

# R for Statistics

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# What is R?

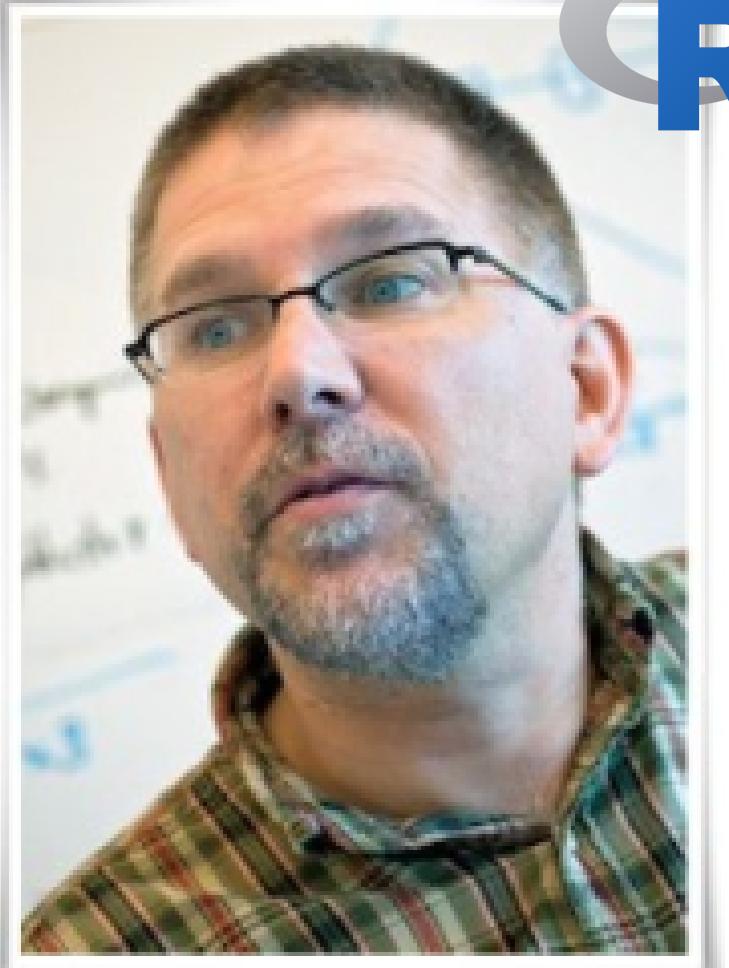
- R is a language and environment for statistical computing and graphics.
- R provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering,...) and graphical techniques, and is highly extensible.



Source: [www.r-project.org](http://www.r-project.org)

