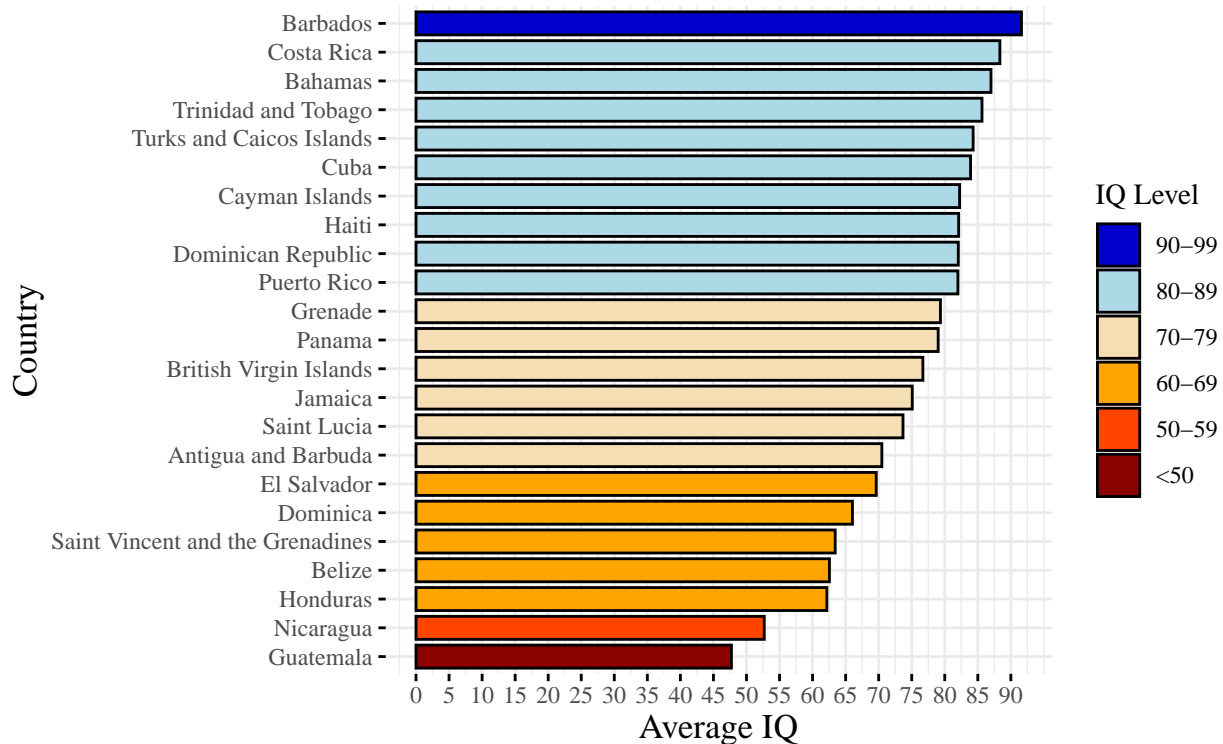
```r
  mutate(IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in centralamerica_data
iq_color_values <- sapply(unique(centralamerica_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(centralamerica_data$IQ_level)

# Create bar graph
ggplot(centralamerica_data, aes(x = reorder(Country, `Average IQ`),
                                y = `Average IQ`, fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000", width = 0.8) +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Central America",
