R Markdown

To Markdown or to not

Inspired by Professor Berardi

Introduction

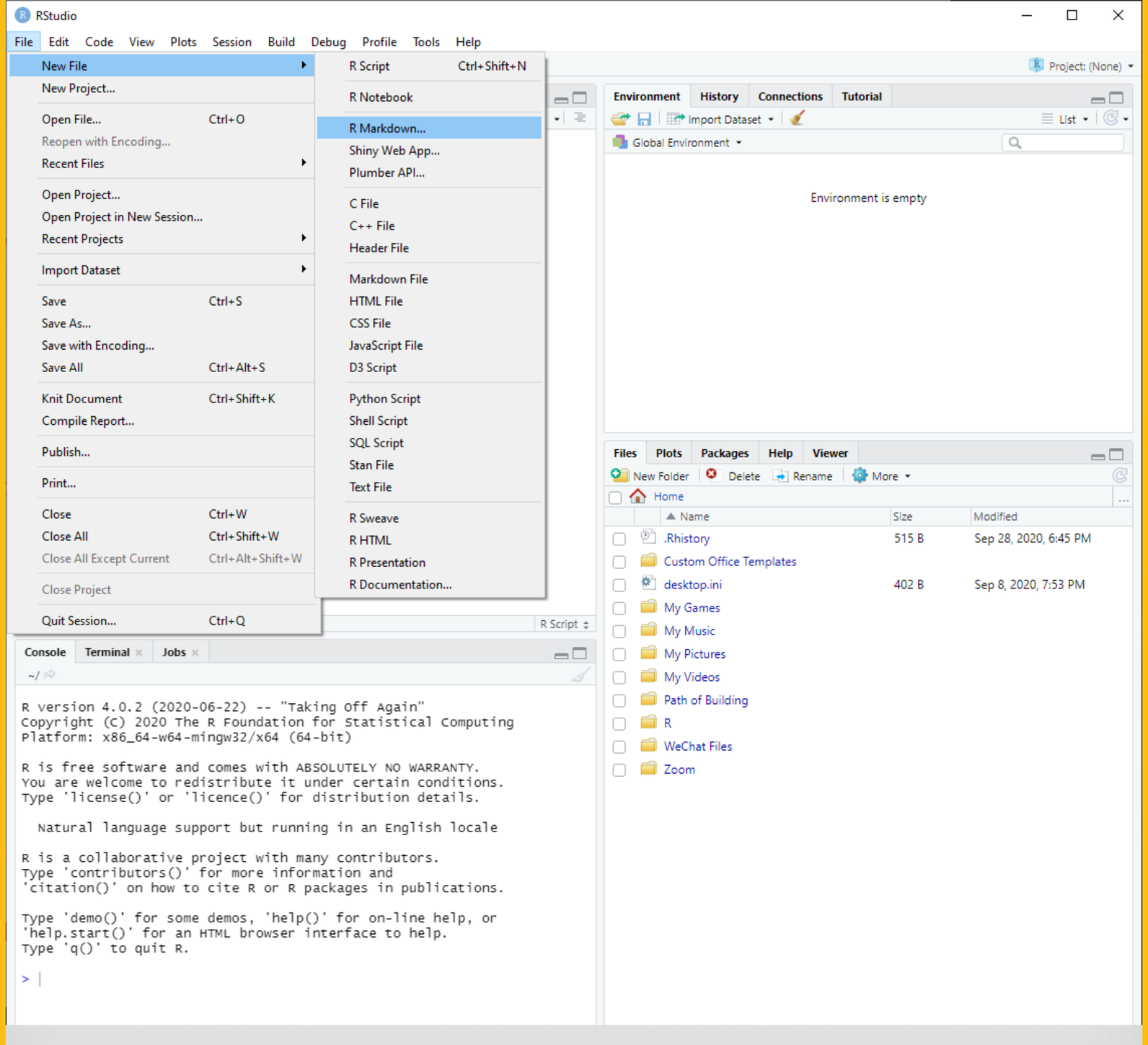
- Its FREE!!!!!!
- It does not make your coding easier.
- But it will make your code and data looking prettier.
- SO its and decoration tool to make your analysis report more readable in a way.