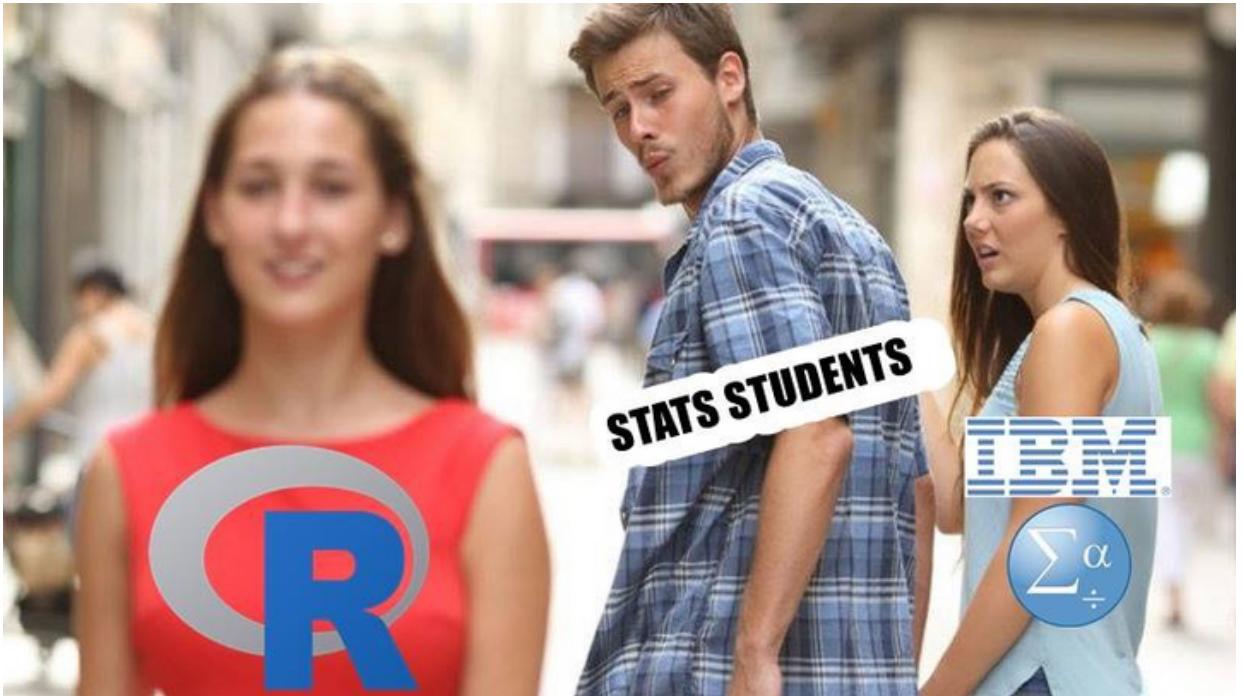
# A Little History of R

- R designed to create a free, open source language which can be used as a replacement for the S language.
- R was created by Ross Ihaka and Robert Gentleman at the University of Auckland, New Zealand.
- R is named partly after the first names of the first two R authors and partly as a play on the name of S.



# Why Learn R

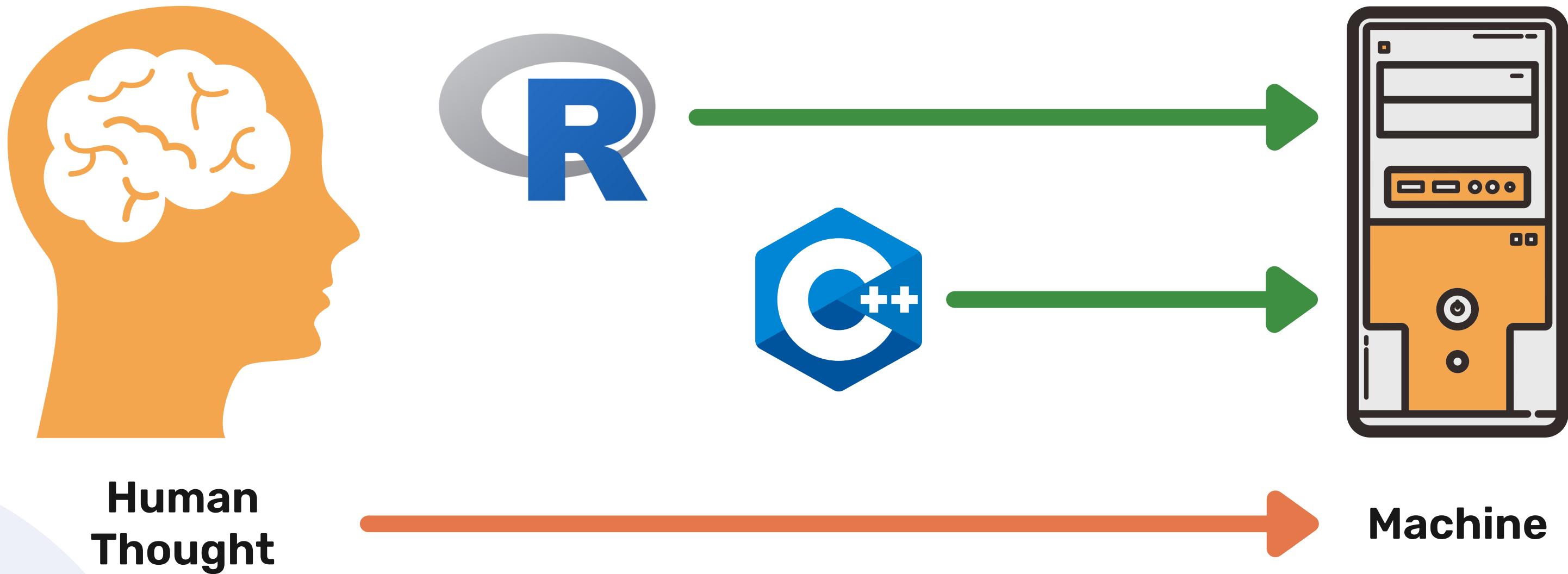
- R is Open Source
- R is a powerful statistical environment and programming language which can be used to perform statistical analyses, manipulate datasets, and produce high-quality graphics.
- Graphical User Interface (GUI) rather than from the command line.
- R user can extend R's functionality via a series of packages or by writing code to implement a new procedure.
- R is actively supported, integrates well with Excel and SPSS, and can be used in the social sciences.