       x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(centralamerica_data$`Average IQ`,
                                         na.rm = TRUE), by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(1)), # x-axis labels
        axis.text.y = element_text(size = rel(1)), # y-axis labels
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```

Average IQ per Country in Central America

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.
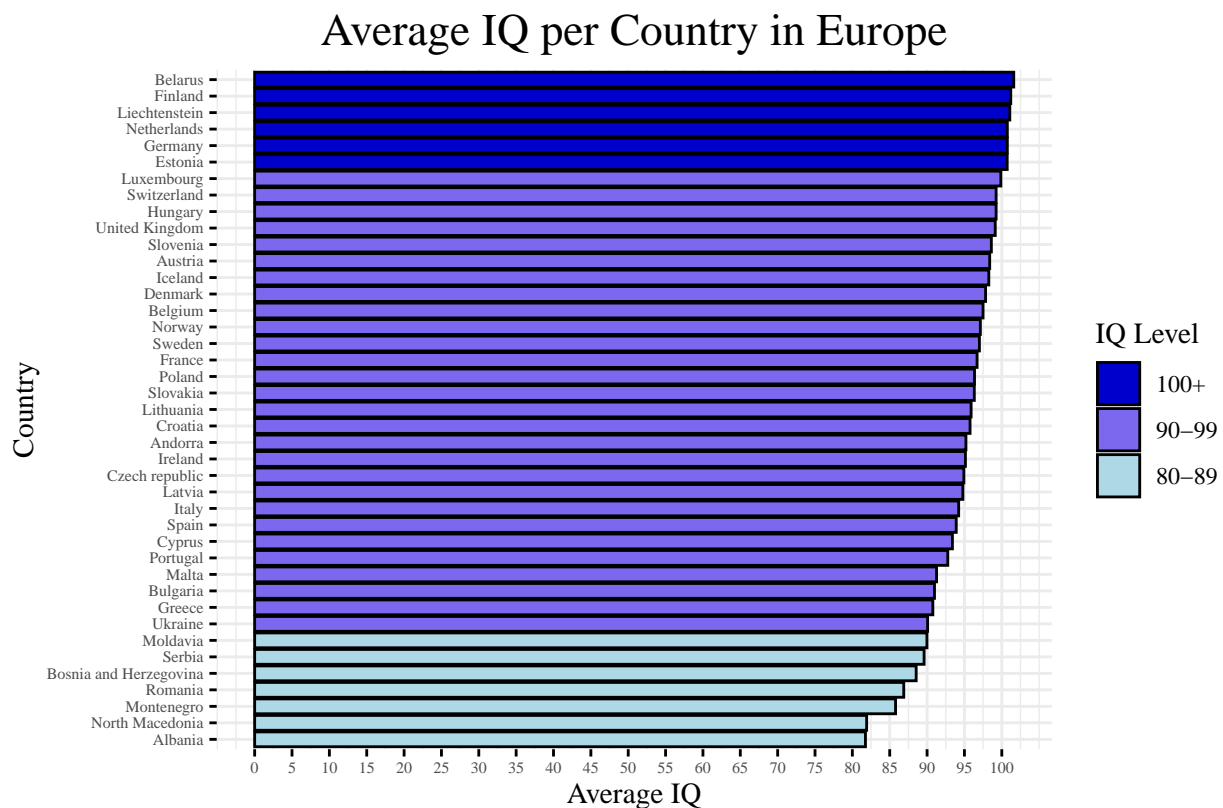
Bar Graph of Average IQ per Country In Europe