Real Introduction

- Its FREE!!!!!!
- Its an integrated tool to simultaneously run your code and generate more reader friendly and nice looking report.
- The output format of the report includes: HTML,PDF,MS words, you name it.
- Its different from R build markdown tool. Enough talk, let's see how it work.

Steps

1. Open your R studio
2. Run: install.packages("rmarkdown")
3. Exist your R studio
4. Open your R studio


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
New File
New Project...
Open File... Ctrl+O
Reopen with Encoding...
Recent Files
Open Project...
Open Project in New Session...
Recent Projects
Import Dataset
Save Ctrl+S
Save As...
Save with Encoding...
Save All Ctrl+Alt+S
Knit Document Ctrl+Shift+K
Compile Report...
Publish...
Print...
Close Ctrl+W
Close All Ctrl+Shift+W
Close All Except Current Ctrl+Alt+Shift+W
Close Project
Quit Session... Ctrl+Q
R Script Ctrl+Shift+N
R Notebook
R Markdown...
Shiny Web App...
Plumber API...
C File
C++ File
Header File
Markdown File
HTML File
CSS File
JavaScript File
D3 Script
Python Script
Shell Script
SQL Script
Stan File
Text File
R Sweave
R HTML
R Presentation
R Documentation...
Project: (None)
Environment History Connections Tutorial
Import Dataset
List
Global Environment
Environment is empty
Files Plots Packages Help Viewer
New Folder Delete Rename More
Home
Name Size Modified
.Rhistory 515 B Sep 28, 2020, 6:45 PM
Custom Office Templates
desktop.ini 402 B Sep 8, 2020, 7:53 PM
My Games
My Music
My Pictures
My Videos
Path of Building
R
WeChat Files
Zoom
R Script
Console Terminal Jobs
~/
R version 4.0.2 (2020-06-22) -- "Taking Off Again"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)
R is free software and comes with ABSOLUTELY NO WARRANTY.
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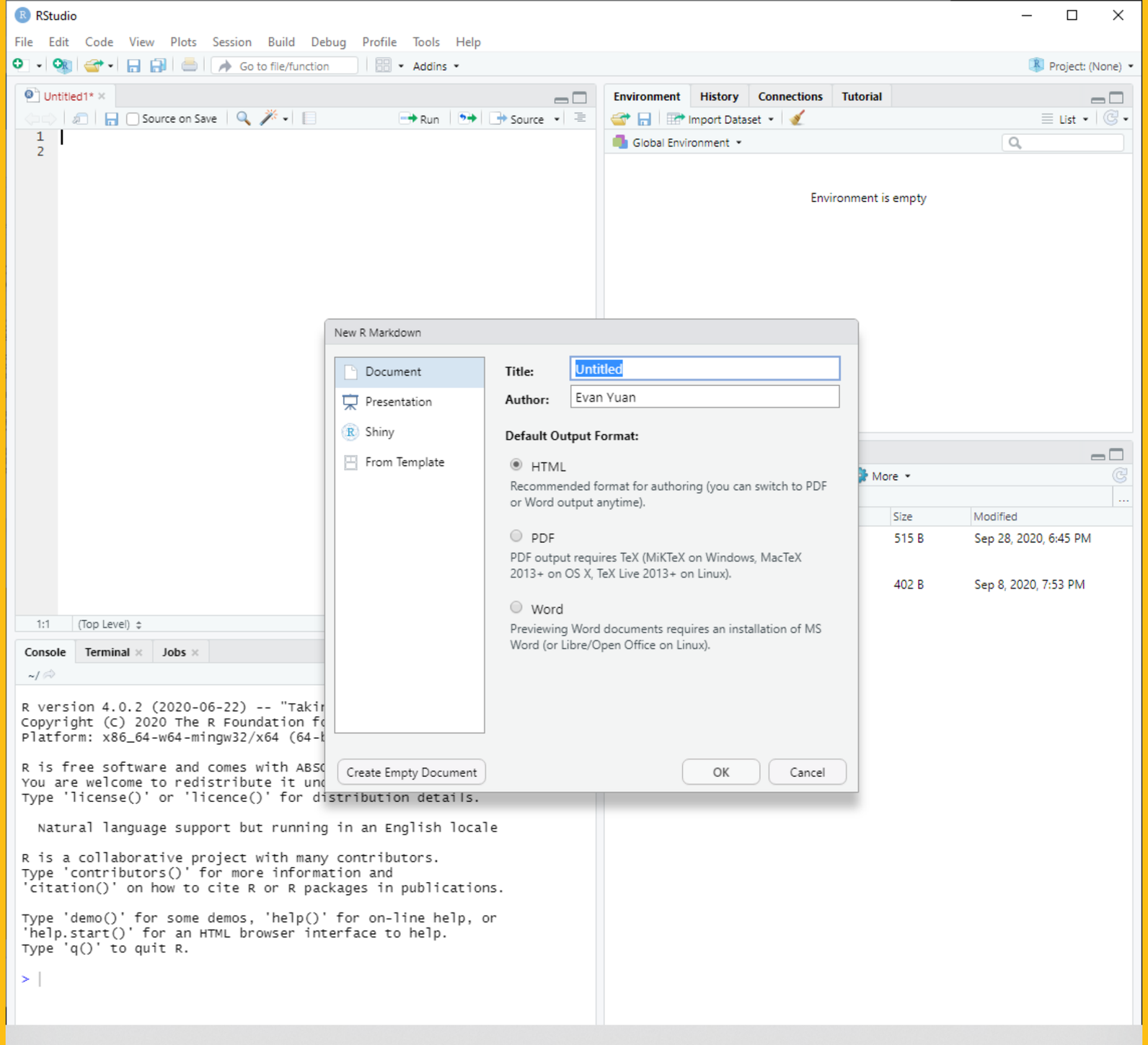
Type 'license()' or 'licence()' for distribution details.
Natural language support but running in an English locale
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
>


