# *Data visualization and analysis in R*

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15.04.2025

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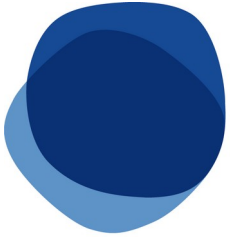

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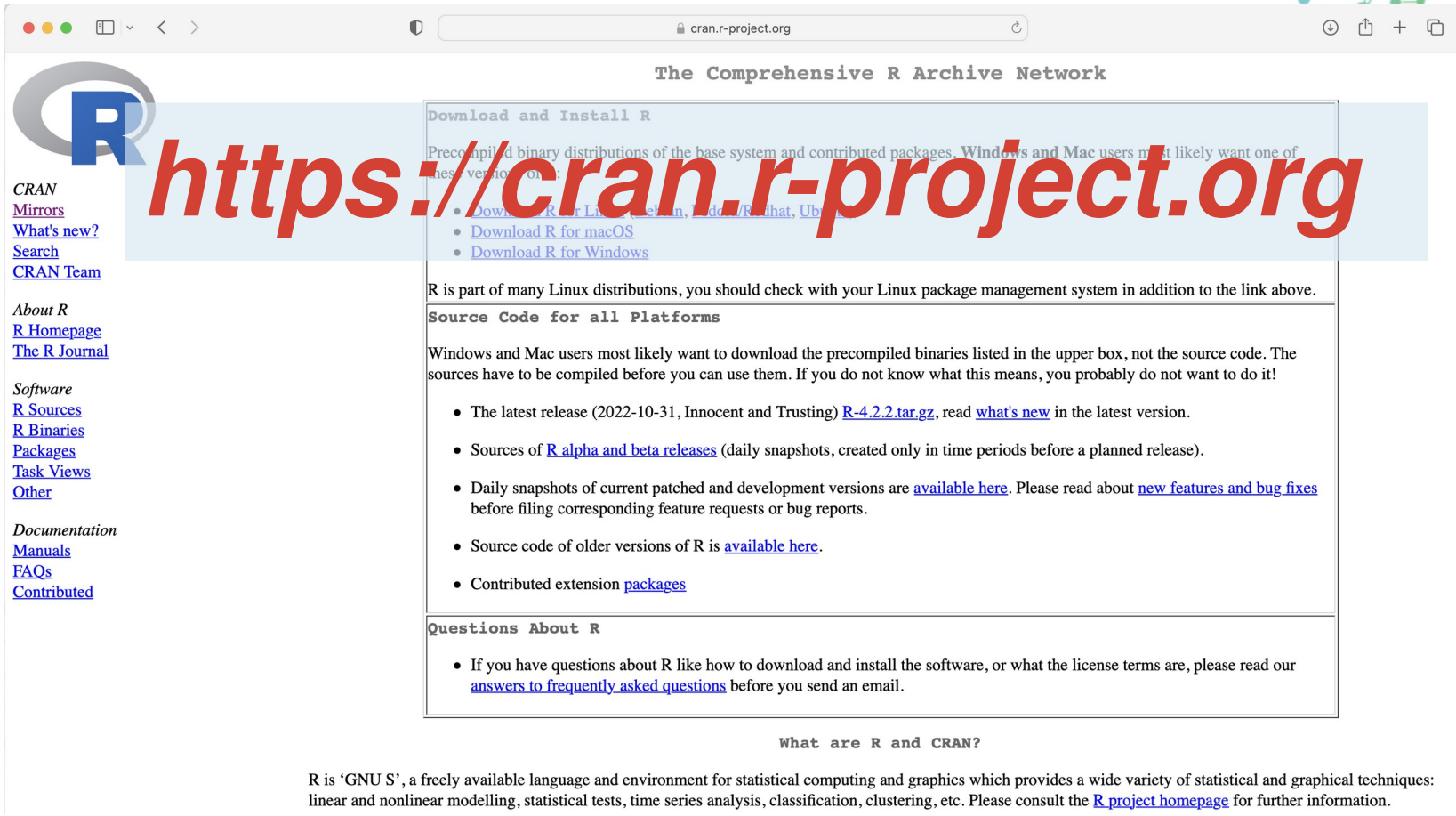
# *Data analysis with R*

- *1992: Ross Ihaka and Robert Gentleman in the University of Auckland, New Zealand developed R.*
- *1995: The first version was released*
- *1997: CRAN (Comprehensive R Archive Network) was started*
- *2000: A stable beta version was released*
- *R has now thousands of packages, designed, maintained, and widely used by statisticians, biostatisticians, and geneticists*

