

Lab 1

0.1 Overview

Note

To complete this lab, you will need:

- access to the shared posit.cloud space for this course (link in Brightspace)
- a quarto.pub account (free)
- GitHub Copilot account approved and enabled in posit.cloud

Go to the shared posit.cloud workspace for this class and open the **Labs** project. Open the `lab01.qmd` file and complete the exercises. Below is an annotated guide to assist you. There is also a video in the Brightspace Todo section for this module.

We will be using the `gapminder` data for this lab so let's start by loading the tidyverse family of packages and gapminder. Since this is more of a report, we'll also be using the `message: false` option to suppress the output message from loading `tidyverse`.

```
```{r}
#| message: false
library(tidyverse)
library(gapminder)
```
```

0.2 Exercises

There are seven exercises in this lab. Grading is shown in Section [0.3](#) at the end of the document.

0.2.1 Exercise 1

Using `ggplot` plot the changes in life expectancy over time for the US, Japan, and Russia. Use a line plot. The geom is `geom_line()`

First, let's `glimpse()` the data to remind us what it looks like.

```
glimpse(gapminder)
```

```
Rows: 1,704
```

```
Columns: 6
```

```
$ country <fct> "Afghanistan", "Afghanistan", "Afghanistan", "Afghanistan", ~
$ continent <fct> Asia, Asia, Asia, Asia, Asia, Asia, Asia, Asia, Asia, Asia, ~
$ year <int> 1952, 1957, 1962, 1967, 1972, 1977, 1982, 1987, 1992, 1997, ~
$ lifeExp <dbl> 28.801, 30.332, 31.997, 34.020, 36.088, 38.438, 39.854, 40.8~
$ pop <int> 8425333, 9240934, 10267083, 11537966, 13079460, 14880372, 12~
$ gdpPercap <dbl> 779.4453, 820.8530, 853.1007, 836.1971, 739.9811, 786.1134, ~
```

Next, let's check the correct spelling of each country to see how we should reference them, remember that country names may have changed over time (e.g., USSR -> Russia and other countries). We can use the `pull()` function so we don't get pages of output for a single column and can easily see the names.

```
gapminder |>
  distinct(country) |>
  pull()
```

| | | |
|-------------------------------|-------------------|------------|
| [1] Afghanistan | Albania | Algeria |
| [4] Angola | Argentina | Australia |
| [7] Austria | Bahrain | Bangladesh |
| [10] Belgium | Benin | Bolivia |
| [13] Bosnia and Herzegovina | Botswana | Brazil |
| [16] Bulgaria | Burkina Faso | Burundi |
| [19] Cambodia | Cameroon | Canada |
| [22] Central African Republic | Chad | Chile |
| [25] China | Colombia | Comoros |
| [28] Congo, Dem. Rep. | Congo, Rep. | Costa Rica |
| [31] Cote d'Ivoire | Croatia | Cuba |
| [34] Czech Republic | Denmark | Djibouti |
| [37] Dominican Republic | Ecuador | Egypt |
| [40] El Salvador | Equatorial Guinea | Eritrea |

| | | | |
|-------|-----------------------|------------------|---------------|
| [43] | Ethiopia | Finland | France |
| [46] | Gabon | Gambia | Germany |
| [49] | Ghana | Greece | Guatemala |
| [52] | Guinea | Guinea-Bissau | Haiti |
| [55] | Honduras | Hong Kong, China | Hungary |
| [58] | Iceland | India | Indonesia |
| [61] | Iran | Iraq | Ireland |
| [64] | Israel | Italy | Jamaica |
| [67] | Japan | Jordan | Kenya |
| [70] | Korea, Dem. Rep. | Korea, Rep. | Kuwait |
| [73] | Lebanon | Lesotho | Liberia |
| [76] | Libya | Madagascar | Malawi |
| [79] | Malaysia | Mali | Mauritania |
| [82] | Mauritius | Mexico | Mongolia |
| [85] | Montenegro | Morocco | Mozambique |
| [88] | Myanmar | Namibia | Nepal |
| [91] | Netherlands | New Zealand | Nicaragua |
| [94] | Niger | Nigeria | Norway |
| [97] | Oman | Pakistan | Panama |
| [100] | Paraguay | Peru | Philippines |
| [103] | Poland | Portugal | Puerto Rico |
| [106] | Reunion | Romania | Rwanda |
| [109] | Sao Tome and Principe | Saudi Arabia | Senegal |
| [112] | Serbia | Sierra Leone | Singapore |
| [115] | Slovak Republic | Slovenia | Somalia |
| [118] | South Africa | Spain | Sri Lanka |
| [121] | Sudan | Swaziland | Sweden |
| [124] | Switzerland | Syria | Taiwan |
| [127] | Tanzania | Thailand | Togo |
| [130] | Trinidad and Tobago | Tunisia | Turkey |
| [133] | Uganda | United Kingdom | United States |
| [136] | Uruguay | Venezuela | Vietnam |
| [139] | West Bank and Gaza | Yemen, Rep. | Zambia |
| [142] | Zimbabwe | | |