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
Project: (None)
Untitled1*
Source on Save
Run
Source
1
2
1:1
(Top Level)
Environment
History
Connections
Tutorial
Import Dataset
List
Global Environment
Environment is empty
New R Markdown
Document
Presentation
Shiny
From Template
Title:
Untitled
Author:
Evan Yuan
Default Output Format:
HTML
Recommended format for authoring (you can switch to PDF or Word output anytime).
PDF
PDF output requires TeX (MiKTeX on Windows, MacTeX 2013+ on OS X, TeX Live 2013+ on Linux).
Word
Previewing Word documents requires an installation of MS Word (or Libre/Open Office on Linux).
Create Empty Document
OK
Cancel
More
Size
Modified
515 B
Sep 28, 2020, 6:45 PM
402 B
Sep 8, 2020, 7:53 PM
Console
Terminal
Jobs
~/
R version 4.0.2 (2020-06-22) -- "Takin
Copyright (C) 2020 The R Foundation fo
Platform: x86_64-w64-mingw32/x64 (64-b
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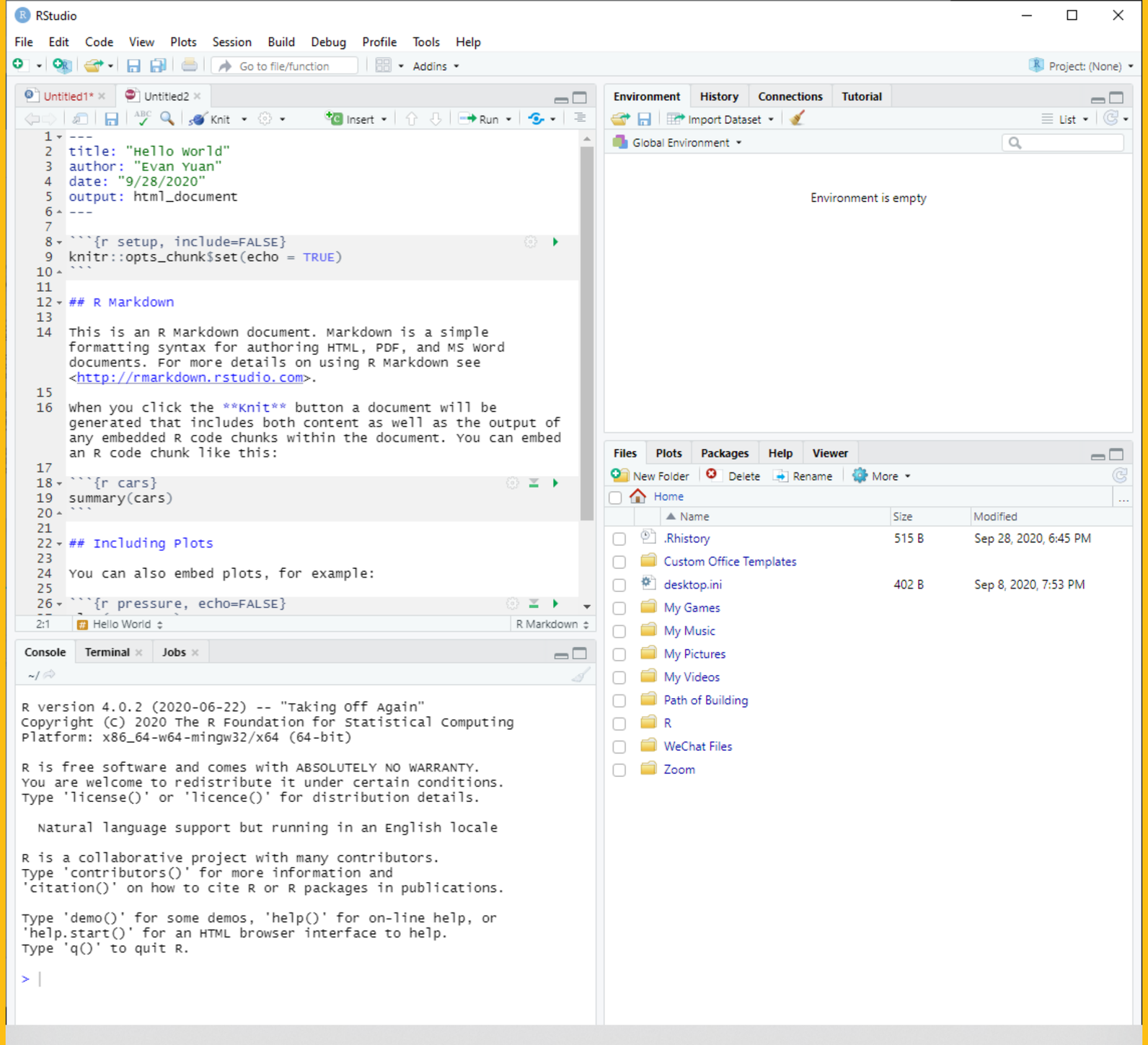
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
Project: (None)
Untitled1*
Untitled2
Knit
Insert
Run
1 ---
2 title: "Hello World"
3 author: "Evan Yuan"
4 date: "9/28/2020"
5 output: html_document
6 ---
7
8 ```{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.
15
16 When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:
17
18 ```{r cars}
19 summary(cars)
20 ```
21
22 ## Including Plots
23
24 You can also embed plots, for example:
25
26 ```{r pressure, echo=FALSE}
2:1
Hello World
R Markdown
Console
Terminal
Jobs
~/
R version 4.0.2 (2020-06-22) -- "Taking Off Again"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)
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Custom Office Templates
desktop.ini 402 B Sep 8, 2020, 7:53 PM
My Games
My Music
My Pictures
My Videos
Path of Building
R
WeChat Files
Zoom