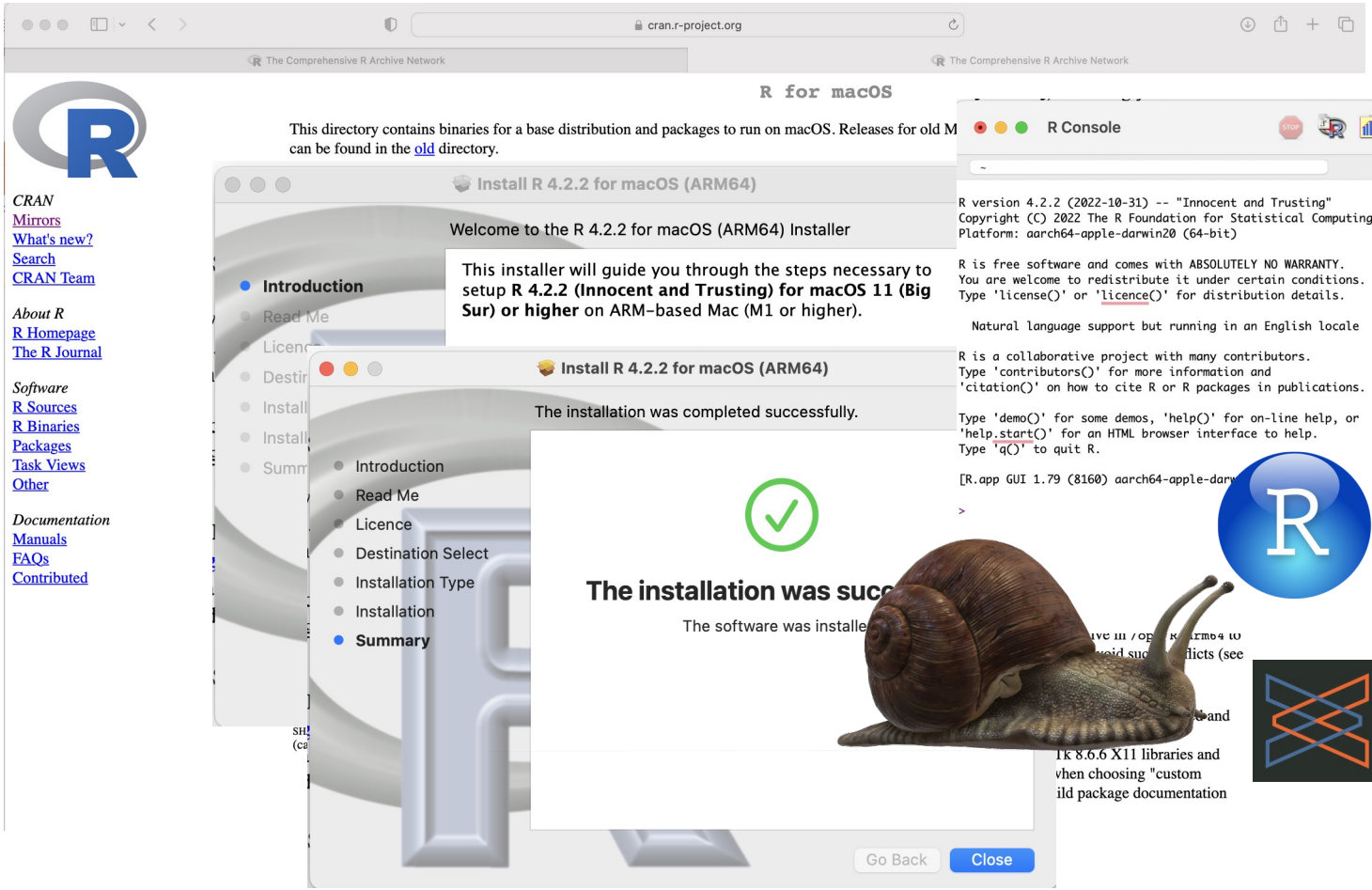
A software environment used to analyze **statistical information**, **graphical representation**, **reporting**, and **data modeling**