# Why I Learn R

- R is Open Source (this makes R free)
- R enables end-to-end data analysis process, without the need to switch applications.
- R has a code structure that is easy to understand, even for me who doesn't have a Computer Science background
- Flexibility and Reusability
- Can be integrated with various existing services (Database, Version Control System, etc.)

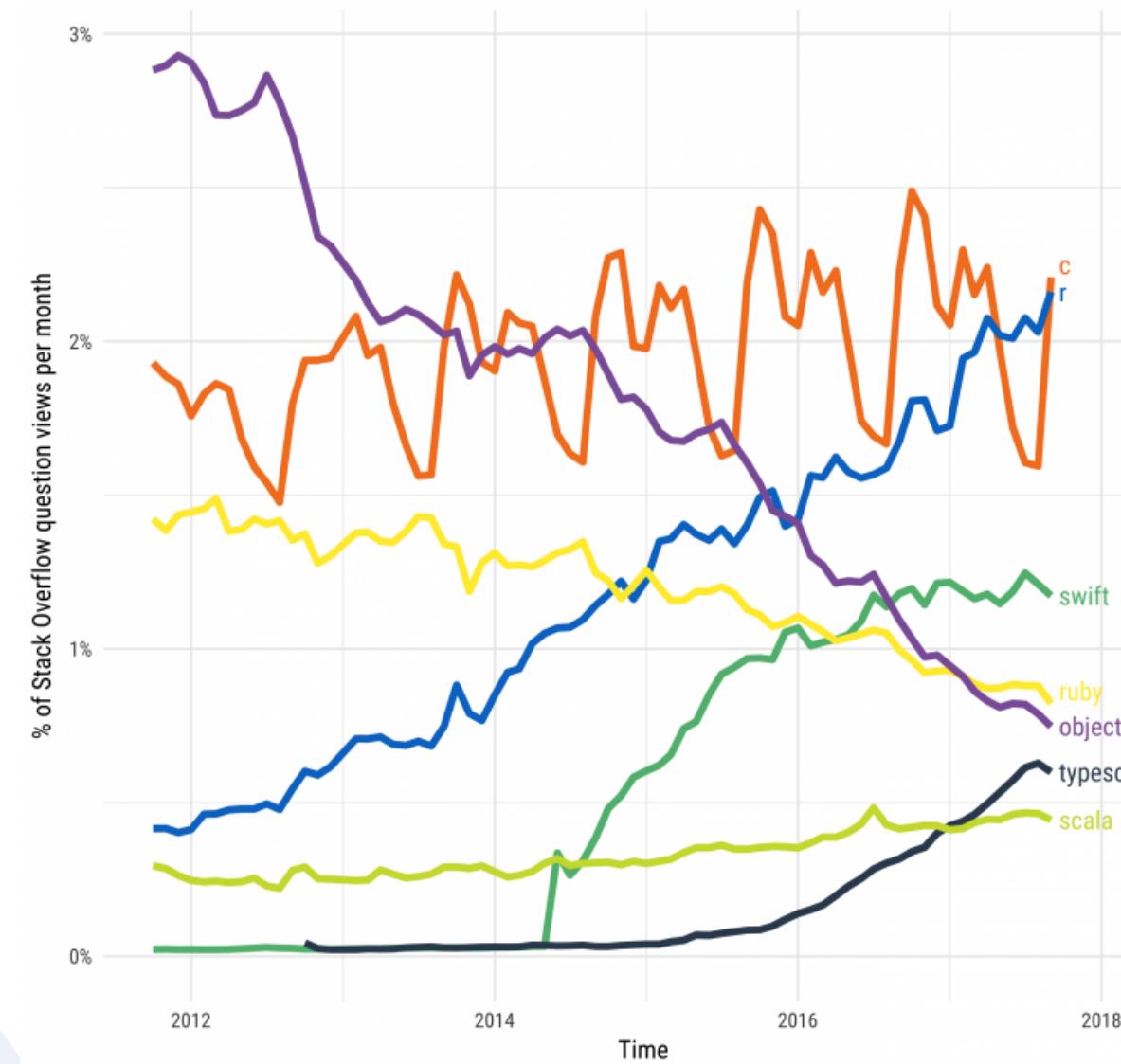
# R (Language Level)



