R FOR ABSOLUTE BEGINNERS

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https://www.lib.ncsu.edu/workshops

LIFE IN A WORLD OF DATA

Imagine yourself stranded in a world of data and you're looking for a better way to process them…

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R IS WHAT YOU NEED

R programming language can be your friendly robot that can assist you to do everything with your data!

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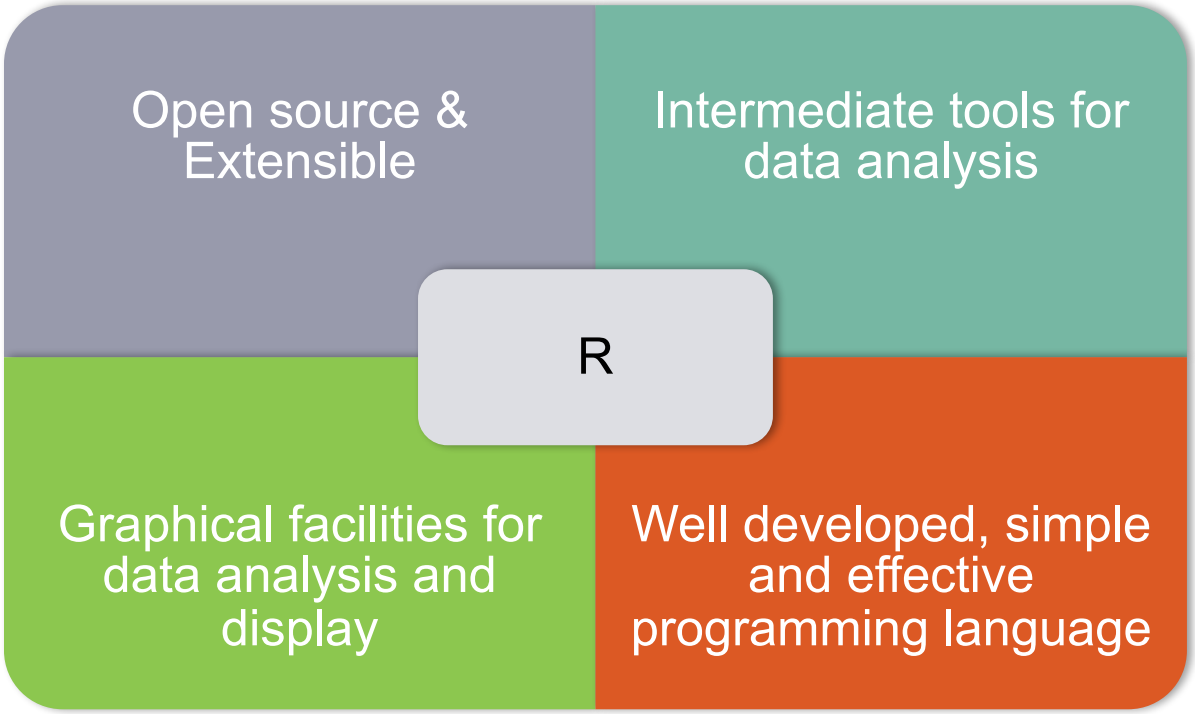
WHAT IS R?

“Free software environment for statistical computing and graphics.” – R-Project [1]



1. https://www.r-project.org/

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OTHER STATISTICAL PACKAGES

Some well-known statistical packages include –

- **MATLAB – Programming language with statistical features**
- **Mathematica – A software package with statistical feature**
- **SAS – Comprehensive statistical package**
- **SPSS (Statistical Package for Social Sciences) – Comprehensive statistical package**

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WHY USE R?