# *Installing*

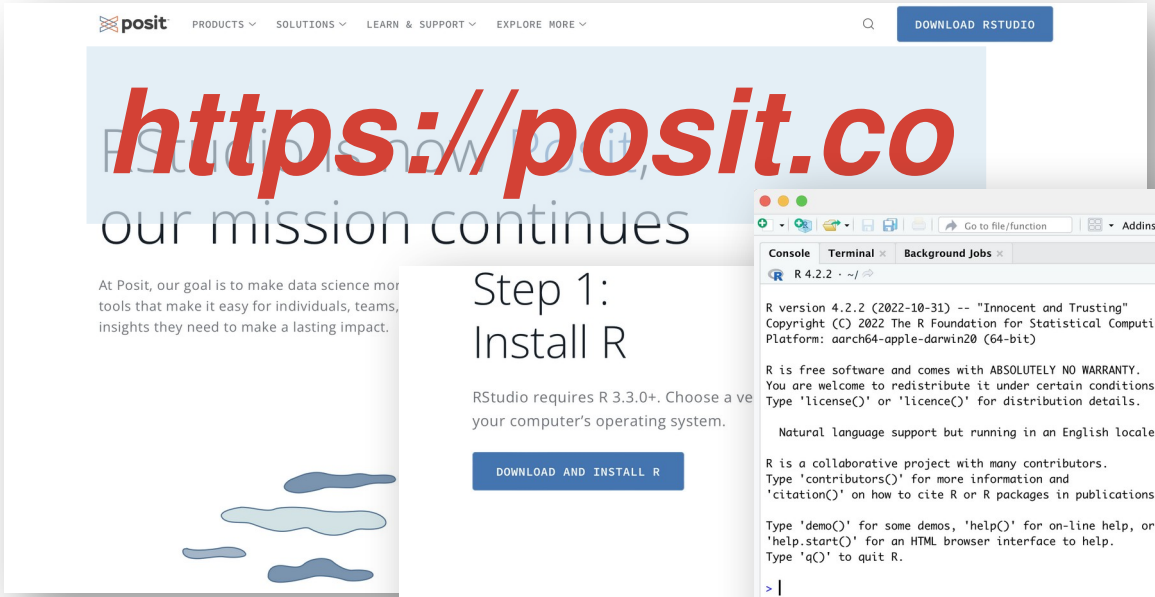
# Installing R

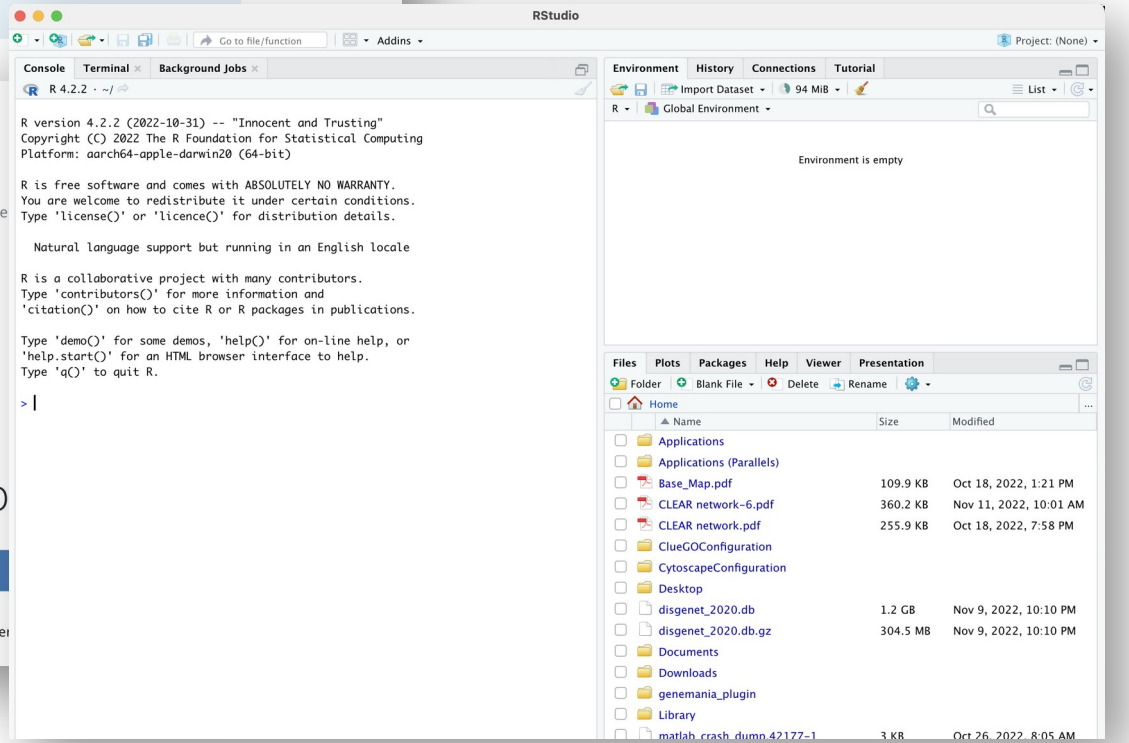


# Installing R

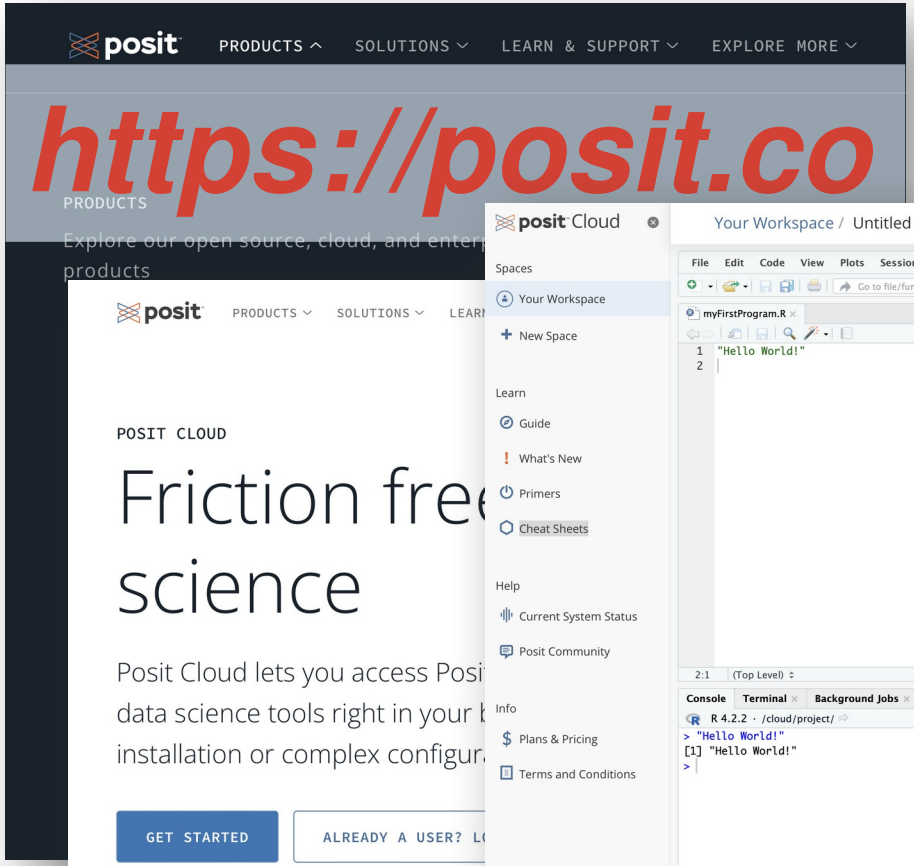


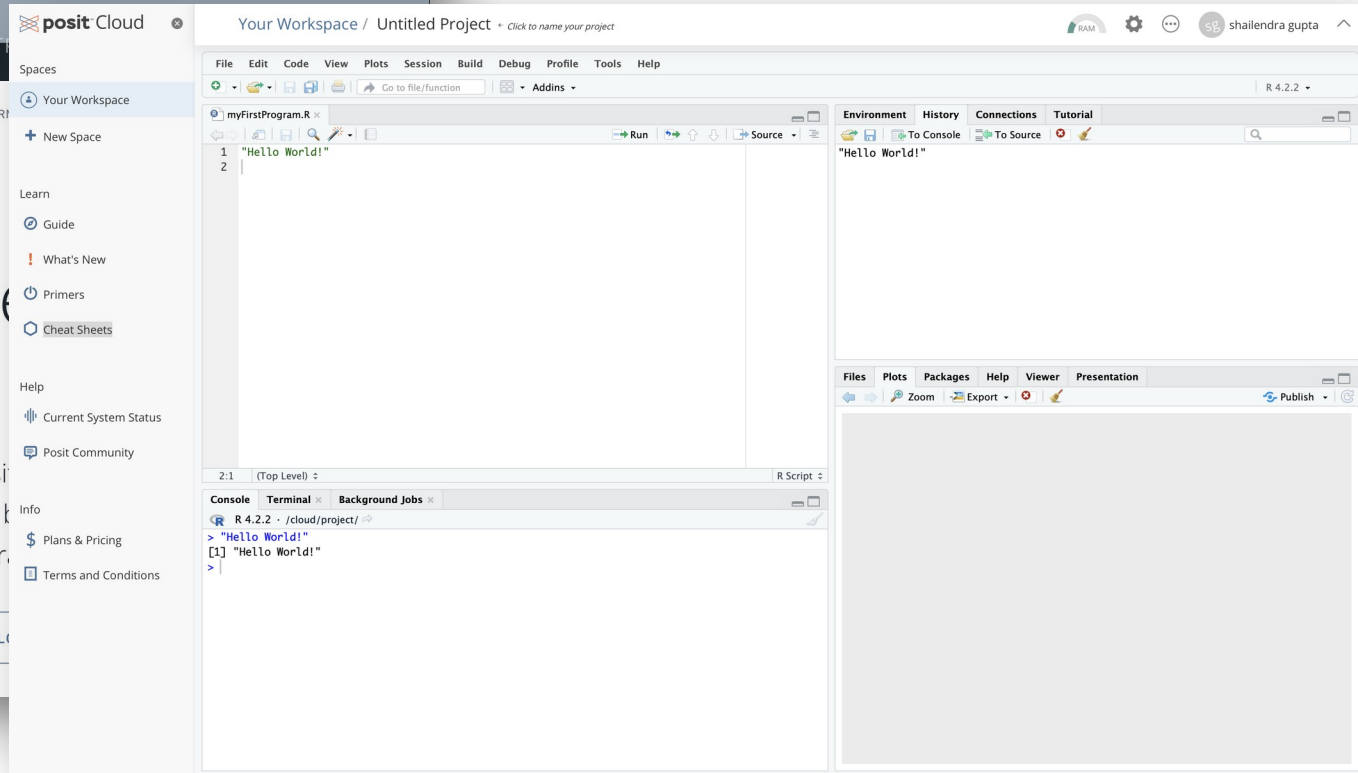
# Installing RStudio Desktop



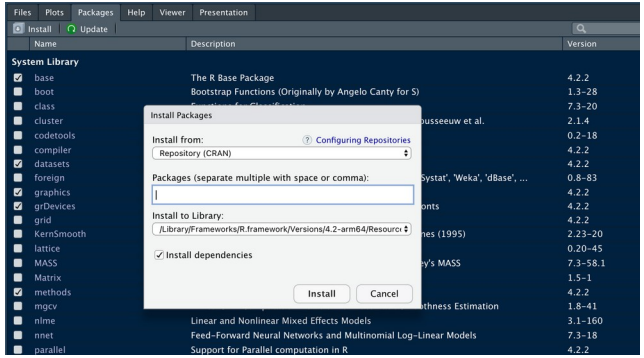
# Running R on Posit Cloud

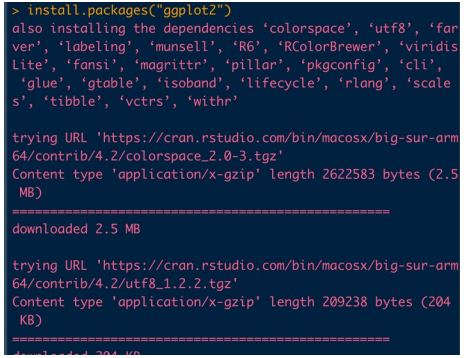


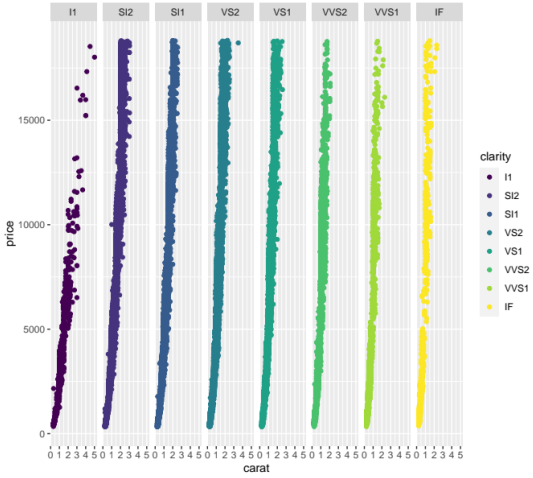
# Packages in R

- Collection of R functions, data and compiled code in a well-defined format to perform specific task.
- Allow to expend the functionality available to you in R programming.
- Packages are stored in a directory called the library.
- Installing packages:
  - using gui
  - using command line in console e.g., install.packages("ggplot2")
- Activate install package
  - library(<name of the package>) e.g., library(ggplot2)

