CS 567
Computational Statistics
Project 1 - User Manual

Life Insurance Using R

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1 Introduction

Our first project is an implementation of some formulas used by insurance companies to set prices for the products they sale. The implementation uses the R language. It reads the input data from external files (.csv and .txt) in order to allow the end user to manipulate them easily. The implementation produces two types of output: numerical and graphical to give more flexibility to the user on how to analyze the results.

2 Getting Started

2.1 Prerequisites

2.1.1 Technical Skills

Running our scripts does not require any programming skills. However, the following skills are necessary:

- basic knowledge on how to operate a computer

- advanced knowledge in statistics in order to interpret the results

2.1.2 Software

- R

  In order to run our R scripts, R must be preinstalled on the system. If R is not present on the system, please download and install it from the following link https://cran.r-project.org/. It is free and available for Windows, Mac and Linux platforms.

  NOTICE: R is a very unstable language, therefore bugs are to be expected when running R scripts. However, to reduce the chances to get into these issues, we recommend to select a CRAN Mirror from the University of California, Berkeley when downloading R or any other R packages.

- RStudio

  After installing R, download and install the latest version of RStudio
  from the following link https://www.rstudio.com/products/rstudio/download/.
  It is free and available for Windows, Mac and Linux platforms. RStudio
  is a user friendly graphical user interface (GUI) that makes writing and
  running R scripts easier.

2.2   Open the scripts in RStudio

The scripts come in a zip file named "R.zip." Unzip this file, then copy or
cut the resulting "R" folder and paste it into the "Documents" folder.

Notice: It is important that the "R" folder is being placed into the "Documents"
folder, otherwise R will not be able to find the input files when the scripts
are executed.
To load the scripts in RStudio, two methods can be considered:

- From outside RStudio

  - open the 'R' folder

  - double click on any of the file with the ".R" extension to see its
  content in RStudio.
  There are 2 such files: "life_table.R" which contains the important
  formulas and "project1.R" where we call the formulas from the previous
  file, perform all the calculations and display the results.

- From inside RStudio

  - open RStudio from the Windows "start" menu or from the Desktop

  - select "File" on the upper left corner, then select "Open File"
  from the drop-down menu. Doing so will bring up a little windows.

  - from there, browse to the "Documents" Folder, then open the
  "R" folder, then select the ".R" file which you want to see the content
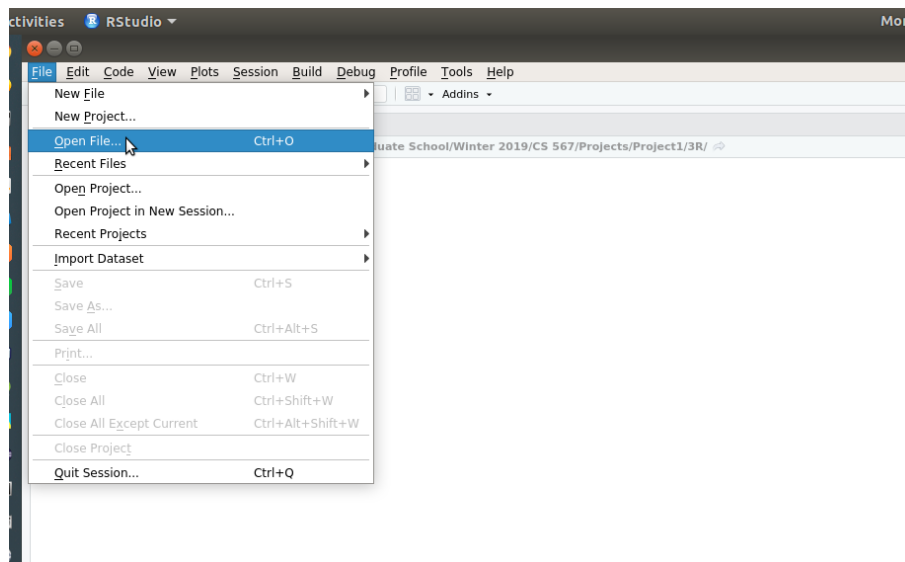 and click on "open"