- All the other software mentioned are proprietary
- Not only a package but also a programming language
- Powerful data handling and storage facility while simple, effective and flexible
- Can write your own package if necessary and make it available for others use

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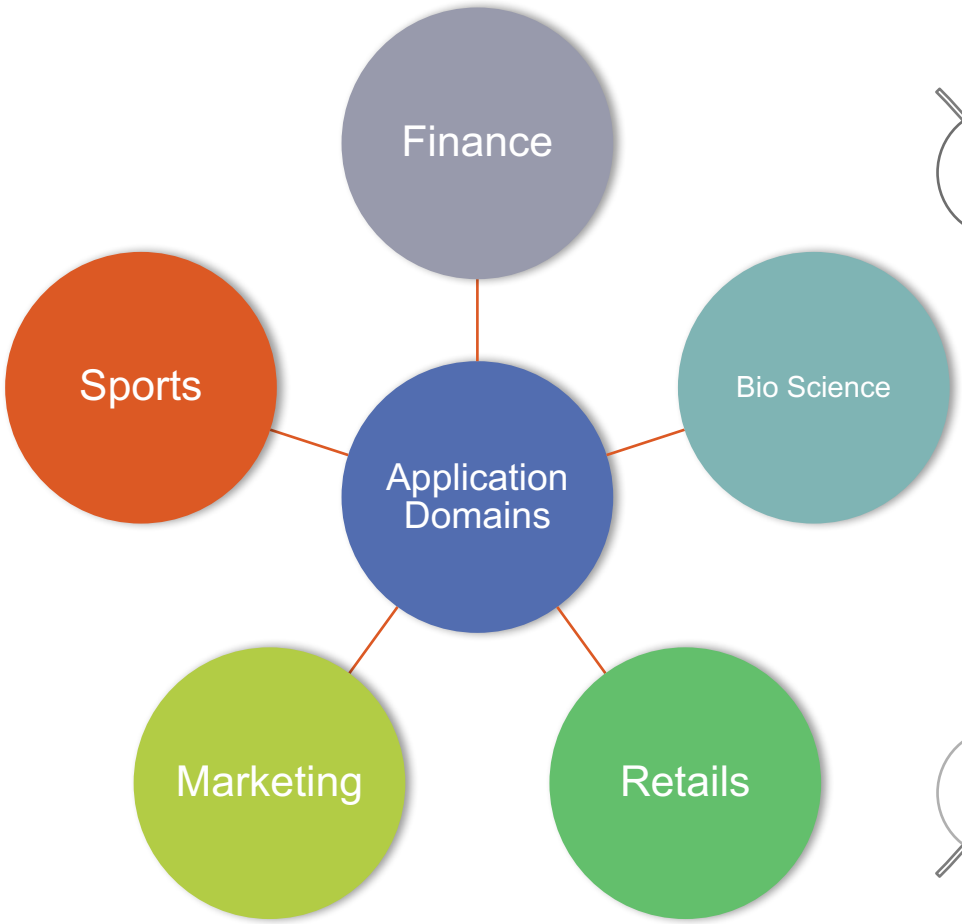
APPLICATIONS OF R



Application Methods

- Data Import
- Data Cleaning
- Investigation
- Data Analysis
- Visualization

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PACKAGES IN R

Packages are libraries of functions that are built to perform some specific tasks, i.e. create plots.

R is supplied with about eight packages but more can be easily added and extended