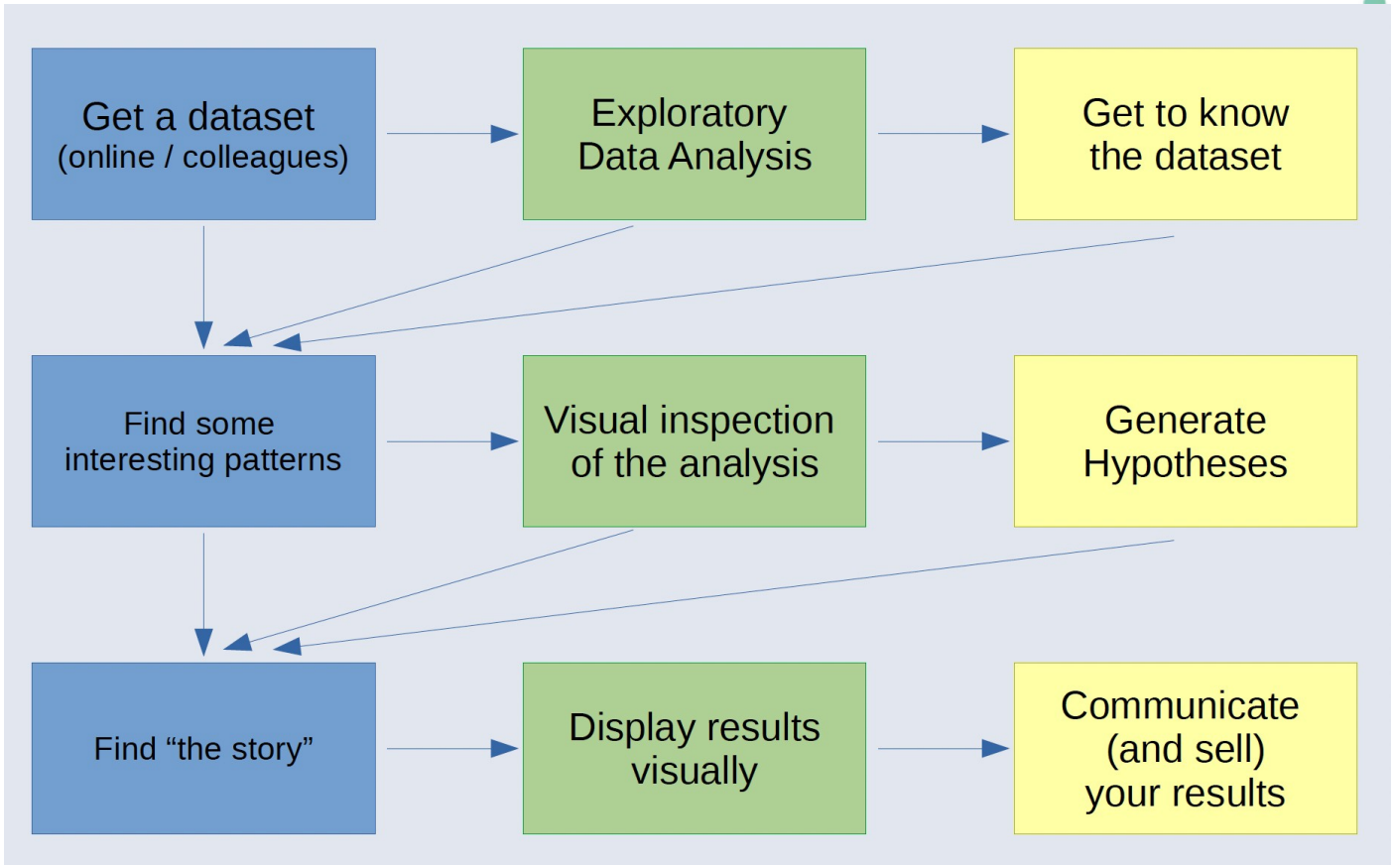



- Example from ggplot2 (ggplots comes with few example datasets, e.g., diamonds, iris)
  - qplot(data=diamonds, carat, price, colour=clarity, facets=.~clarity)