# Growth of R

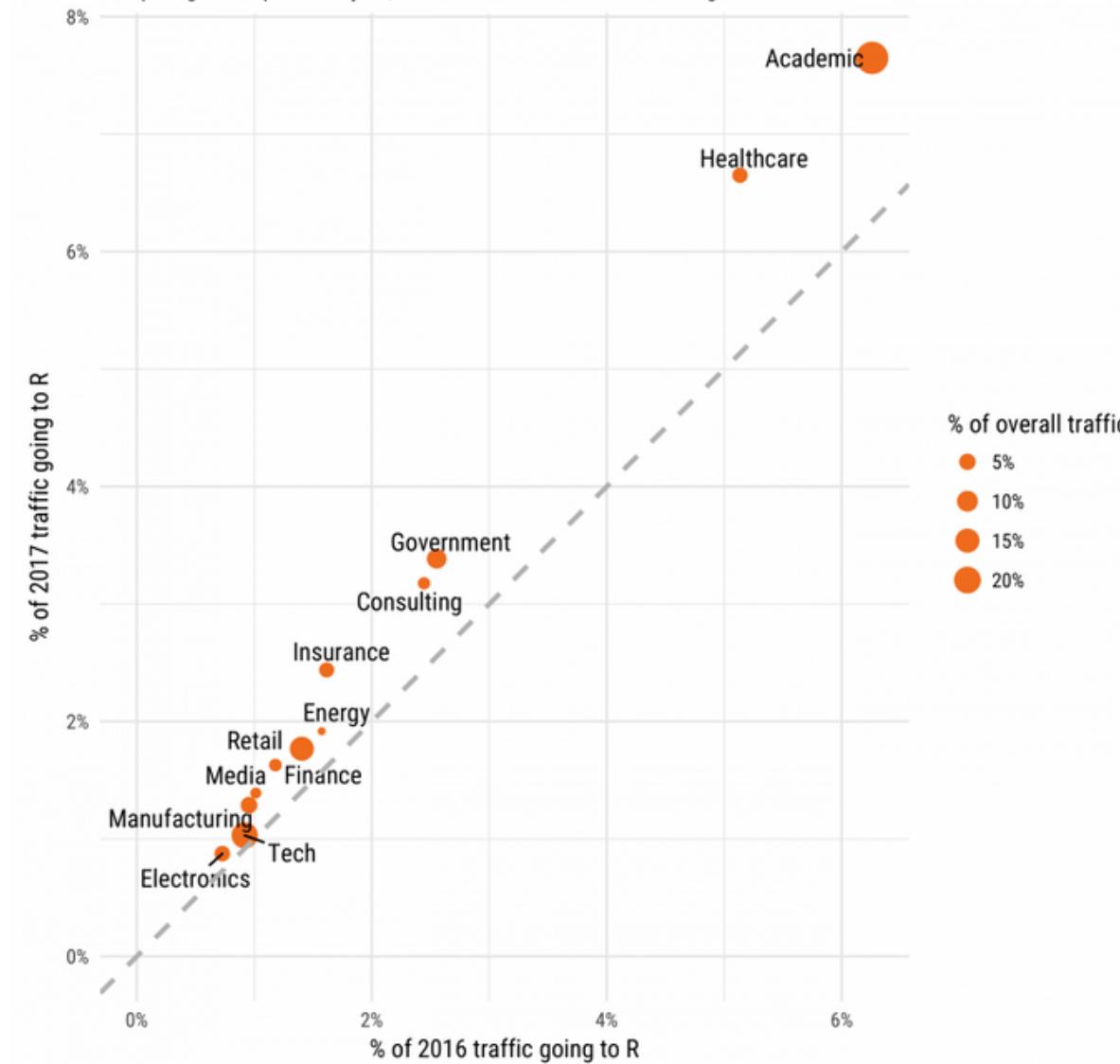
## Stack Overflow Traffic to Programming Languages

Based on visits to Stack Overflow questions from World Bank high-income countries.  
The more-visited languages of Python, JavaScript, Java, C#, and PHP were omitted.



