

BIostatistics Software Resource Guide

Center for Innovative Design & Analysis (CIDA)

Moses Owusu

Colorado School of Public Health

November 30, 2023

Center for Innovative Design & Analysis

colorado school of public health

Center for Innovative Design & Analysis
colorado school of public health

Topics covered

- 1 R & RStudio
- 2 Statistical methods in R
- 3 Tableau
- 4 Power BI
- 5 Other statistics resources

- R is a free, open source software used for statistical analysis. It runs on different platforms. Learn more about R here: [The R project for statistical computing](#) 
- A new version of R is released every few months. You do not have to download every version but it is good practice to update at least yearly.
- Download the latest version (use suggested default settings):
 - [For Windows](#) 
 - [For MacOS with Apple silicon](#) 
 - [For Intel-based Macs](#) 

```
R Console
-
R version 4.2.2 (2022-10-31) -- "Innocent and Trusting"
Copyright (C) 2022 The R Foundation for Statistical Computing
Platform: aarch64-apple-darwin20 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
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.

[R.app GUI 1.79 (8160) aarch64-apple-darwin20]

[Workspace restored from /Users/nosesowusu/.RData]
[History restored from /Users/nosesowusu/.Rapp.history]

> |
```

- R-studio is an integrated development environment (IDE) for R.
- Compared to the R interface (previous slide), which mimics the command line prompt, RStudio offers a more user-friendly interface (see screenshot on next slide).
- We recommend you pin RStudio to your taskbar for easy access.
- Download and install R **before** you download RStudio.
- Download RStudio (use suggested default settings):
 - [For Windows](#) 
 - [For MacOS](#) 

RStudio interface

The screenshot displays the RStudio interface with the following components:

- Environment Pane:** Lists global environment objects with their types and values:

Object	Type	Value
nsr	int	[1:28] 210 53 238 52 228 93 104 215 181 31 ...
p	6	
pr	int	[1:4] 37 25 4 2
pvc	int	[1:13] 69 81 95 56 133 72 32 78 46 18 ...
r1	num	[1:7] 0 0.5 0 0 0 0 0.5
rbbbb	int	[1:6] 31 54 51 34 25 56
sample	num	[1:128] -0.187 -0.621 -0.816 -0.521 -0.79 ...
sdhb	int	[1:9] 4 1 9 10 7 2 5 3 8
series	num	[1:128] -1.43 -1.76 -1.48 -1.59 -1.76 ...
slm	int	[1:10000] 7 6 6 5 5 5 5 4 ...
sin2	int	[1:10000] 1 1 1 1 1 3 4 3 3 3 ...
ctm1ct	num	[1:10000] 0 0 0 0 0 0 0 0 0 0 ...
- Files Pane:** Shows the current project location: "R: Area under the ROC curve (AUC)".
- Console:** Displays the R version and path: "R 4.2.2 - ~/Downloads/CSPI/Fall 2023/BIOS6618-Adv_Bios_meth/HW4/".
- Help Pane:** Displays the documentation for the `auc` function, including a description, usage, and arguments.

R-studio interface

Center for Innovative Design & Analysis
colorado school of public health

Getting started with R & RStudio

We recommend the following freely available resources for getting started with R and RStudio:

- Golemund, G. *Hands-on programming with R: write your own functions and simulations*. O'Reilly Media, Inc., 2014. [🔗](#)
- Wickham, H. & Golemund, G. *R for Data Science* [🔗](#)
- Stack overflow R questions [🔗](#)

R quick help

- Type "**?[function name]**" in the console or in a script for help.
- Use exact function names in the search box.

The screenshot shows the RStudio interface. In the console, the command `?t.test` has been entered and is circled in blue. The Help pane on the right displays the documentation for `t.test`, including its description, usage, and arguments. The search box in the Help pane is also circled in blue.

Environment

Object	Class	Attributes
mydata_1	data.frame	151 obs. of 3 variables
mydata_new	data.frame	80 obs. of 2 variables
mydata_standard	data.frame	120 obs. of 2 variables
new	data.frame	80 obs. of 2 variables
over_unit	data.frame	139 obs. of 11 variables
run	matrix	run [1:3, 1:3] 0 1 0.333 0.5 0 ...
pattern	data.frame	1 obs. of 5 variables
pts	SpatialPointsDataFrame	Formal class 'SpatialPointsDataFrame'
pts2	data.frame	139 obs. of 46 variables
sample_bag	list	list of 45
stan	data.frame	120 obs. of 2 variables

Files Plots Packages Help Viewer Presentation

R: Student's t-Test - Find in Topic

t.test (stats) R Documentation

Student's t-Test

Description

Performs one and two sample t-tests on vectors of data.