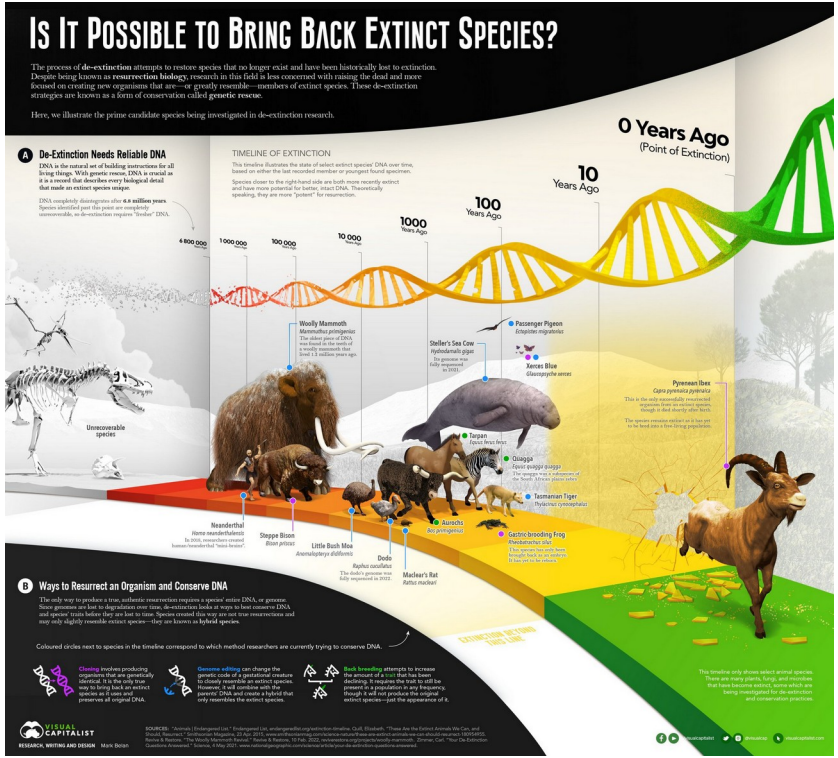


# *The daily life of a data scientist..*



# *Data visualization in R*

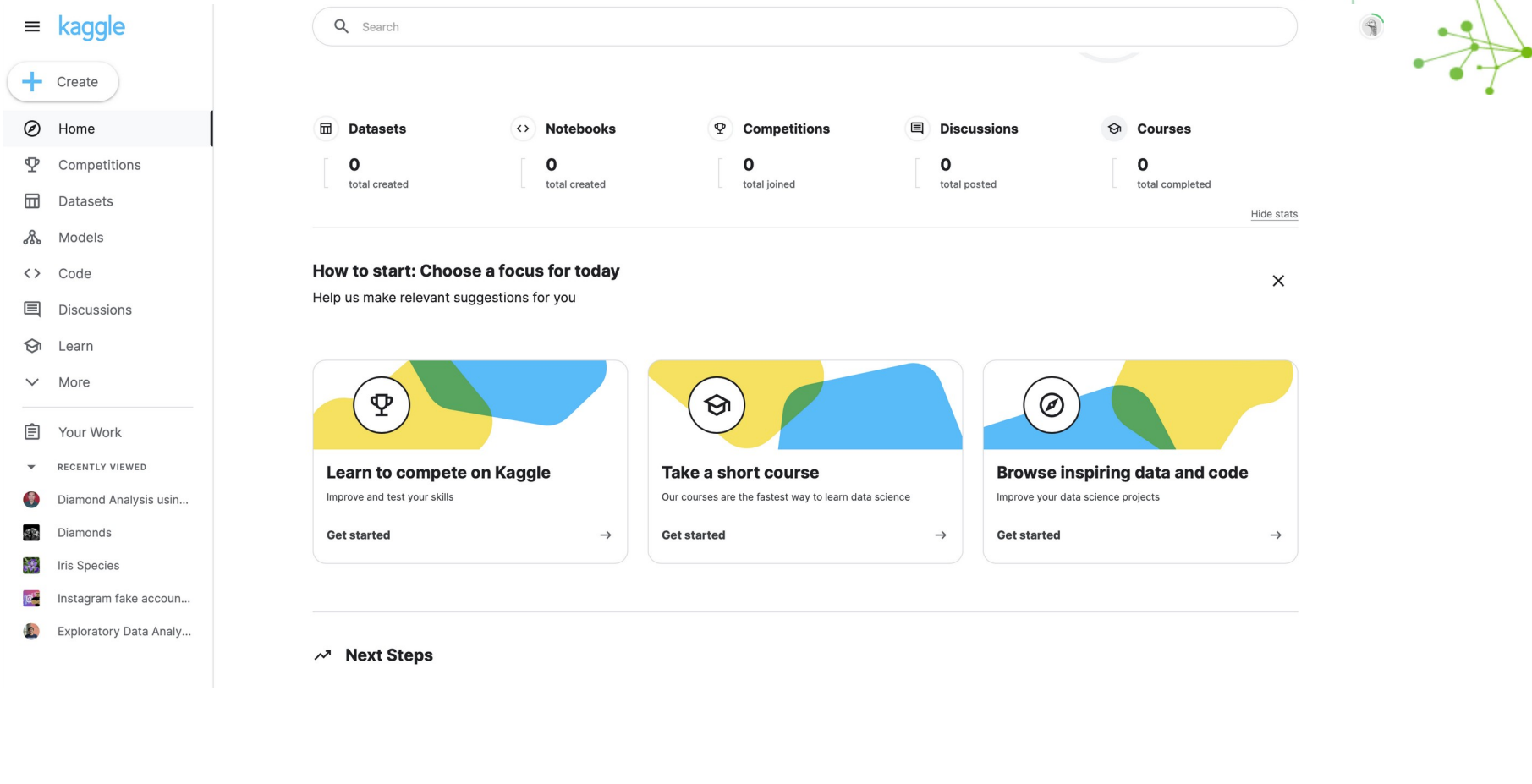
Not this




*Twitter*
*@markabelan*

But this

# Getting the data



# Getting the data

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Diamond Analysis usin...

Diamonds

Iris Species

Instagram fake accoun...

Exploratory Data Analy...

SHIVAM AGRAWAL · UPDATED 6 YEARS AGO

929

New Notebook

Download (751 kB)

## Diamonds

Analyze diamonds by their cut, color, clarity, price, and other attributes

Data Card | Code (415) | Discussion (8)

### About Dataset

**Context**

This classic dataset contains the prices and other attributes of almost 54,000 diamonds. It's a great dataset for beginners learning to work with data analysis and visualization.