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function | Addins | Project: (None)

Untitled1* | Untitled2*

Knit | Insert | Run

```
1  ---
2  title: "Hello World"
3  author: "Evan Yuan"
4  date: "9/28/2020"
5  output: html_document
6  ---
7
8  ```{r setup, include=FALSE}
9  knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ```{r cars}
13 print('Hello Worlds')
14 ```
15
16
17 ```{r pressure, echo=FALSE}
18 plot(pressure)
19 ```
20
21
```

19:1 | Chunk 3: pressure | R Markdown

Console | Terminal | Jobs

~/

```
  Natural language support but running in an English locale

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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> knitr::opts_chunk$set(echo = TRUE)
> summary(cars)
     speed           dist
 Min.   : 4.0   Min.   :  2.00
 1st Qu.:12.0   1st Qu.: 26.00
 Median :15.0   Median : 36.00
 Mean   :15.4   Mean   : 42.98
 3rd Qu.:19.0   3rd Qu.: 56.00
 Max.   :25.0   Max.   :120.00
> print('Hello Worlds')
[1] "Hello Worlds"
> plot(pressure)
>
```

Environment | History | Connections | Tutorial

Import Dataset | List

Global Environment

Environment is empty

Files | Plots | Packages | Help | Viewer

New Folder | Delete | Rename | More

Home

Name	Size	Modified
.Rhistory	515 B	Sep 28, 2020, 6:45 PM
Custom Office Templates		
desktop.ini	402 B	Sep 8, 2020, 7:53 PM
My Games		
My Music		
My Pictures		
My Videos		
Path of Building		
R		
WeChat Files		
Zoom		