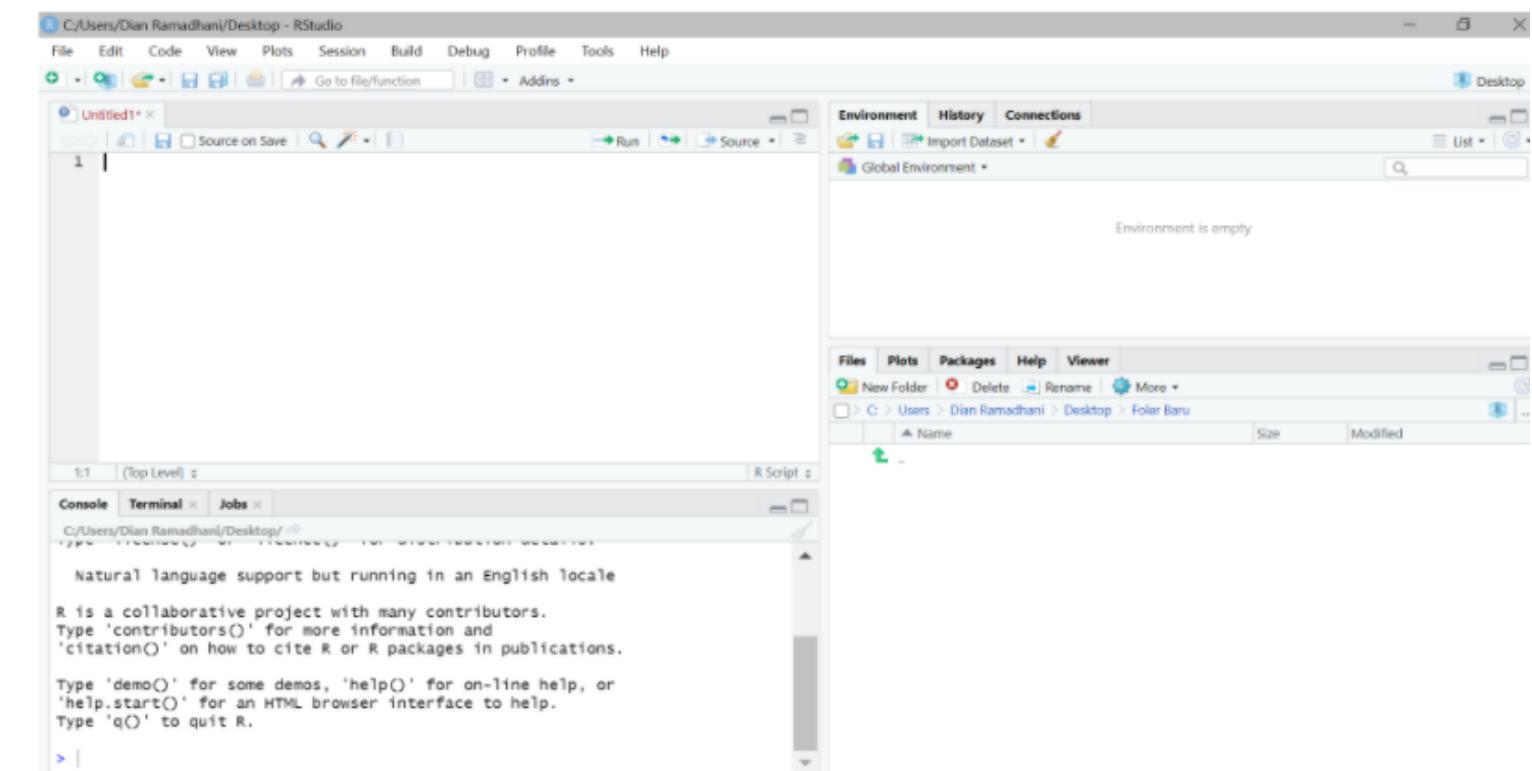
## Traffic by industry to R

Comparing Jan-Sep of each year, in the United States and United Kingdom.