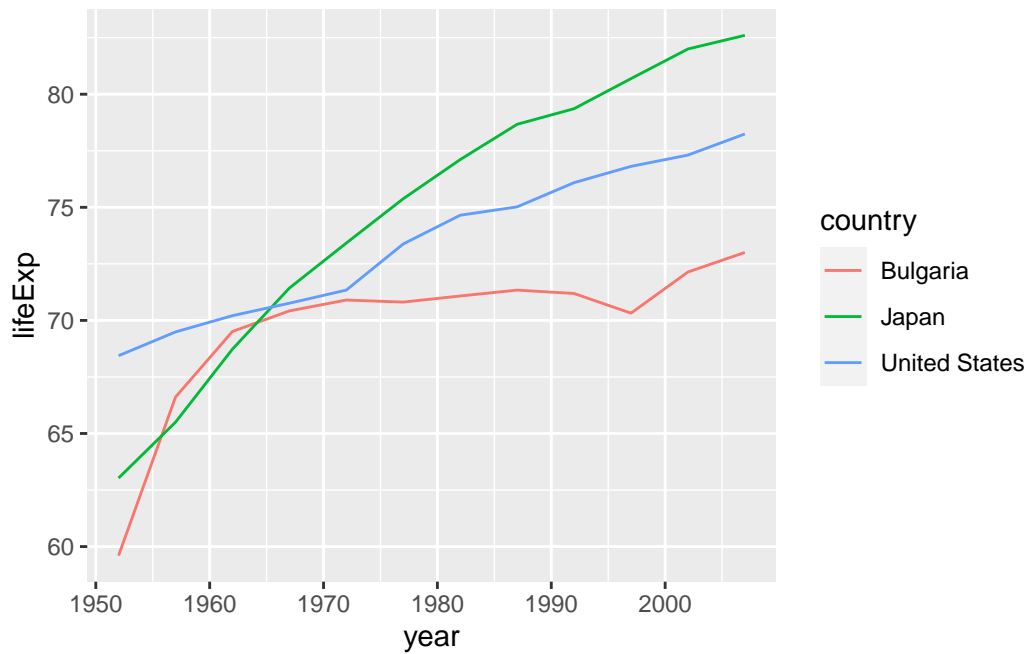
142 Levels: Afghanistan Albania Algeria Angola Argentina Australia ... Zimbabwe

It looks like Russia isn't included in the dataset. Instead of Russia, we'll examine Bulgaria, Japan, United States. We'll create a new tibble called `three_countries` to store our restricted data. Since we are looking at life expectancy changes over time, the three columns we'll need are `country`, `year`, and `lifeExp`.

```
three_countries <- gapminder |>
  select(country, year, lifeExp) |>
  filter(country %in% c("Bulgaria", "Japan", "United States"))
```

Now we can use `ggplot` to create our chart.

```
three_countries |>
  ggplot(aes(x = year, y = lifeExp)) +
  geom_line(aes(color = country))
```

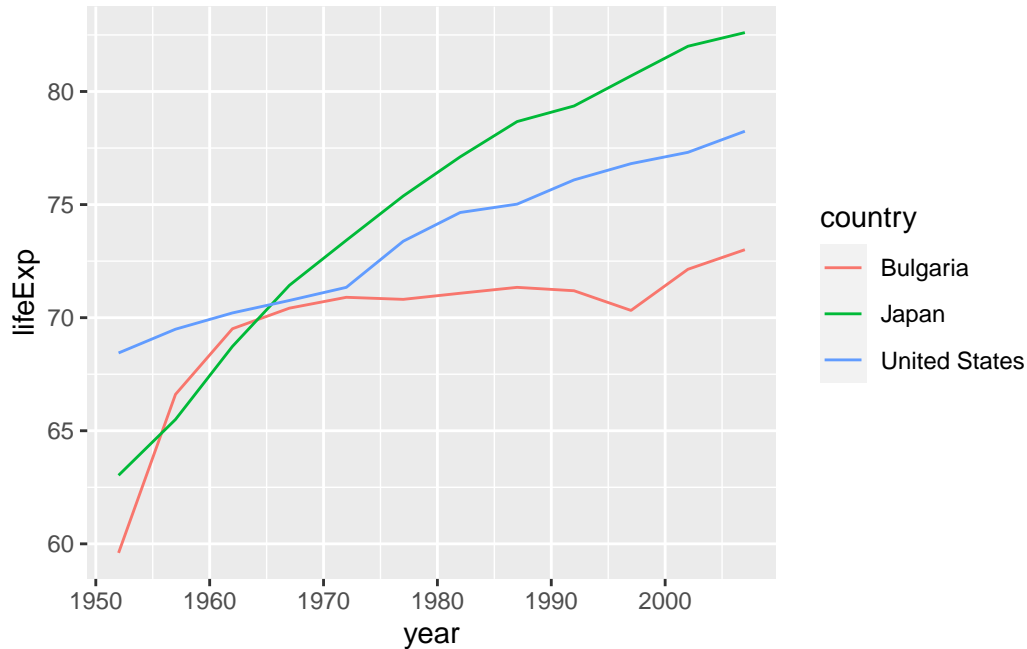


0.2.2 Exercise 2

Modify the code below to add a title to the plot, create a more meaningful y-axis label, and use `theme_minimal()` to change the theme of the plot.