```r
# Define the order of levels for IQ_level factor
iq_levels_ordered <- c("80-89", "90-99", "100+")

# Filter the dataset for European countries
europe_data <- avgIQpercountry %>%
  filter(Continent == "Europe") %>%
  mutate(IQ_level = factor(sapply(`Average IQ`, iq_labels),
                           levels = iq_levels_ordered))

# Define the color palette
iq_color_values <- c("80-89" = "#ADD8E6",
                     "90-99" = "#7B68EE",
                     "100+" = "#0000CD")

# Create bar graph
ggplot(europe_data, aes(x = reorder(Country, `Average IQ`),
                        y = `Average IQ`, fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000") +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Europe",
       x = "Country", y = "Average IQ",
```

```
          caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(europe_data$`Average IQ`, na.rm = TRUE),
                                  by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(0.7)), # x-axis labels
        axis.text.y = element_text(size = rel(0.7)), # y-axis labels
        axis.title.x = element_text(size = rel(1)), # x-axis title
        axis.title.y = element_text(size = rel(1)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```
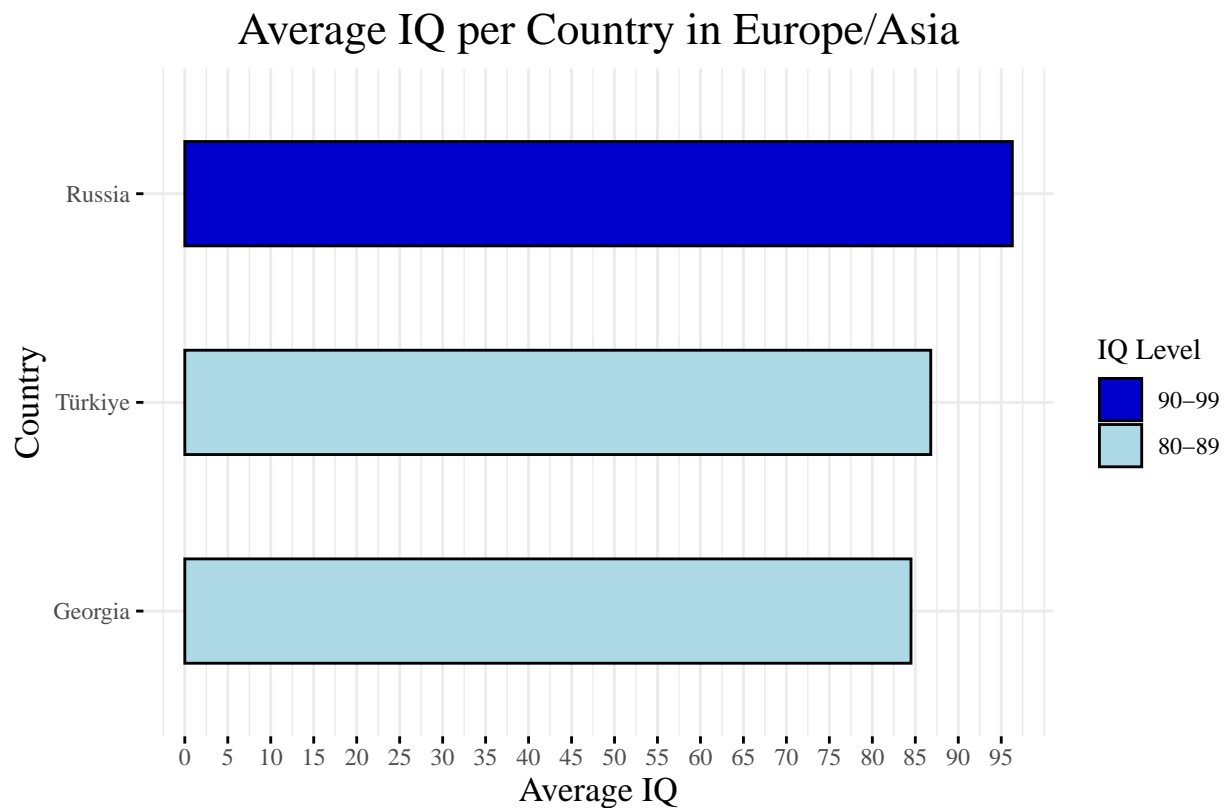

