Week 2/3 Programming Workbook for R

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1 In-class Practice Questions

1.1 Functions

Exercise 1. Create a function that converts Fahrenheit to Kelvin. The conversion is as follows:

$$(\texttt{degrees in kelvin}) = (\texttt{degrees in Fahrenheit} - 32) \times \frac{5}{9} + 273.15$$

Exercise 2. Create a function that converts Kelvin to Celsius. The conversion is as follows:

$$(\texttt{degrees in Celsius}) = (\texttt{degrees in Kelvin}) - 273.15$$

1.2 Getting to know the data

Exercise 1. Load the GDP per capita data into R

Exercise 2. What is the richest country?

Exercise 3. What is the poorest country?

Exercise 4. What is the mean GDP per capita? (without considering the size of each country)

Exercise 5. Load the HIV prevalence data into R

Exercise 6. What is the maximum rate? What country is it?

Exercise 7. What is the minimum reported rate? What country is it?

1.3 Working with the Data

Exercise 1. Both datasets include a variable named "country". Can we combine the two variables by country?

Exercise 2. What does the distribution of GDP per capita look like?

Exercise 3. Generate a dataset of natural logarithm of GDP per capita and see if this approximates a normal distribution better

Exercise 4. What about the distribution of HIV prevalence?

Exercise 5. Generate a natural logartihm HIV prevalence rate

Exercise 6. Are HIV prevalence and GDP per capital correlated?

1.4 Visualizing the data using `ggplot`

Exercise 1. Create a scatter plot with GDP per capita on the x axis and HIV prevalence on the y axis

Exercise 2. Add a linear fit to the plot

Exercise 3. Add a title to the plot

Exercise 4. Create a better label for the x and y axes

Exercise 5. Add labels for each country

2 Weekly Challenges (30pts) Due by 01/19, 11:59pm

For the submission method, please look at Appendix.

2.1 (10pts) Problem 1. Writing a function

Create a function `fahr2Cel` that converts Fahrenheit to Celsius

2.2 (10pts) Problem 2. Modifying the graph

Using the gapminder data we used on Monday's class, modify the color and size of the points on the point layer in the previous example. `HINT`: do not use the aes function.