To install a new package type in console –

- **install.packages("package_name")**
- **library("package_name")**

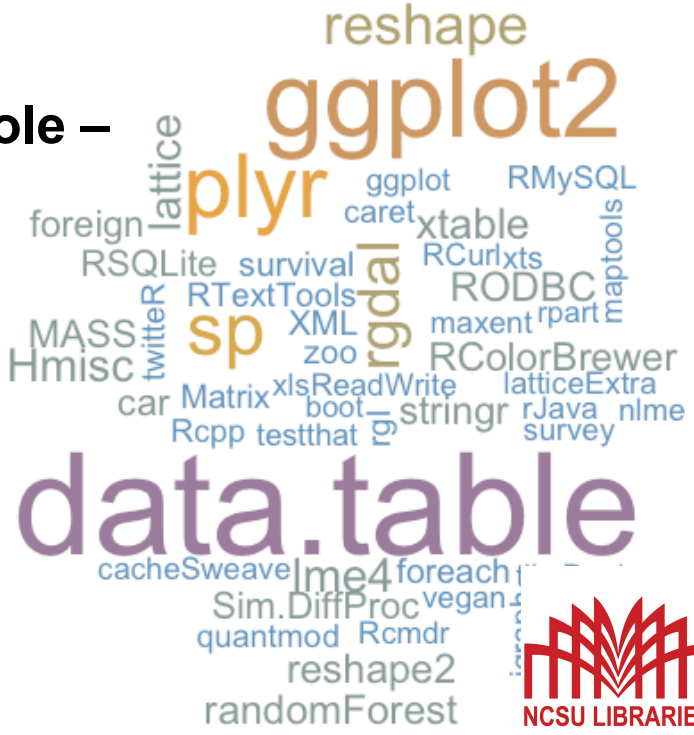

Image from http://bxhorn.com/category/r-packages/

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PACKAGES USED

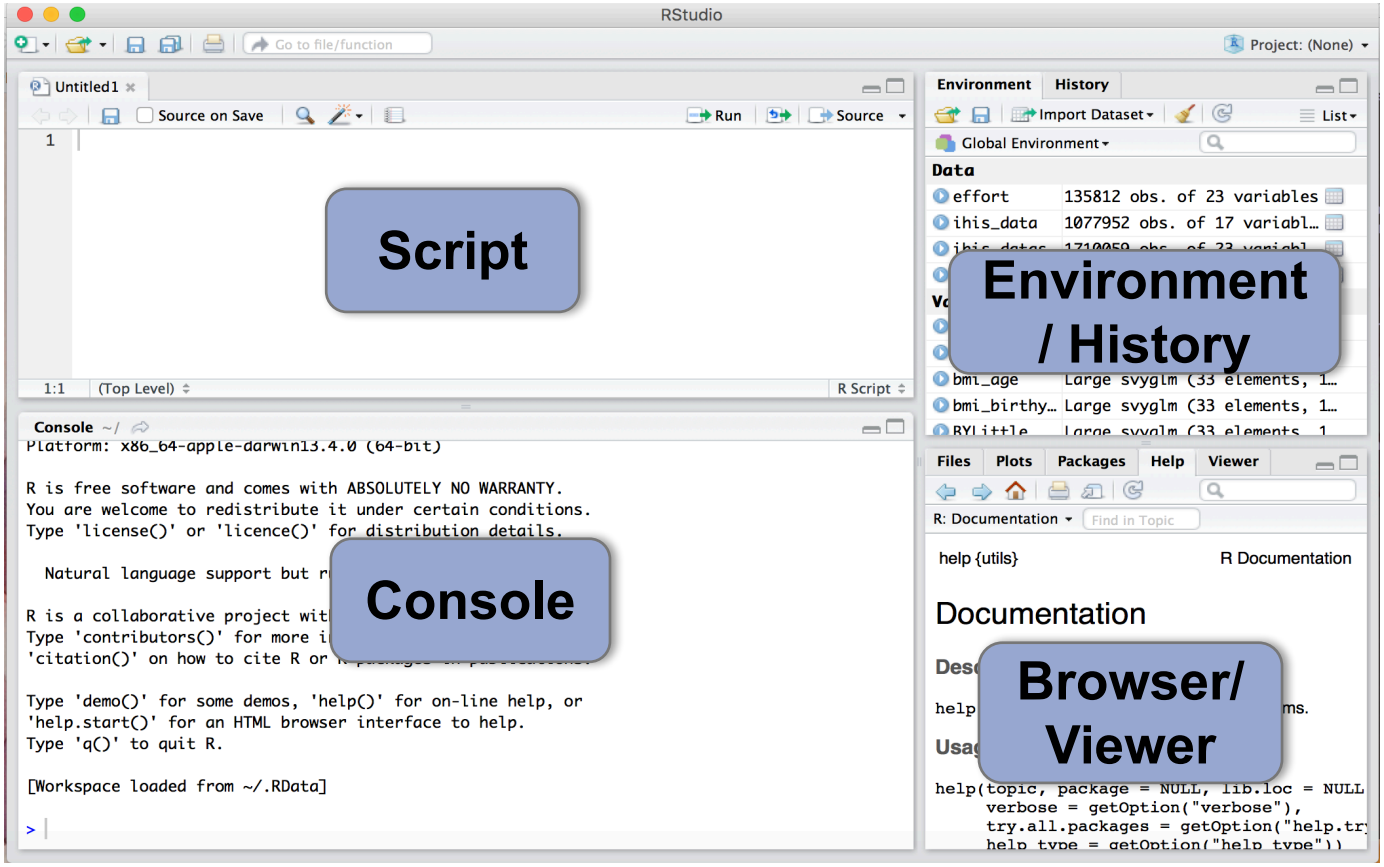
For the hands-on exercises we will use the packages below. These are some of the widely used libraries in R.