Refer to the [Getting Started](#) chapter, which is when we first labeled the axes and added a title to plots.

```
three_countries |>
  ggplot(aes(x = year, y = lifeExp)) +
  geom_line(aes(color = country))
```



0.2.3 Exercise 3

In the empty code chunk below, create the same graphic using three new countries of your choosing. Set the chunk option to render the plot, but not the code.

```
# insert code here
```

0.2.4 Exercise 4

Try to recreate the plot **and the linked reference to it** shown below.

You can see in Figure 1 that Bulgaria's life expectancy increase slowed starting in the mid 1960s.

💡 Hints

- use the chunk option `fig-cap: "Write your caption here"` to replicate the caption towards the bottom of the plot.
- use the chunk option `label: fig-unique_label_name` to make a label that becomes cross-referenceable. Ideally, `unique_label_name` should be something unique and meaningful like `three_country_life_exp`. The `fig-` prefix is required

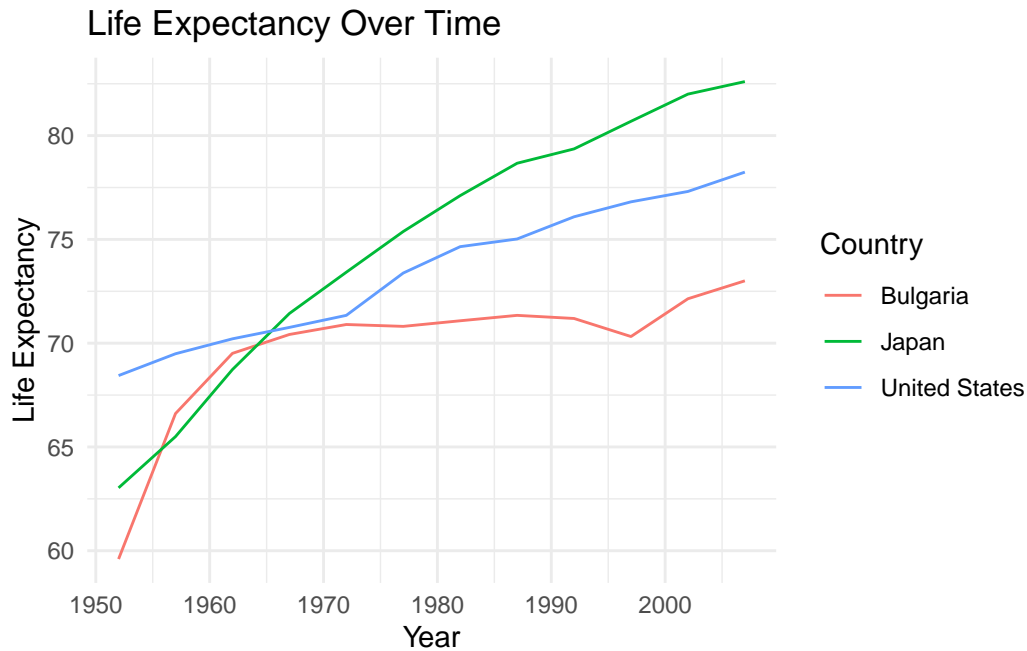


Figure 1: Life expectancy trend - Bulgaria, Japan, United States

to properly cross reference figures.

- After the code chunk with the label has been run or rendered, in the visual editor, you should be able to select Insert -> Cross Reference to place it in the narrative text. It will default as link to “Figure 1” which is the first labeled figure in the document.

```
# insert code here
```

0.2.5 Exercise 5

Copilot doesn't suggest completions when in Visual mode.

Insert a code chunk below using **Insert -> Executable Cell -> R** in the visual editor, then switch to Source mode.

While in source mode, type the following comment line: `# Create a plot of life expectancy over time for the United States and Portugal.`

In the narrative below the plot, describe how well Copilot did.

0.2.6 Exercise 6

In the YAML section at the top of the document, replace the author's name with your own.

0.2.7 Exercise 7

Publish your document to quarto.pub and copy/paste the link to the Lab 1 assignment in Brightspace.

0.3 Grading

| Exercise | Points |
|--------------|--------|
| Exercise 1 | 10 |
| Exercise 2 | 10 |
| Exercise 3 | 10 |
| Exercise 4 | 10 |
| Exercise 5 | 10 |
| Exercise 6 | 10 |
| Exercise 7 | 40 |
| Total | 100 |