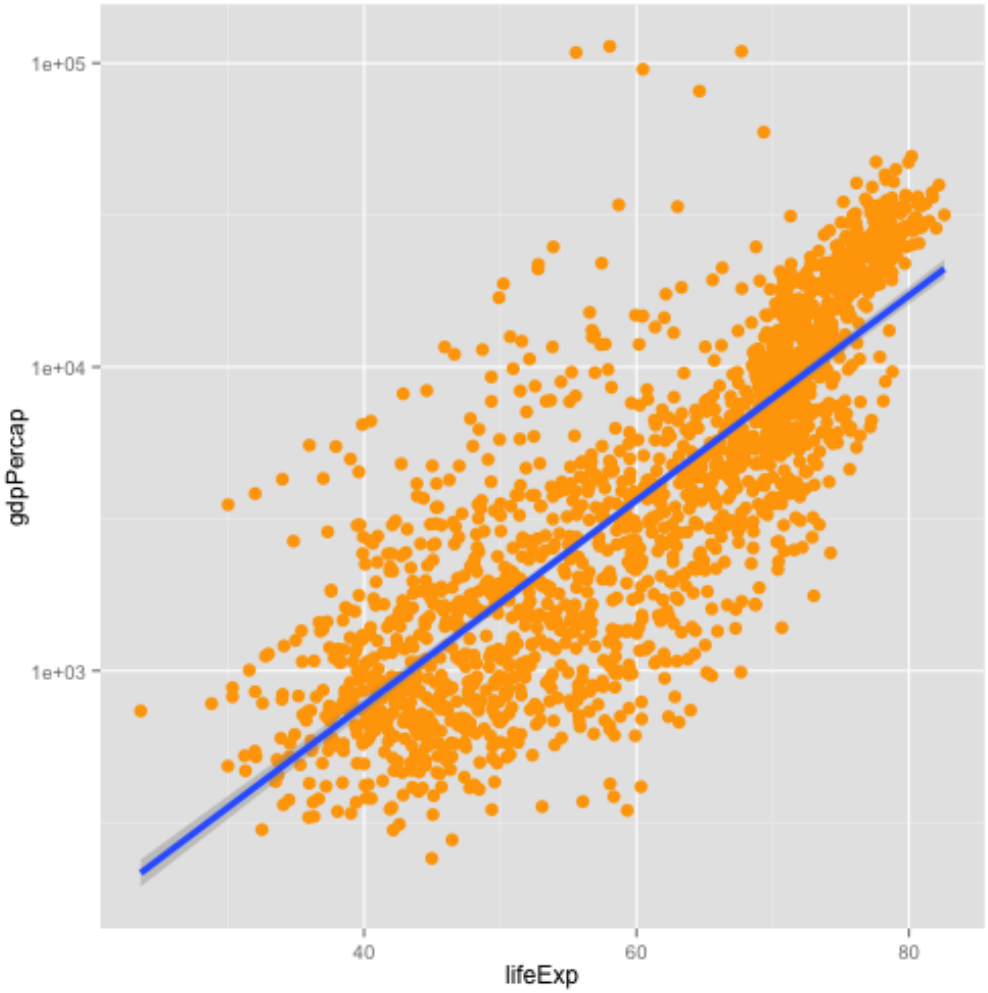

Figure 1: Target plot

2.3 (10pts) Problem 3. Creating an area graph

Using the gapminder data we used on Monday's class, create a density plot of GDP per capita, filled by continent that looks like the following: `NOTE`: Transform the x axis to better visualise the data spread. - Add a facet layer to panel the density plots by year.

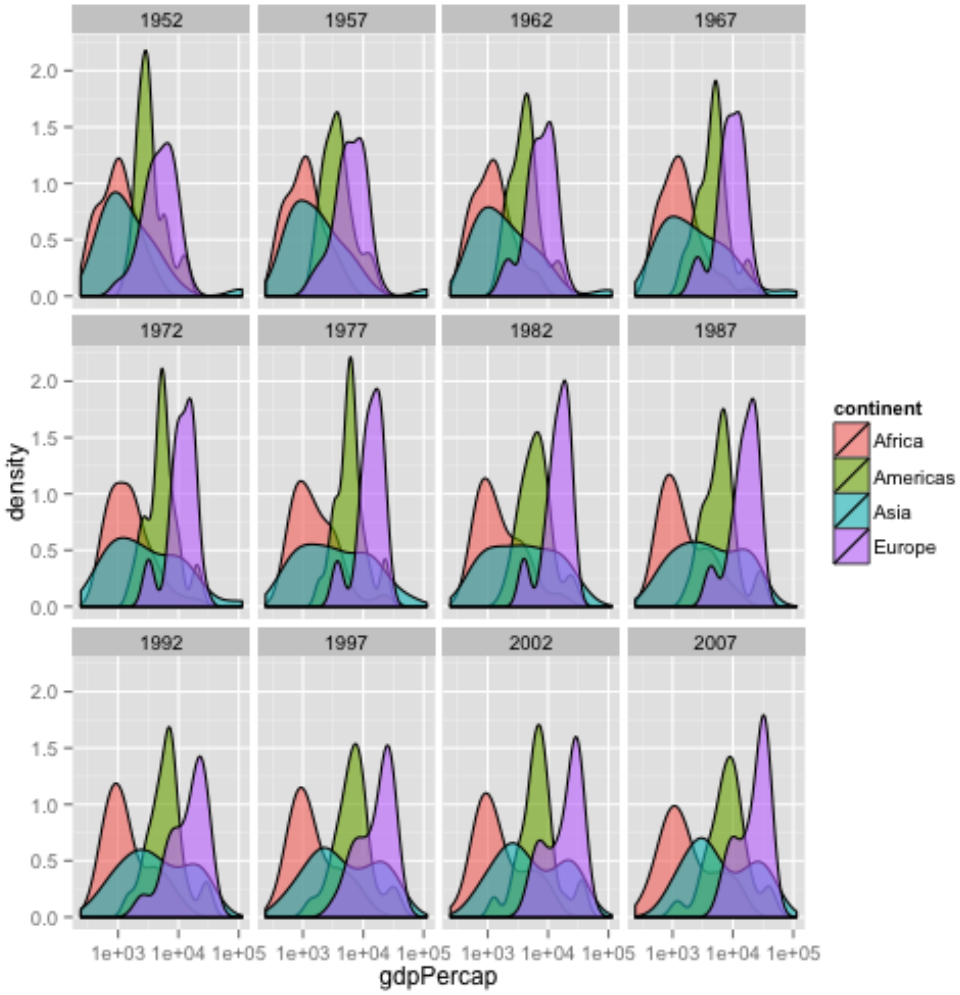

Figure 2: Target plot

APPENDIX

How to submit your challenge solutions:

(1) Create an .r file for each problem: `w2p1.r` for Problem 1, `w2p2.r` for Problem2 and `w2p3.r` for Problem3.

(2) Type the solution in the script file.

(3) `NOTE`: No need for writing an extra `print()` function at this time.

(4) Save the script file.

(5) Attach all three files as well as two image files (`w2p2.png`, `w2p3.png`) of the two graphs you created and send an email to `challenges.gps.programming.ta@gmail.com`. `NOTE`: Please use the same email address throughout the quarter (your email address will be the key for you to findout the grades for the assignments)