C:/Users/evany/Desktop/School/CS510/R-Markdown-presentation.html

R-Markdown-presentation.html | Open in Browser | Find | Publish

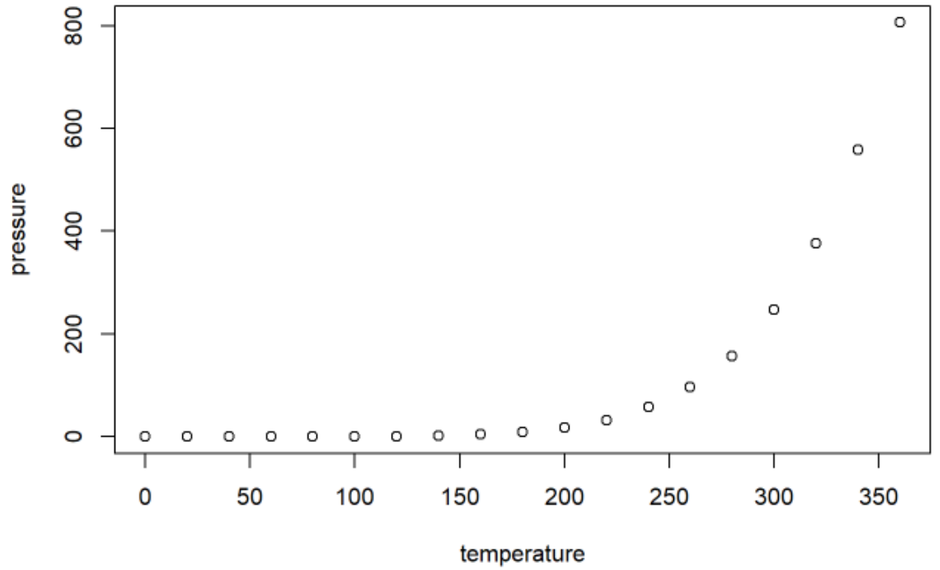
Hello World

Evan Yuan

9/28/2020

```
print('Hello Worlds')
```

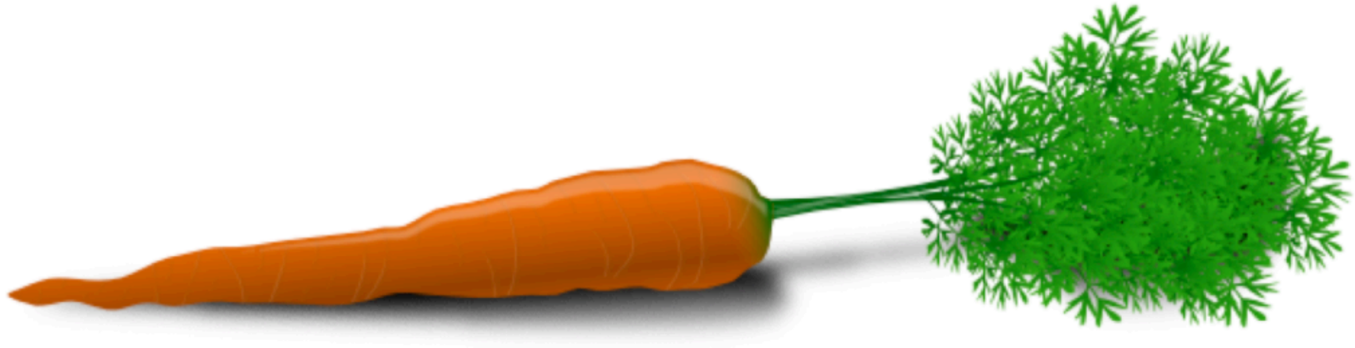
```
## [1] "Hello Worlds"
```



THANK YOU!

R Markdown Official Website:
https://rmarkdown.rstudio.com/index.html

R Markdown Official GitHub Location:
https://github.com/rstudio/rmarkdown



Caret

“Classification And Regression Training”