**Content**

**price** price in US dollars (\$326--\$18,823)

**carat** weight of the diamond (0.2--5.01)

**cut** quality of the cut (Fair, Good, Very Good, Premium, Ideal)

**color** diamond colour, from J (worst) to D (best)

**clarity** a measurement of how clear the diamond is (I1 (worst), SI2, SI1, VS2, VS1, VVS2, VVS1, IF (best))

**x** length in mm (0--10.74)

**Usability**
7.65

**License**
Unknown

**Expected update frequency**
Not specified

# *Exploratory Data Analysis in*

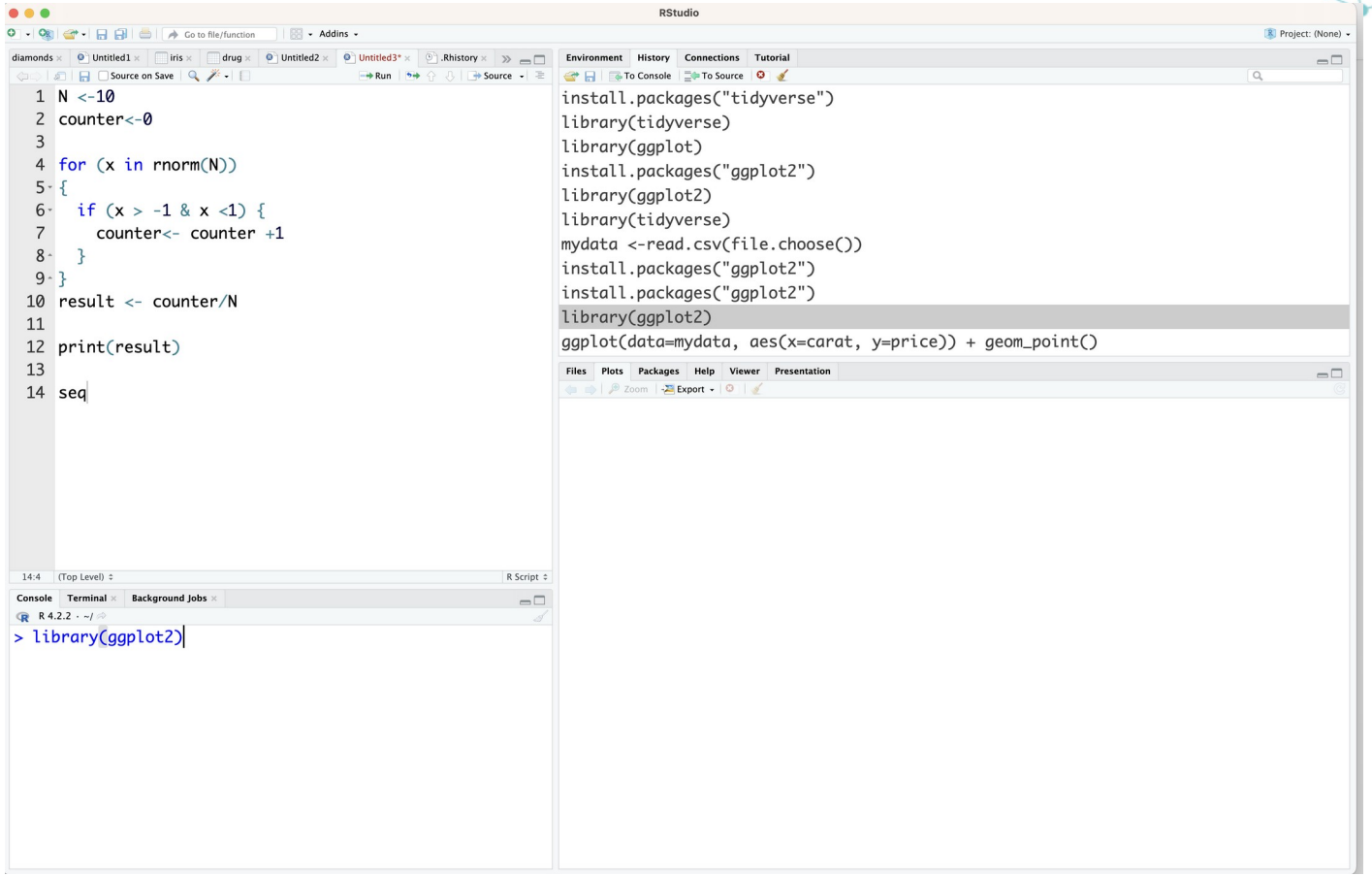
## *Exploratory Data Analysis*

- Exploratory Data Analysis (EDA) is an approach to analyzing datasets to summarize their main characteristics, often employing visual methods.
- The primary goal of EDA is to understand the underlying patterns, distributions, and relationships within the data.
- It involves techniques to identify outliers, detect patterns, test assumptions, and summarize the main features of the dataset.