- **Hmisc**[1] – Provides numerous functions for data analysis, high level graphics, utility operations etc. We will explore the "describe" function for our exercise.
- **Dplyr**[2] – Contains many functions to make data manipulation easier, i.e. filter(), arrange(), distinct().
- **ggplot2**[3] – This package allows us to create graphs that are represented by color, symbol, size and transparency. There is a helper function **qplot()** that simplifies complex codes for some standard graphs

1. Overview of Hmisc Library. (n.d.). Retrieved from http://math.furman.edu/~dcs/courses/math47/R/library/Hmisc/html/Overview.html
2. Introduction to dplyr. (2016, June 23). Retrieved from https://cran.rstudio.com/web/packages/dplyr/vignettes/introduction.html
3. Quick-R: ggplot2 Graphs. (n.d.). Retrived from http://www.statmethods.net/advgraphs/ggplot2.html

ABOUT R-STUDIO

A powerful user interface for R that is free, open source and works in all platforms.



WORKING DIRECTORY

Working directory – Directory of a hierarchical file system

In R Studio we can set our working directory to indicate where we want to get our data from and save our data to.

Method 1 (From the menu) – Session > Set Working Directory > Choose Directory

Method 2 (On console) – setwd(directory_path)

More on - R Studio Support Page

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VARIABLES AND FUNCTIONS IN R

What is a variable?

In programming a variable is a value that can change based on the conditions. It can be useful in complex calculation by not having to repeat writing long code.

Example : x <- c(1,2,5,7) – here x is a variable that is holding the value of vector c

What is a function?

A function can be defined as a sub program that can be used repeatedly to perform the same task where needed. In R users can write their own functions where necessary.

Example: f1 <- function(x,y) {x+y}. So, f1(1,3) will return 4.