Jeremy Wayland: September 30, 2020

Overview

Types of Functionality Supported by Caret

- Data Visualization
- Data Pre-processing and Splitting
- Machine Learning Models
  - Classification and Regression
- Training and Parameter Tuning
- Performance Measurements
- And much more!

featurePlot()

- Main graphing function that is a wrapper for different *lattice* plots

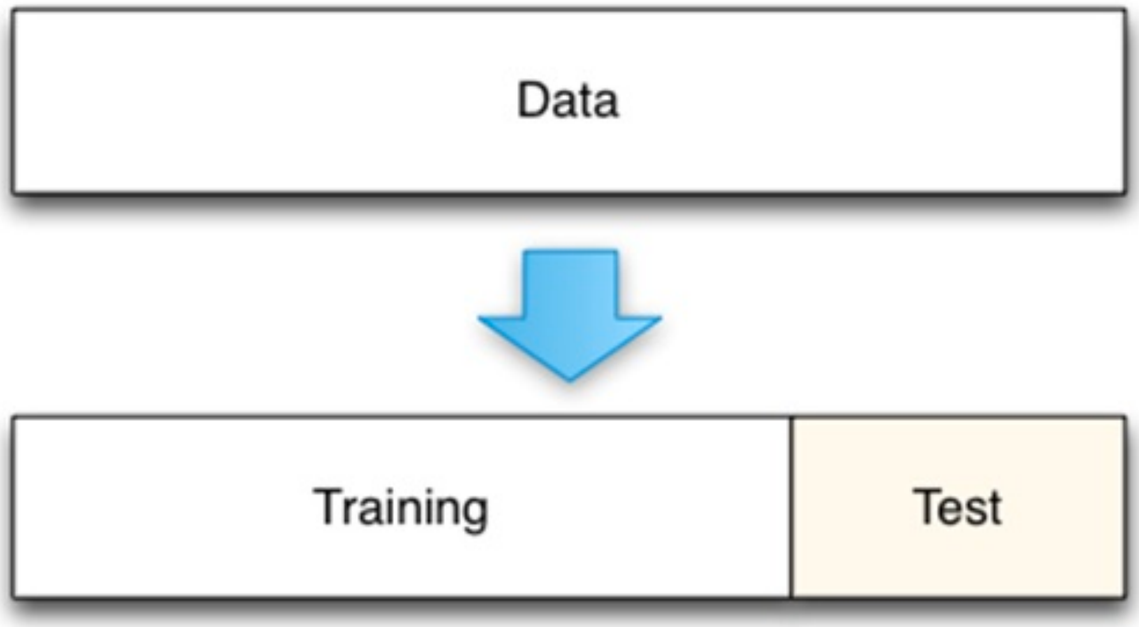
- Lets take a look at some data visualization used for the “Iris” dataset