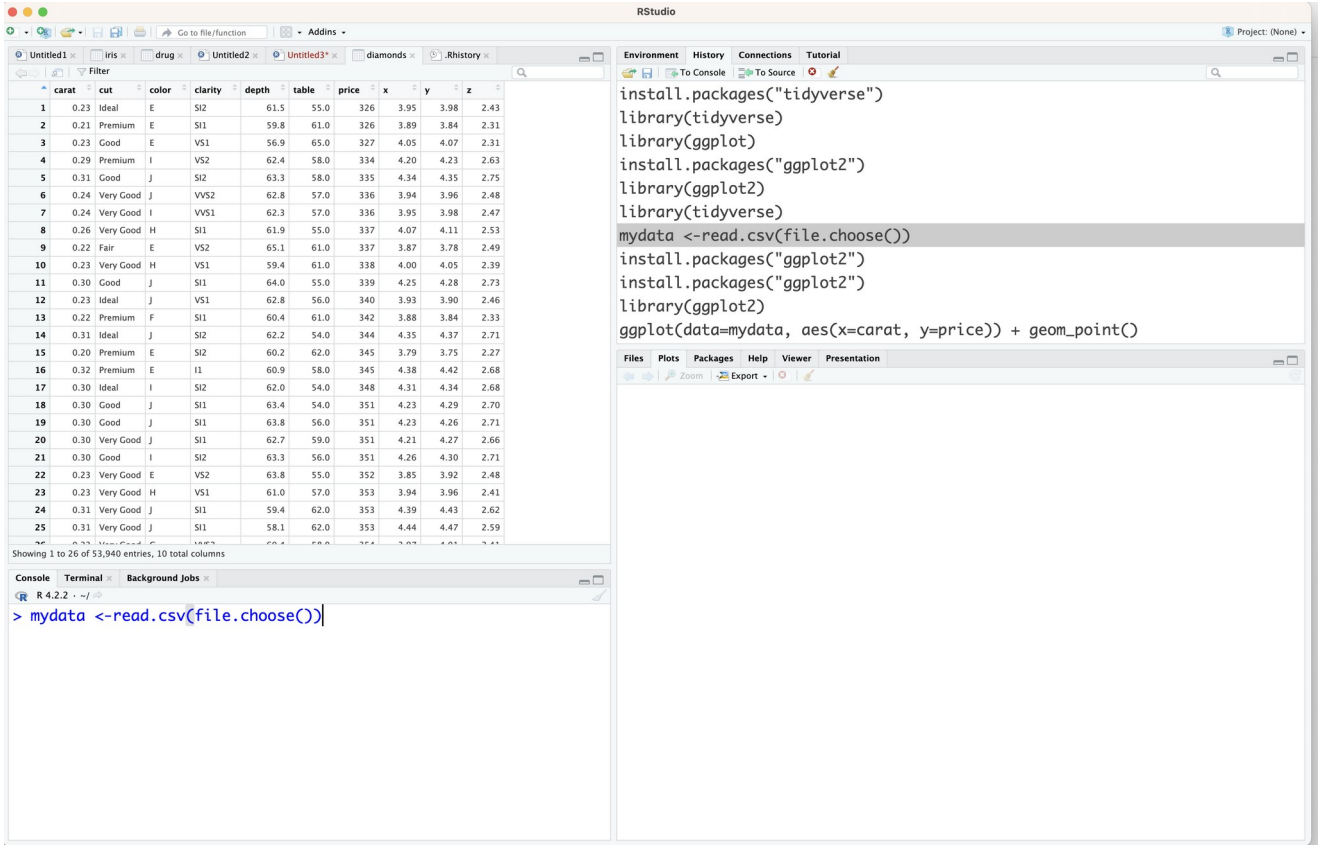
### Exploratory vs Confirmatory Data Analysis

| EDA | CDA |
|---|---|
| • No hypothesis at first<br>• Generate hypothesis<br>• Uses graphical methods (mostly) | • Start with hypothesis<br>• Test the null hypothesis<br>• Uses statistical models |

# Data visualization in R

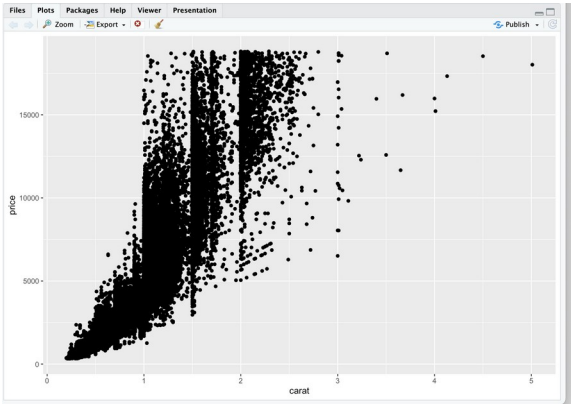


# Data visualization in R

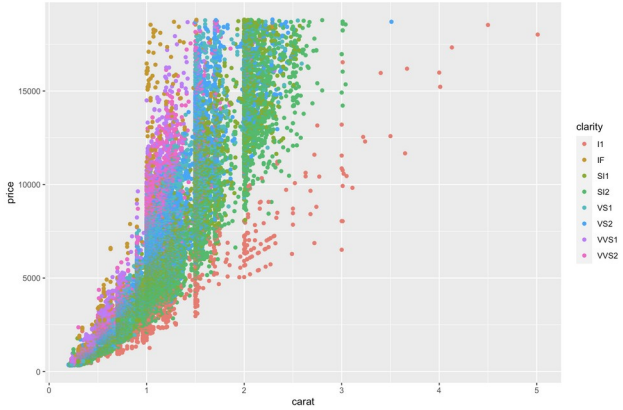


# *Data visualization in R*

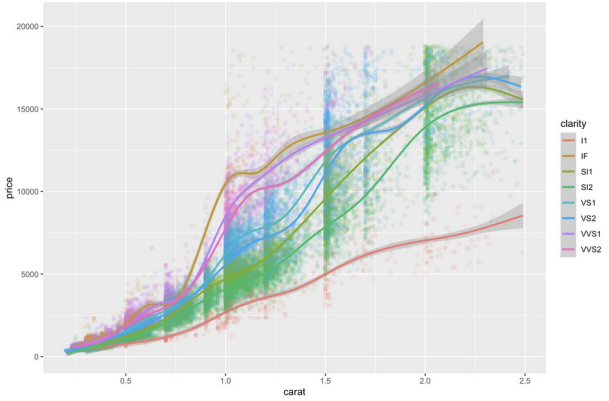
ggplot(data=mydata, aes(x=carat, y=price)) + geom_point()




ggplot(data=mydata, aes(x=carat, y=price, color=clarity)) + geom_point()




ggplot(data=mydata[mydata$carat<2.5,], aes(x=carat, y=price, color=clarity)) + geom_point(alpha=0.1) + geom_smooth()



# *Additional reading*

https://carpentries-incubator.github.io/open-science-with-r/

https://marianattestad.com/blog

https://www.stats.ox.ac.uk/~evans/Rprog/LectureNotes.pdf

*Thank you for your attention!*