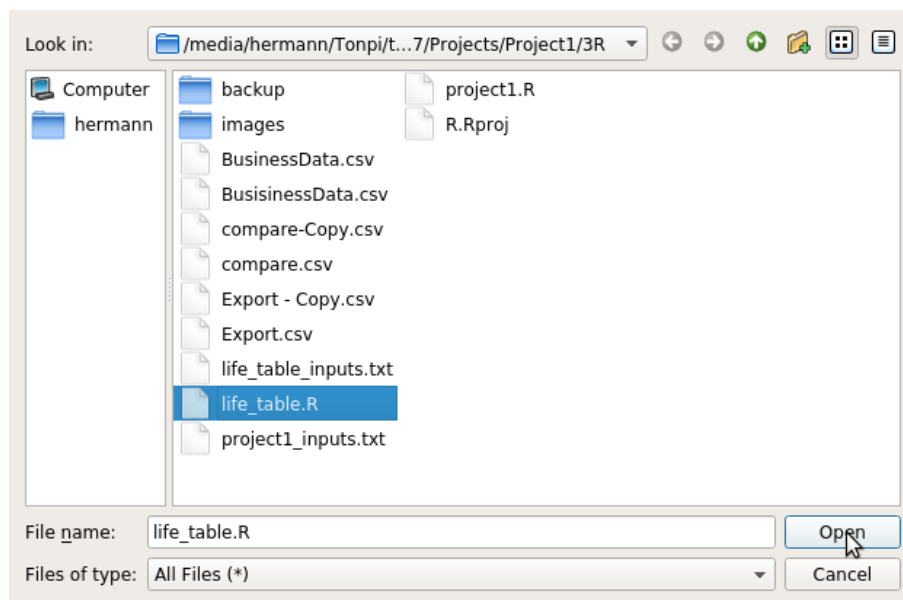Figure 1: "Open File" located in the "File" drop down menu

Figure 2: Browse to "R" directory and open ".R" files

2.3   Run the scripts

As we have mentioned in the previous section, there are two R scripts in the
"R" folder. The one that needs to be run is named "project1.R." This script
internally executes the second script called "life_table.R" and produces all
the expected results. So, to run the program and see the results, perform the
following steps:

- first load the "project1.R" file as described in the previous section

- select all the text in the editor either by pressing the keys "Alt + a"
  or by pressing and holding the left button of the mouse and dragging
  the cursor throughout the entire text.

- then select "run" as depicted on figure 3 below. Doing this will run the
  script and display all the results on the screen including all the graphs.
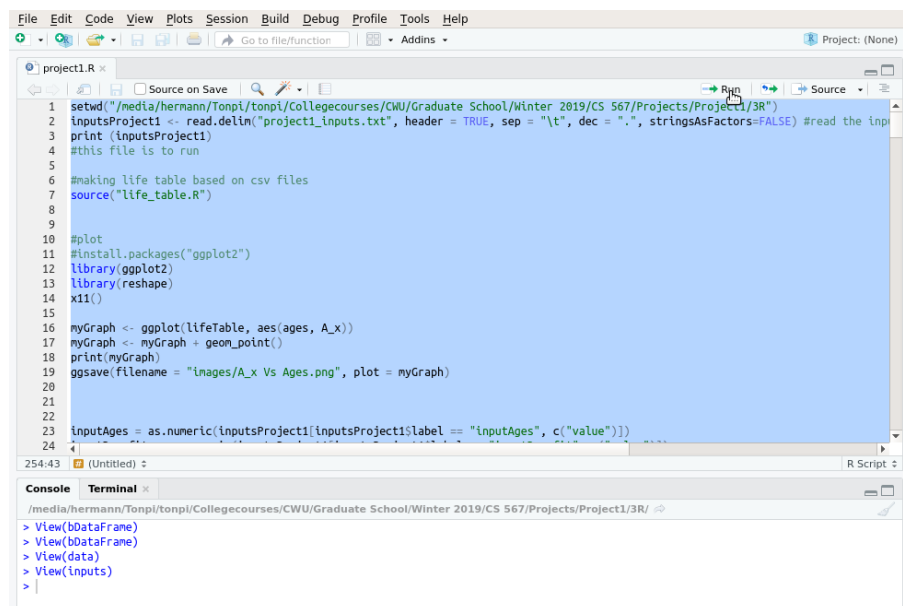
Figure 3: running the script