preProcess()

- Centering
- Scaling
- Imputation
- Transforming Predictors

createDataPartition()

- Split your data via random sampling into training and test sets
  - Preserve the overall class distribution of data
- Other more nuanced splitting functions:
  - maxDissim (to split based on predictors)
  - createTimeSlices (For time series data)
  - groupKFold (Qualitative Grouping Considerations)



train() & predict()

- Train a specific model using a training dataset
- Use this model to predict and compare to your the actual values in your test dataset
- Lets look at the “ranger” implementation of a random forest model

Useful Documentation, Links and Tutorials

- https://cran.r-project.org/web/packages/caret/caret.pdf
- http://topepo.github.io/caret/visualizations.html
- http://www.rebeccabarter.com/blog/2017-11-17-caret_tutorial/
- https://cran.r-project.org/web/packages/lattice/lattice.pdf

MonteCarlo R Package

Daniel Briseno

September 28, 2020

Monte Carlo Simulation

What is Monte Carlo?

- Experiment simulation technique where a large amount of simulated experiments are carried out
- Each experiment is represented as a function whose inputs (akin to independent variables) are randomly sampled from a probability distribution
- Has many surprising applications

An Example, Monte Carlo Integration

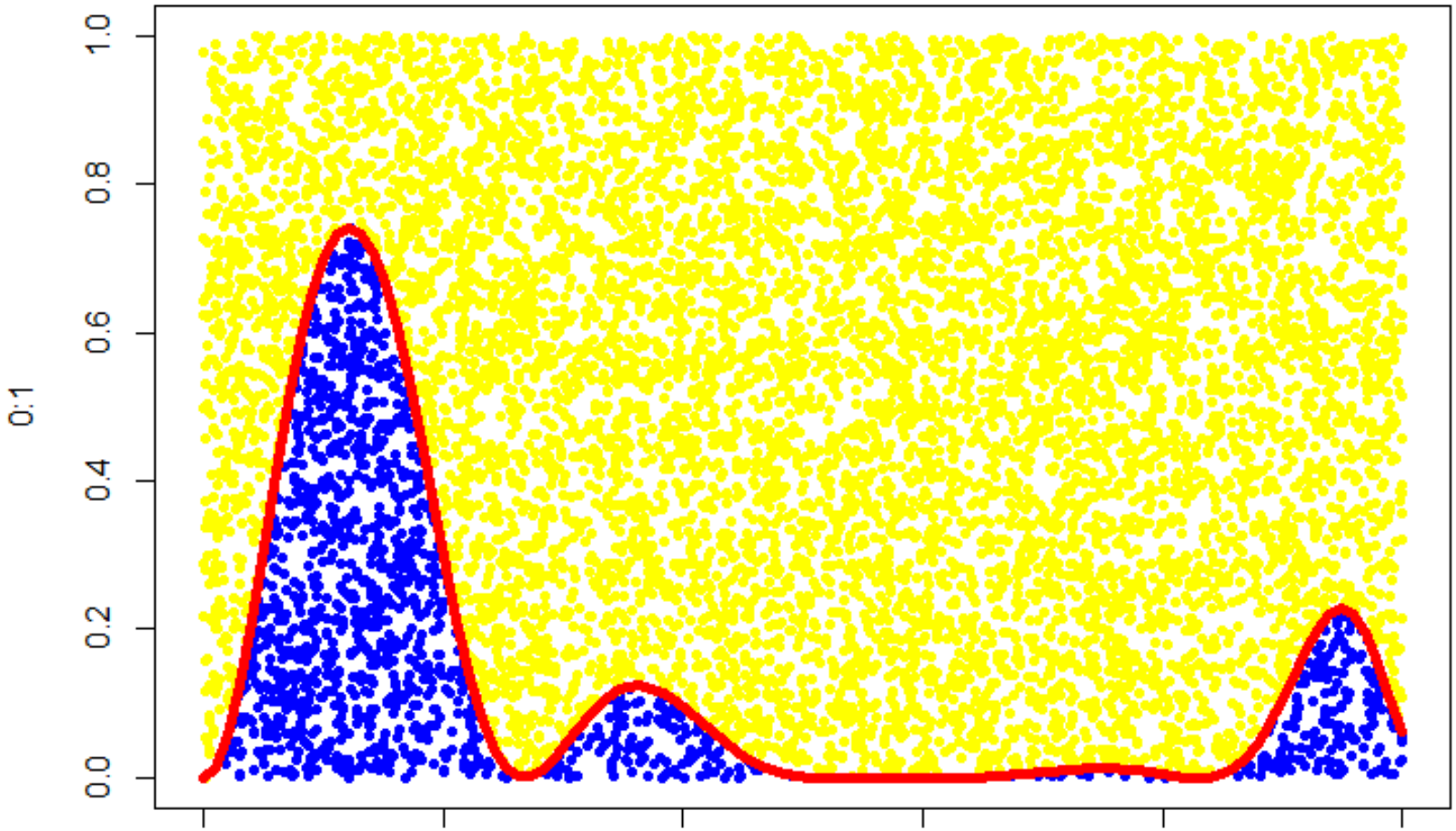
Monte Carlo Integration

- Suppose we would like to integrate

$$f(x) = \sin\left(\frac{\sin(5x^5 + 3x^3 - 12x)\cos(x^9 + 3x)}{(x^2+1)^2}\right)$$

- Usually the solution would be to cry and give up on your STEM career dreams
- Monte Carlo integration offers a better alternative

An Example, Monte Carlo Integration