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Bar Graph of Average IQ per Country In Europe/Asia

```
# Filter the dataset for Eurasian countries
eurasian_data <- avgIQpercountry %>%
  filter(Continent == "Europe/Asia") %>%
  mutate(Country = ifelse(Country == "Turkey", "Türkiye", Country),
         IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in eurasian_data
iq_color_values <- sapply(unique(eurasian_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(eurasian_data$IQ_level)
```

```
# Create bar graph
ggplot(eurasian_data, aes(x = reorder(Country, `Average IQ`),
                          y = `Average IQ`, fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000", width = 0.5) +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Europe/Asia",
       x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(eurasian_data$`Average IQ`, na.rm = TRUE),
                                  by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(1)), # x-axis labels
        axis.text.y = element_text(size = rel(1)), # y-axis labels
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```


Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

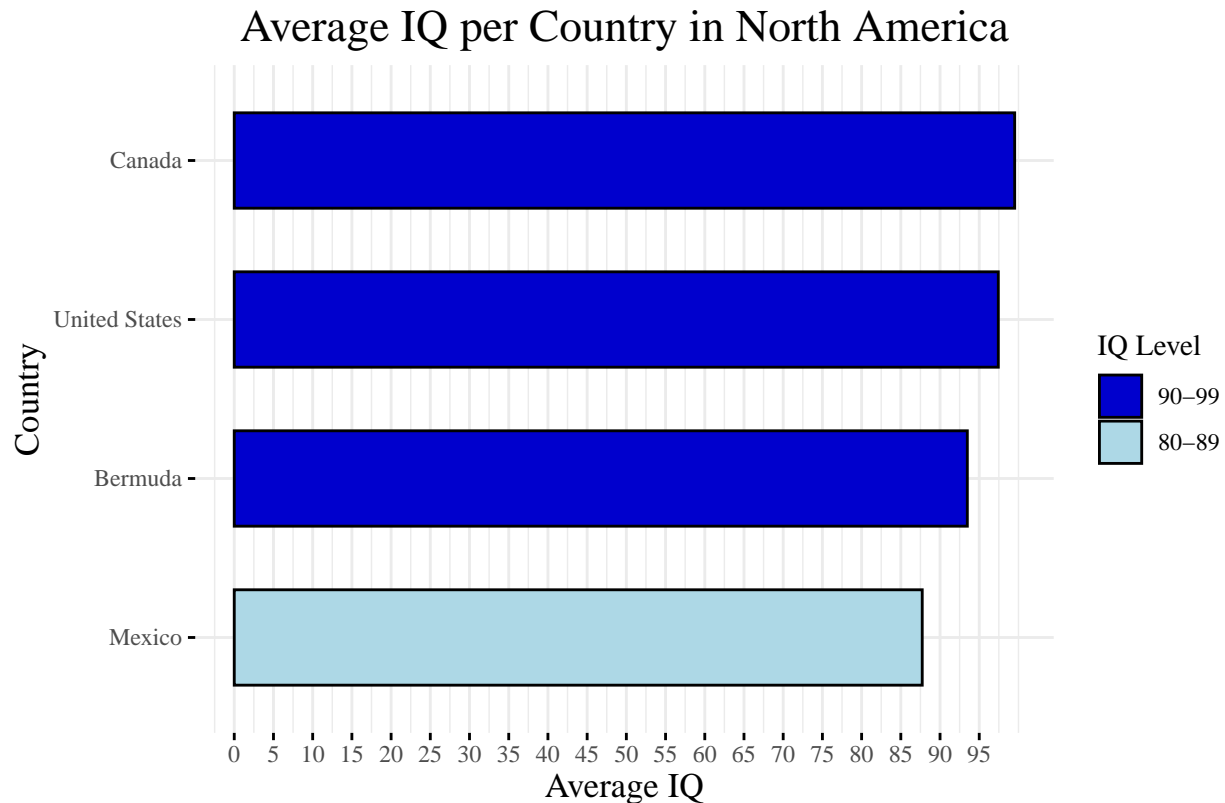Bar Graph of Average IQ per Country In North America