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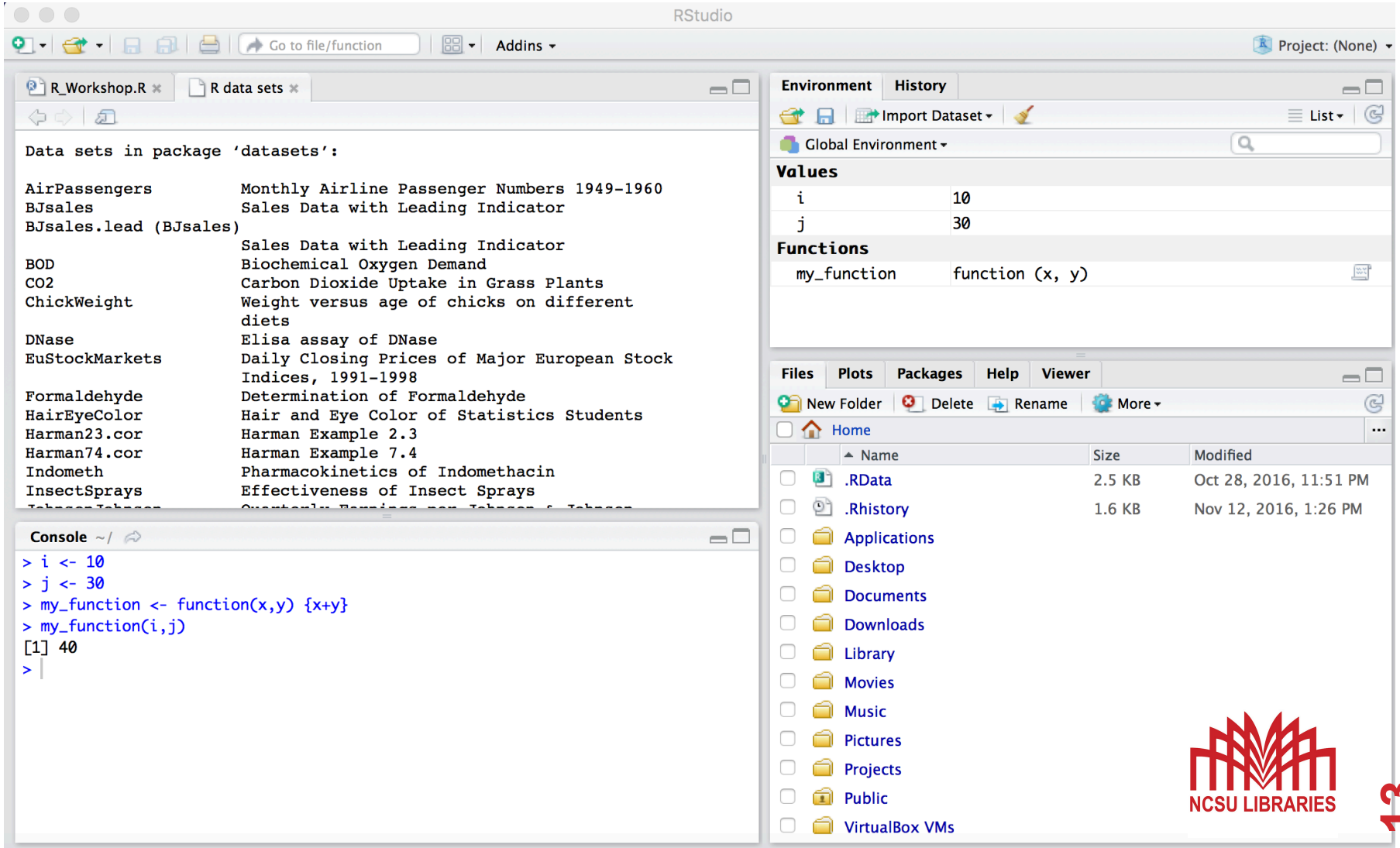
VARIABLES & FUNCTIONS (CONT'D)



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WORKING WITH DATA

- **Create your own dataframe by joining multiple vectors (sequence of data elements of the same basic type).**
- **Load your own datasets**
- **Work with the sample datasets that comes with R to learn and test**
  - To view the list of available datasets run this command in console – data()
  - View and download any available dataset from this page - https://stat.ethz.ch/R-manual/R-devel/library/datasets/html/00Index.html
- **For this workshop we will use airquality and mtcars datasets provided by R**