2.4   Additional Features

After running the script,

• you can get information about the data or input that was used by
navigating through the little "Data" window on the upper right corner
or the RStudio screen, and selecting the data which you need information
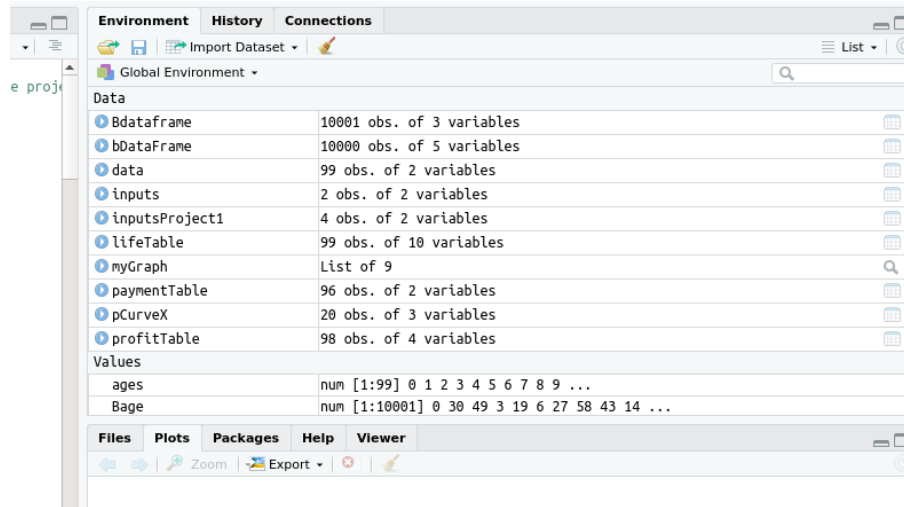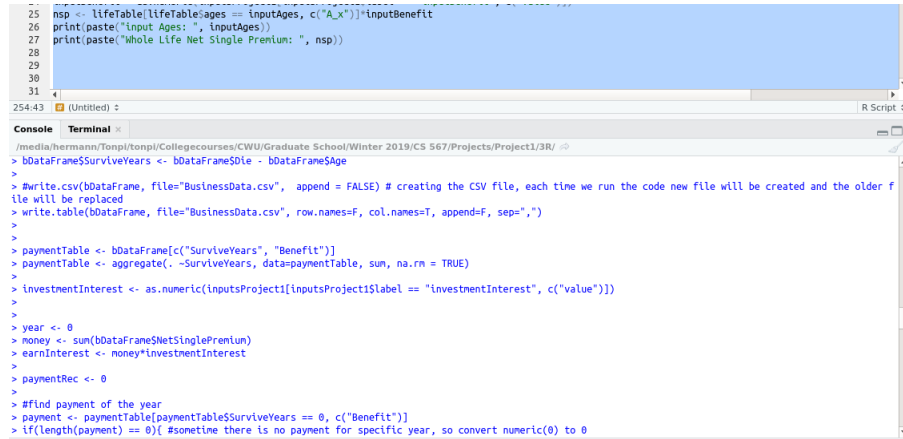about. (see figure 4.)

Figure 4: The Data window on the upper right corner of the screen

• you can see all the steps of the computations by checking the "Console"
window located at the bottom left corner of the RStudio screen. (see
figure 5.)

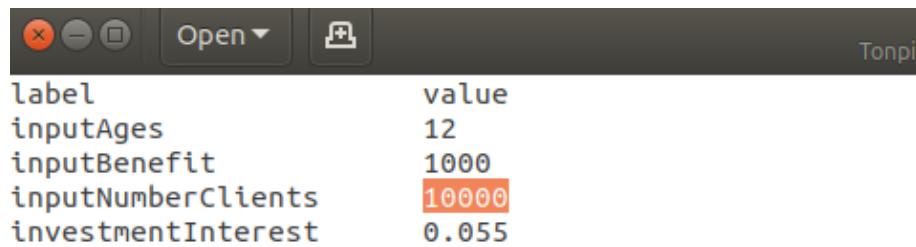Figure 5: The Console window at the lower left corner of the screen

2.5   Accessing the Images

After running the scripts, different plots will displayed on the screen automatically for visual analysis. However, copies of those images are also saved for later use in the "Images" directory inside the "R" folder. The user can access those copies at any time without having to run the scripts again.

3   Modify the inputs

All the inputs used in the scripts for all the calculations are read from text files (".txt" extension) present in the R directory. There are two such files, "life_table_inputs.txt" and "project1_inputs.txt" which contain inputs for the "life-table.R" and "project1.R" scripts respectively.

　　To modify the inputs, open the text file containing the information you wish to change, change the value without changing the label and save the file. This change will be observed after the next execution of the scripts.

Figure 6: "change input value

Notice: The highlighted value depicted on figure 6 is an example of a value that can be changed. The label in front of that value can not be changed, otherwise the script will not recognize the new label. If a value is changed, make sure to replace it with a new value of the same type (number, text etc...)