```r
# Filter the dataset for North American countries
northamerican_data <- avgIQpercountry %>%
  filter(Continent == "North America") %>%
  mutate(IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in northamerican_data
iq_color_values <- sapply(unique(northamerican_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(northamerican_data$IQ_level)

# Create bar graph
ggplot(northamerican_data, aes(x = reorder(Country, `Average IQ`),
                               y = `Average IQ`, fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000", width = 0.6) +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in North America",
       x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(northamerican_data$`Average IQ`,
                                         na.rm = TRUE), by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(1)), # x-axis labels
        axis.text.y = element_text(size = rel(1)), # y-axis labels
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```

Average IQ per Country in North America

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

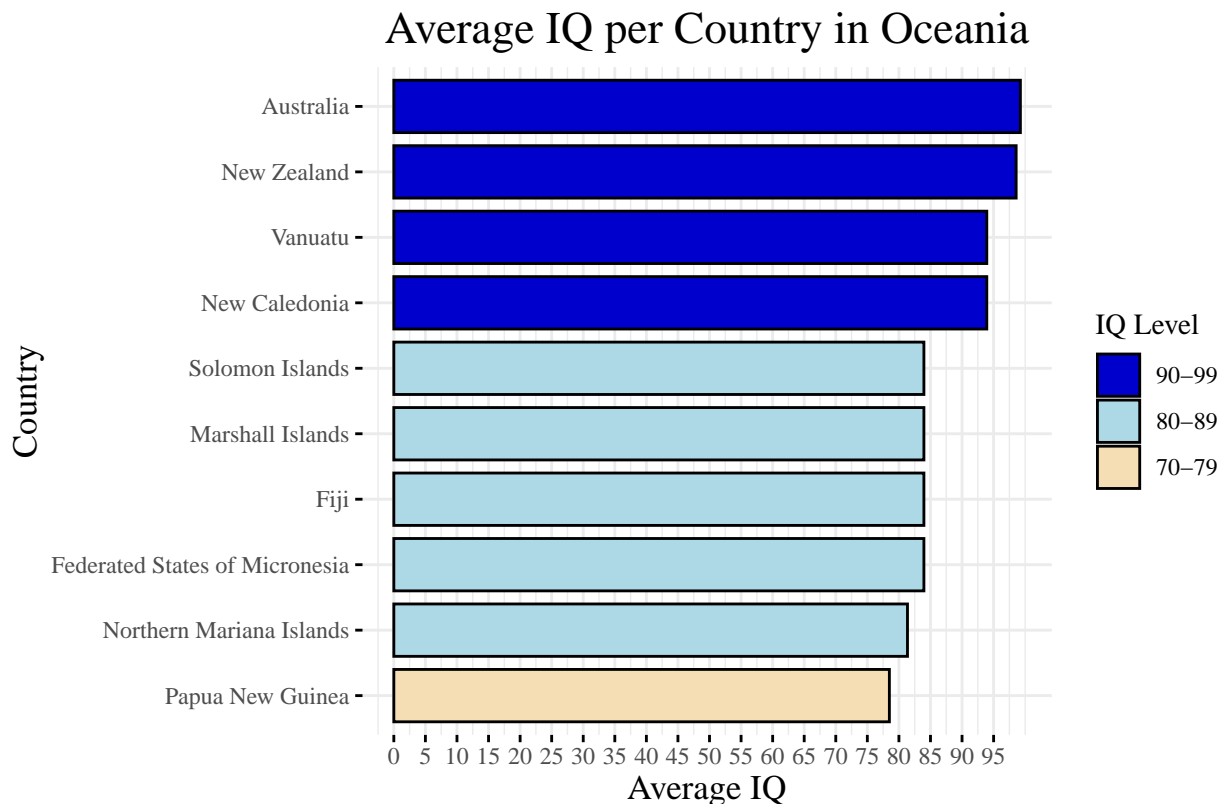Bar Graph of Average IQ per Country In Oceania

```r
# Filter the dataset for Oceanian countries
oceanian_data <- avgIQpercountry %>%
  filter(Continent == "Oceania") %>%
  mutate(IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in oceanian_data
iq_color_values <- sapply(unique(oceanian_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(oceanian_data$IQ_level)

# Create bar graph
ggplot(oceanian_data, aes(x = reorder(Country, `Average IQ`),
                          y = `Average IQ`, fill = IQ_level)) +
  geom_bar(stat = "identity", color = "black", width = 0.8) +
  coord_flip() +
  theme_minimal() +
  scale_fill_manual(values = iq_color_values, name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "Average IQ per Country in Oceania",
       x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  scale_y_continuous(breaks = seq(0, max(oceanian_data$`Average IQ`, na.rm = TRUE),
                                  by = 5)) +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(size = rel(1)), # x-axis labels
```

```
        axis.text.y = element_text(size = rel(1)), # y-axis labels
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
        legend.position = "right")
```