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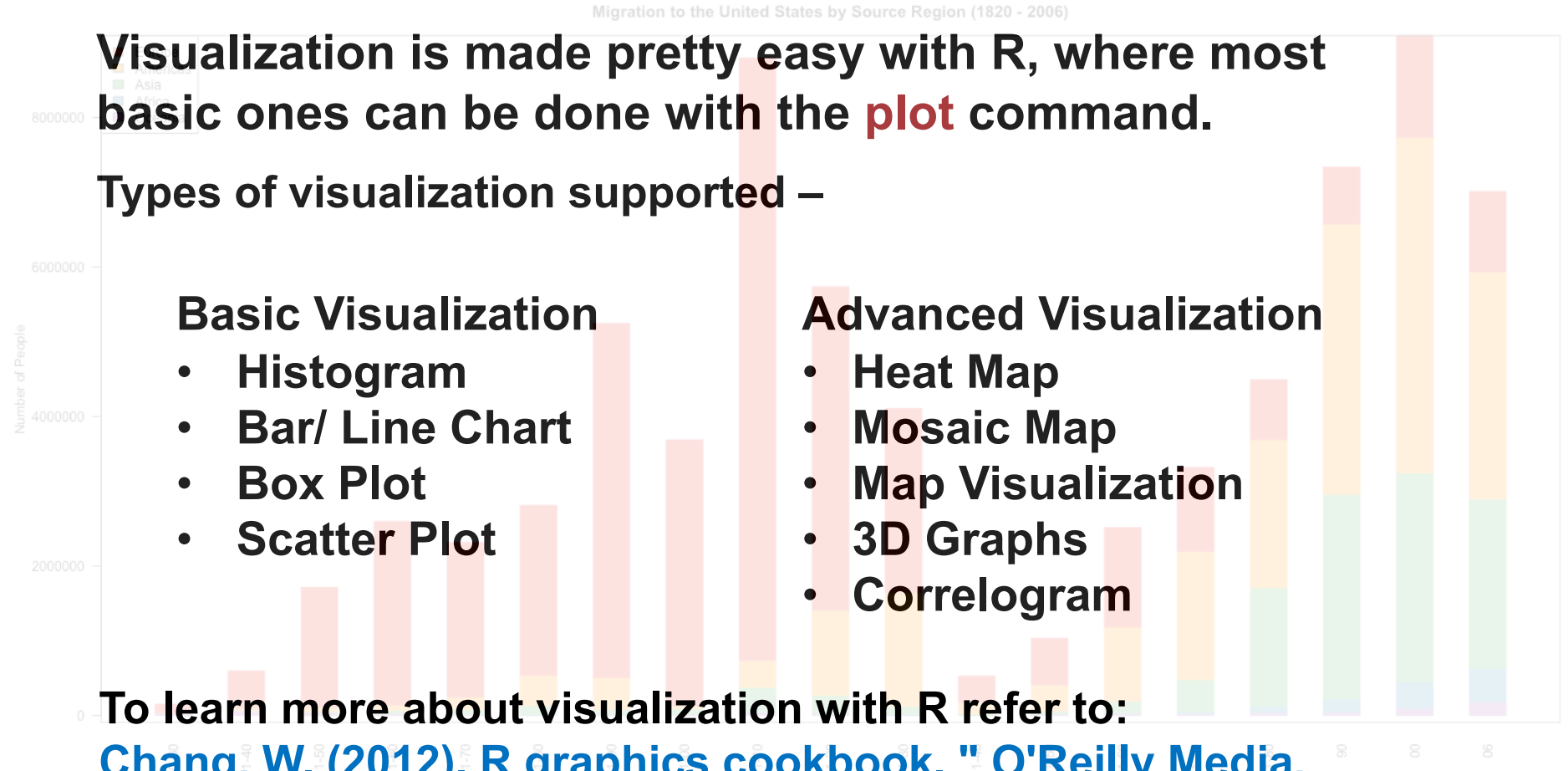
VISUALIZATION WITH R



Visualization is made pretty easy with R, where most basic ones can be done with the plot command.

Types of visualization supported –

Basic Visualization
- Histogram
- Bar/ Line Chart
- Box Plot
- Scatter Plot

Advanced Visualization
- Heat Map
- Mosaic Map
- Map Visualization
- 3D Graphs
- Correlogram

To learn more about visualization with R refer to:

Chang, W. (2012). R graphics cookbook. " O'Reilly Media, Inc." *

*** E-book is accessible from NCSU library, but only one person at a time.**

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GET R & R-STUDIO ON YOUR MACHINE

- Open the terminal in your machine and type ‘which r’. If R is already installed then it will show the path where it is located. Follow the link below to download R if it is not included.
- R can be downloaded from any of the CRAN mirrors - https://cran.r-project.org/mirrors.html. It is available for all types of OS – Windows, Linux and Mac.
- After downloading R, open the package and install it following the installation instructions.
- R Studio can be downloaded from the website - https://www.rstudio.com/products/rstudio/download3/
- Install R Studio following the instruction and R can be launched from the console within.

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OTHER RESOURCES

- Impatient R – Quick tutorial of R basics for the beginners. Link: http://www.burns-stat.com/documents/tutorials/impatient-r/
- R – bloggers – A compiled resource useful articles on R from about 580 blogs. Link: https://www.r-bloggers.com/
- A short list of the most useful R commands - http://www.personality-project.org/r/r.commands.html
- Learn more advanced topics in depth from this book (freely available) - Wickham, H. (2014). Advanced R. CRC Press.

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