The R Package MonteCarlo

Basic Overview

- MonteCarlo methods can be computationally expensive and difficult to implement
- MonteCarlo package does 3 things to mediate these problems:
    - Parallelizes MonteCarlo experiments to save on runtime
    - Does the heavy-lifting in implementing many experiments based off of a random distribution
    - Provides MakeFrame, MergeResults and MakeTable functions for easy data analysis

MonteCarlo()

```
MonteCarlo(func, nrep, param_list, ncpus = 1)
```

Parameters

- func: Function implementing experiment we would like to run. Must satisfy two conditions:
  1. Must take scalar arguments only
  2. Must output a list of the form: list("output_name"=output)
- nrep: number of experiment repetitions to carry out
- param_list: list of labeled values corresponding to the inputs to func
- ncpus: number of cpus to use in Monte Carlo simulation. Default is 1.

MonteCarlo()

Output

Returns a list of type MonteCarlo. Each list item is a vector of experiment results, repetition number and repetition inputs.

MakeFrame()

```
MakeFrame(output)
```

Parameters

- output: a MonteCarlo list object

Output

- A dataframe object containing output of Monte Carlo simulation. Rows correspond to the output of func for one repetition and respective values of the parameters.

MakeTable()

```
MakeTable(output,rows,cols)
```

Parameters

- output: a MonteCarlo list object
- rows: vector of row labels for latex table
- cols: vector of column labels for latex table

References

Christian Hendrik Leschinski (2019). MonteCarlo: Automatic Parallelized Monte Carlo Simulations. R package version 1.0.6. https://CRAN.R-project.org/package=MonteCarlo