Average IQ per Country in Oceania

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.
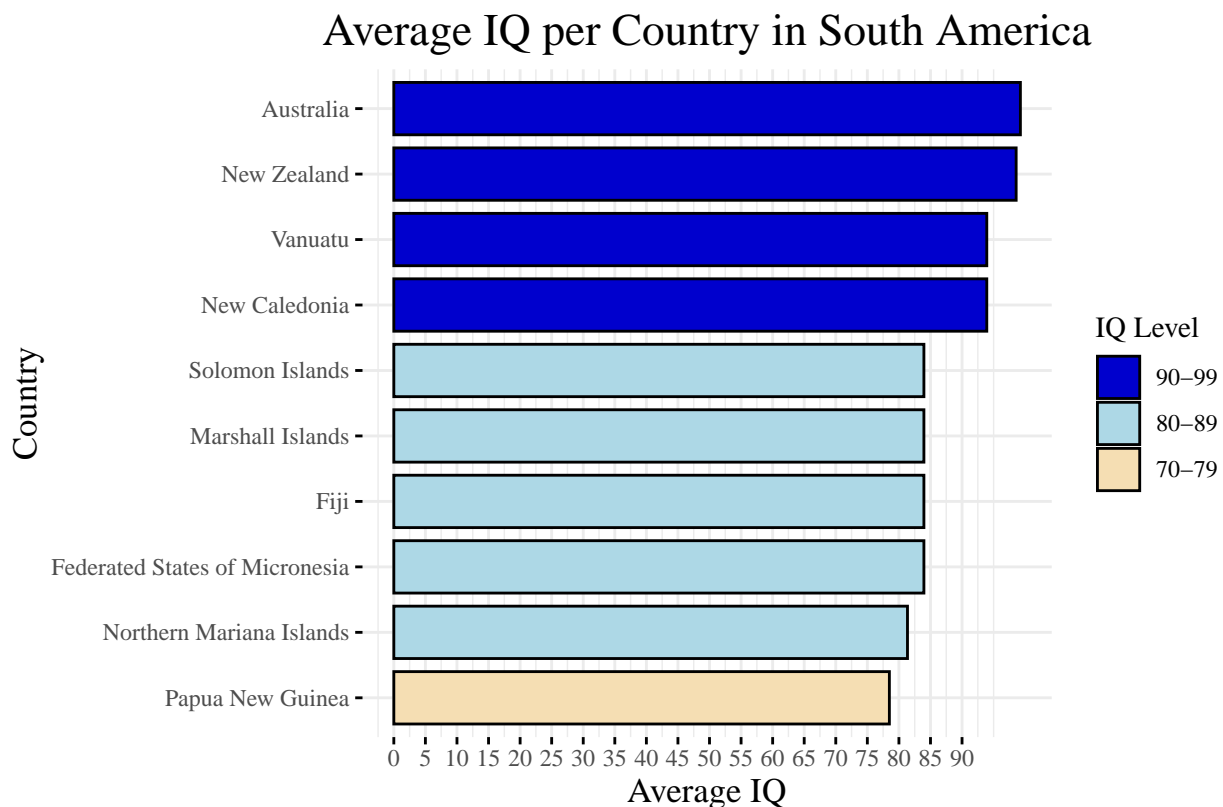
Bar Graph of Average IQ per Country In South America

```
# Filter the dataset for South American countries
southamerican_data <- avgIQpercountry %>%
  filter(Continent == "South America") %>%
  mutate(IQ_level = sapply(`Average IQ`, iq_labels))

# Create the color palette based on unique IQ levels in southamerican_data
iq_color_values <- sapply(unique(southamerican_data$IQ_level), iq_colors)
names(iq_color_values) <- unique(southamerican_data$IQ_level)

# Create bar graph
ggplot(oceanian_data, aes(x = reorder(Country, `Average IQ`), y = `Average IQ`,
                    fill = IQ_level)) +
  geom_bar(stat = "identity", color = "#000000", width = 0.8) +
  coord_flip() +
  theme_minimal() +
```

```r
scale_fill_manual(values = iq_color_values, name = "IQ Level") +
guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
labs(title = "Average IQ per Country in South America",
     x = "Country", y = "Average IQ",
     caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
scale_y_continuous(breaks = seq(0, max(southamerican_data$`Average IQ`, na.rm = TRUE), by = 5)) +
theme(text = element_text(family = "serif"),
      axis.text.x = element_text(size = rel(1)), # x-axis labels
      axis.text.y = element_text(size = rel(1)), # y-axis labels
      axis.title.x = element_text(size = rel(1.2)), # x-axis title
      axis.title.y = element_text(size = rel(1.2)), # y-axis title
      plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
      plot.caption = element_text(hjust = 1, size = rel(1)), # Center caption
      axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
      axis.ticks.y = element_line(color = "black"), # Add black ticks on y-axis
      legend.position = "right")
```


Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Compare IQ in Countries Involved in Arab-Israeli Conflict

```r
# Define the grouping of countries and prepare the data
selected_countries_data <- avgIQpercountry %>%
  filter(Country %in% c("United States", "Israel",
                        "Palestine", "Syria",
                        "Jordan", "Egypt",
                        "Lebanon", "Iraq")) %>%
  select(Country, `Average IQ`) %>%
```
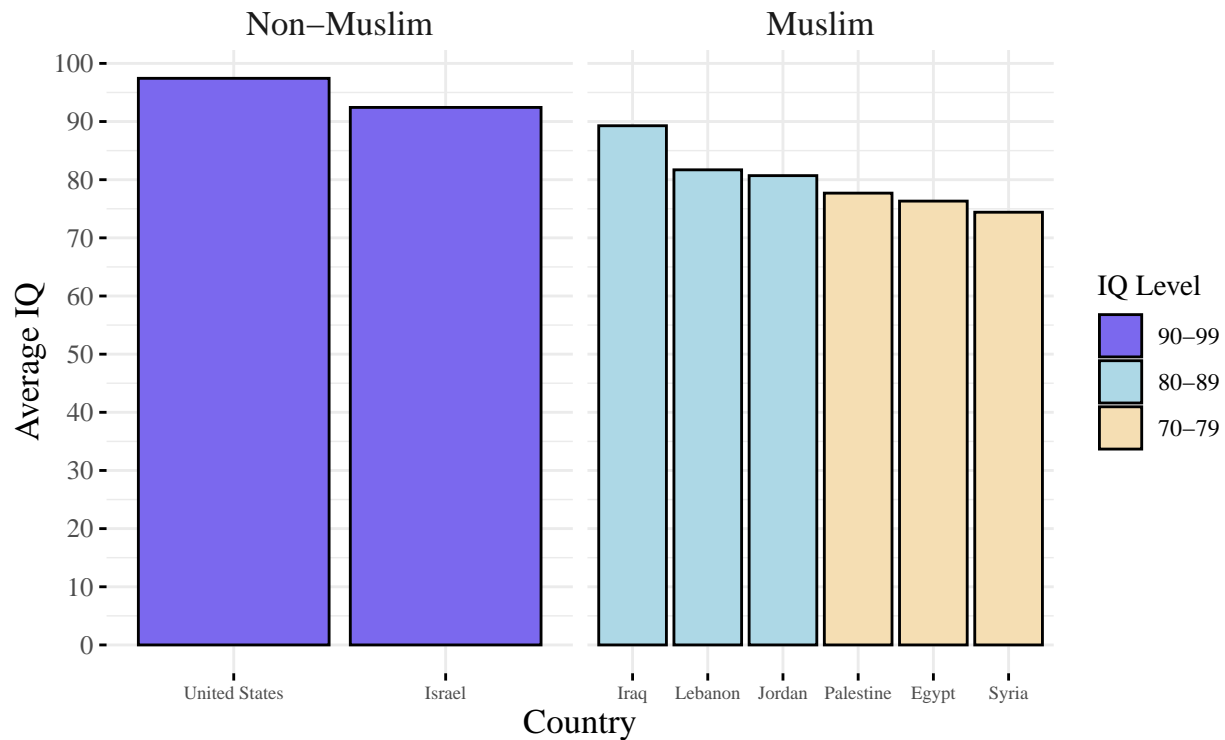
```r
  arrange(desc(`Average IQ`)) %>% # Sorting by descending IQ
  mutate(Color = sapply(`Average IQ`, iq_colors), # Apply the iq_colors function
         IQ_Range = sapply(`Average IQ`, iq_labels), # Apply the iq_labels function
         Category = factor(ifelse(Country %in% c("United States", "Israel"),
                                  "Non-Muslim", "Muslim"),
                           levels = c("Non-Muslim", "Muslim")))

# Ensure the order of factors in Country matches the descending IQ order
selected_countries_data$Country <- factor(selected_countries_data$Country,
                                          levels = selected_countries_data$Country)

# Graph their IQs with custom colors and relative text sizing
ggplot(selected_countries_data, aes(x = Country, y = `Average IQ`,
                                    fill = IQ_Range)) +
  geom_bar(stat = "identity", color = "#000000") +
  scale_fill_manual(values = setNames(as.character(selected_countries_data$Color),
                                      selected_countries_data$IQ_Range),
                    name = "IQ Level") +
  guides(fill = guide_legend(reverse = TRUE)) + # Reverse legend order
  labs(title = "IQ Scores of Participants in Arab-Israeli Conflict",
       x = "Country", y = "Average IQ",
       caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
  theme_minimal() +
  theme(text = element_text(family = "serif"),
        axis.text.x = element_text(hjust = 0.5, size = rel(0.8)),  # x-axis label
        axis.text.y = element_text(size = rel(1.1)), # y-axis label
        axis.title.x = element_text(size = rel(1.2)), # x-axis title
        axis.title.y = element_text(size = rel(1.2)), # y-axis title
        plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
        plot.caption = element_text(hjust = 0.5, size = rel(0.8)),# Center caption
        strip.text = element_text(size = rel(1.2)), # facet titles
        axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
        axis.ticks.y = element_line(color = "black")) + # Add black ticks on y-axis
  scale_y_continuous(breaks = seq(0, 100, by = 10)) + # y-axis ticks
  facet_wrap(~ Category, scales = "free_x") # Split graph into two categories
```