Usage

```
t.test(x, ...)
```

Default S3 method:

```
t.test(x, y = NULL,
      alternative = c("two.sided", "less", "greater"),
      mu = 0, paired = FALSE, var.equal = FALSE,
      conf.level = 0.95, ...)
```

S3 method for class 'formula'

```
t.test(formula, data, subset, na.action, ...)
```

Arguments

R help

Center for Innovative Design & Analysis
colorado school of public health

Regression analysis in R

- [Geeksforgeeks: Regression analysis in R](#) 
- [R documentation: Regression Analysis](#) 
- [Scribbr: Simple linear regression](#) 
- [Datacamp: R for Regression](#) 

T tests in R

- [Geeksforgeeks: T test approach in R](#) 
- [R documentation: T tests](#) 
- [Data flair: T tests in R](#) 
- [Datacamp: T test in R](#) 

Power calculations in R

- [Power analysis in R](#) 
- [R documentation: Statistical power & sample size calculations](#) 
- [Calculating the power of a test](#) 
- [Datacamp: Power analysis](#) 

Tableau

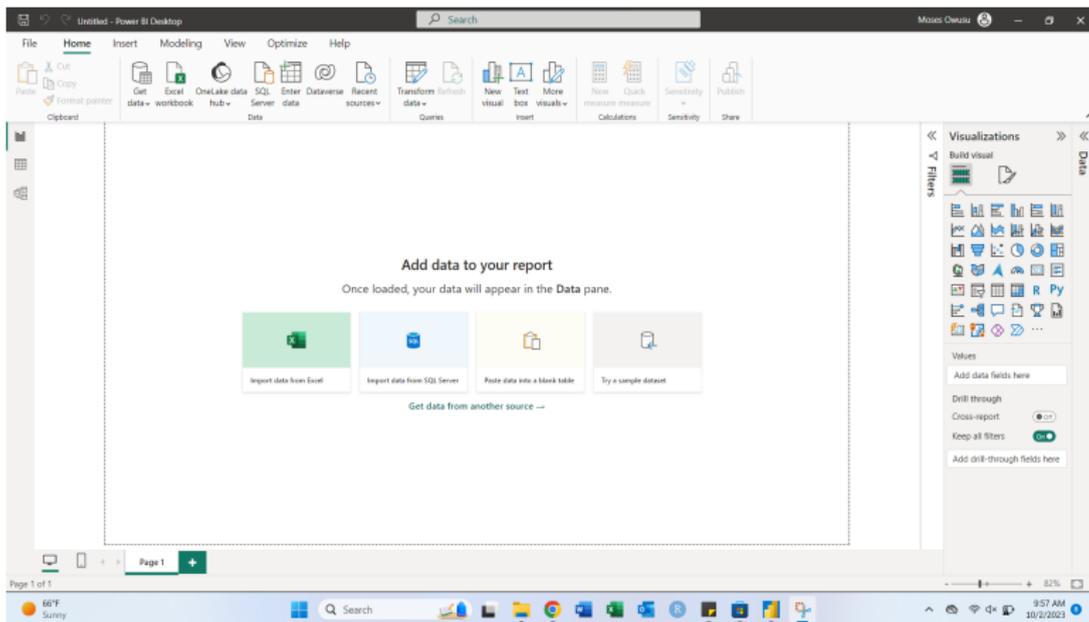
- [Tableau](#) is a popular analytic software known for creating graphs, maps, charts and other visualizations using data.
- Tableau offers different platforms & services, including:
 - Tableau Desktop
 - Tableau Server
 - Tableau Cloud
- [Download a 14-day trial version of Tableau Desktop](#)
- Students can get a 1-year extended trial using their CU Anschutz credentials. See the [Tableau for students FAQ](#).
- [Check the system specifications for using Tableau on your machine](#)

Tableau tutorials & resources

- [Tableau help](#) 
- [Tableau community](#) 
- [Edureka Tableau full course](#) 
- How-to-videos on the basics : [Tableau learn](#) 

- [Power BI](#) is a data visualization tool offered by Microsoft. It is free to download from the Microsoft store but is only available for Windows.
- Power BI also offers paid license options (Power BI Pro, Power BI Premium Per User (PPU)) as well as a paid subscription option (Power BI Premium). The free desktop version ([Power BI Desktop](#)) should be sufficient for basic data visualization needs.
- [Check the system specifications for using Power BI on your machine](#).
- Installation is straightforward if you have a Microsoft Office 365 account and are signed in.

Power BI interface



Power BI interface

Power BI resources

- [Power BI community](#) 
- [Microsoft Power BI tutorials](#) 

Other helpful statistics resources

- [UCLA: What statistical test should I use? \(SAS, Stata, SPSS, R\)](#) 
- [Biostats4You: Statistical resources for non-statisticians](#) 
- [Biostats4You: Topics](#) 
- [Biostats4You: Sample size calculators](#) 
- [LISA short courses \(R, SAS, JMP, Python\)](#) 