IQ Scores of Participants in Arab–Israeli Conflict

Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.

Compare IQ in Countries Involved in Russo-Ukrainian War

```r
# Define the grouping of countries and prepare the data
selected_countries_data <- avgIQpercountry %>%
  filter(Country %in% c("Russia", "Syria", "Belarus", "Ukraine", "United States",
                        "United Kingdom", "Germany", "France", "Poland",
                        "Canada", "Turkey", "Estonia", "Latvia", "Lithuania",
                        "Moldova", "Hungary", "Slovakia")) %>%
  mutate(Country = gsub("Turkey", "Türkiye", Country)) %>% # Replace Turkey with Türkiye
  select(Country, `Average IQ`) %>%
  arrange(desc(`Average IQ`)) %>% # Sorting by descending IQ
  mutate(Color = sapply(`Average IQ`, iq_colors), # Apply the iq_colors function
         IQ_Range = sapply(`Average IQ`, iq_labels), # Apply the iq_labels function
         Category = factor(ifelse(Country %in% c("Russia", "Belarus", "Syria"),
                                  "Allied with Russia", "European Union/NATO"),
                           levels = c("Allied with Russia", "European Union/NATO")))

# Ensure the order of factors in Country matches the descending IQ order
selected_countries_data$Country <- factor(selected_countries_data$Country,
                                          levels = selected_countries_data$Country)

# Graph their IQs with custom colors and relative text sizing
ggplot(selected_countries_data, aes(x = Country, y = `Average IQ`,
                                    fill = IQ_Range)) +
  geom_bar(stat = "identity", color = "#000000") +
  scale_fill_manual(values = setNames(as.character(selected_countries_data$Color),
```
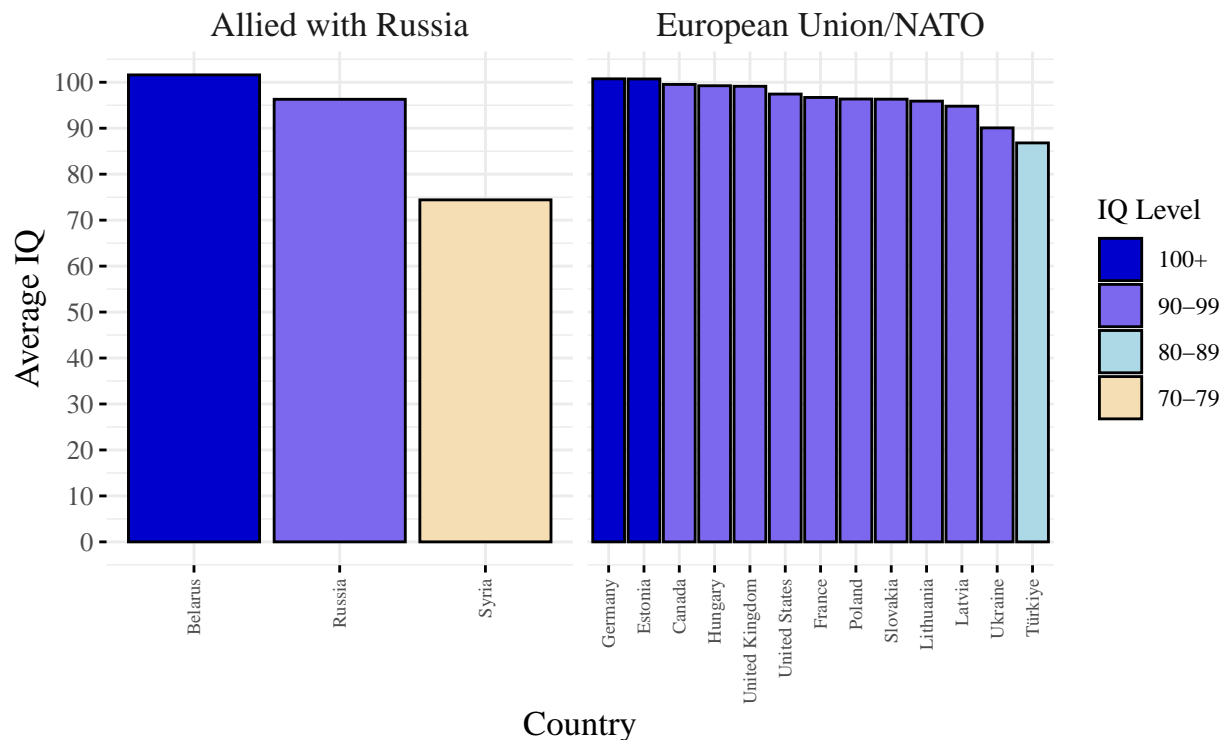
```
                                    selected_countries_data$IQ_Range),
                name = "IQ Level",
                breaks = c("100+", "90-99", "80-89", "70-79")) + # Order legend
guides(fill = guide_legend(reverse = FALSE)) + # Maintain specified order
labs(title = "IQ Scores of Countries in the Russo-Ukrainian War",
    x = "Country", y = "Average IQ",
    caption = "Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.") +
theme_minimal() +
theme(text = element_text(family = "serif"),
    axis.text.x = element_text(angle = 90, hjust = 1,
                                vjust = .5, size = rel(0.8)), # x-axis label
    axis.text.y = element_text(size = rel(1.1)), # y-axis label
    axis.title.x = element_text(size = rel(1.2)), # x-axis title
    axis.title.y = element_text(size = rel(1.2)), # y-axis title
    plot.title = element_text(hjust = 0.5, size = rel(1.5)), # Center title
    plot.caption = element_text(hjust = 0.5, size = rel(0.8)), # Center caption
    strip.text = element_text(size = rel(1.2)), # facet titles
    axis.ticks.x = element_line(color = "black"), # Add black ticks on x-axis
    axis.ticks.y = element_line(color = "black")) + # Add black ticks on y-axis
scale_y_continuous(breaks = seq(0, 100, by = 10)) + # y-axis ticks
facet_wrap(~ Category, scales = "free_x") # Split graph into two categories
```


Source: Kaggle/ Google LLC (2023) Average Global IQ per Country with Other Stats.