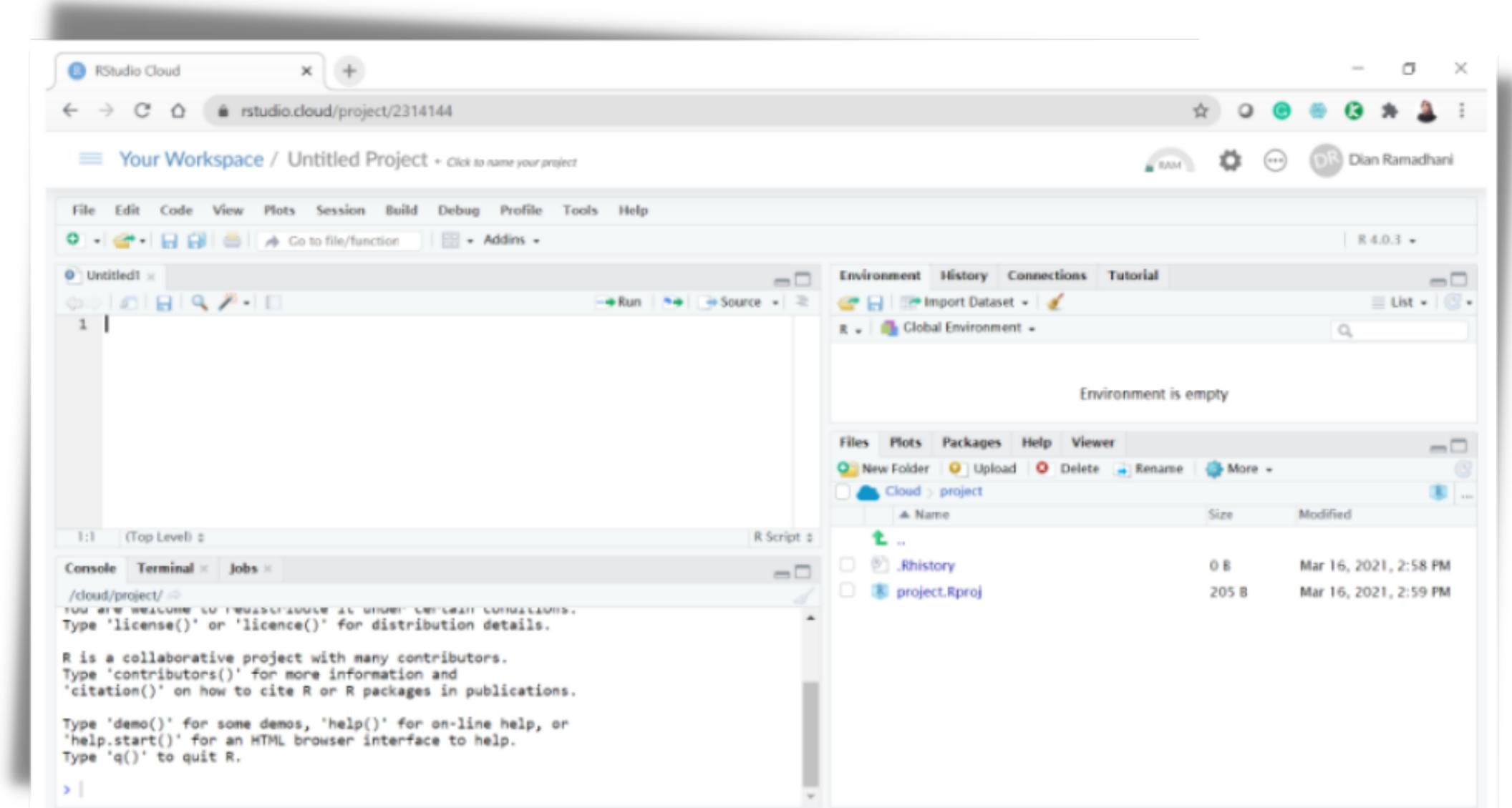
# What is R Studio?

RStudio is an integrated development environment (IDE) for R. It includes a console, syntax-highlighting editor that supports direct code execution, as well as tools for plotting, history, debugging and workspace management.



# R Studio Cloud

- Cloud Version of R Studio
- No need to install, run through browser
- Free with certain usage limit



# Try R Studio Cloud

Please create an R studio cloud account at <https://rstudio.cloud/>

The image shows two screenshots of the RStudio Cloud website. On the left is the homepage, featuring a large blue header with the RStudio Cloud logo and the text "RStudio Cloud" and "Do, share, teach and learn data science". It includes two buttons: "GET STARTED FOR FREE" and "ALREADY A USER? LOG IN". On the right is the login page, which has fields for "Email" and "Password", a "Log in" button, and links for "Forgot your password?" and "Sign up". Below these are "Log in with Google" and "Log in with GitHub" buttons, each with its respective logo. At the bottom of the login page is a small note: "By clicking log in, you agree to the RStudio.cloud terms of use."

# R Package

- R packages are collections of functions and data sets developed by R user or R community.
  - Packages increase the power of R by improving existing base R functionalities, or by adding new ones.

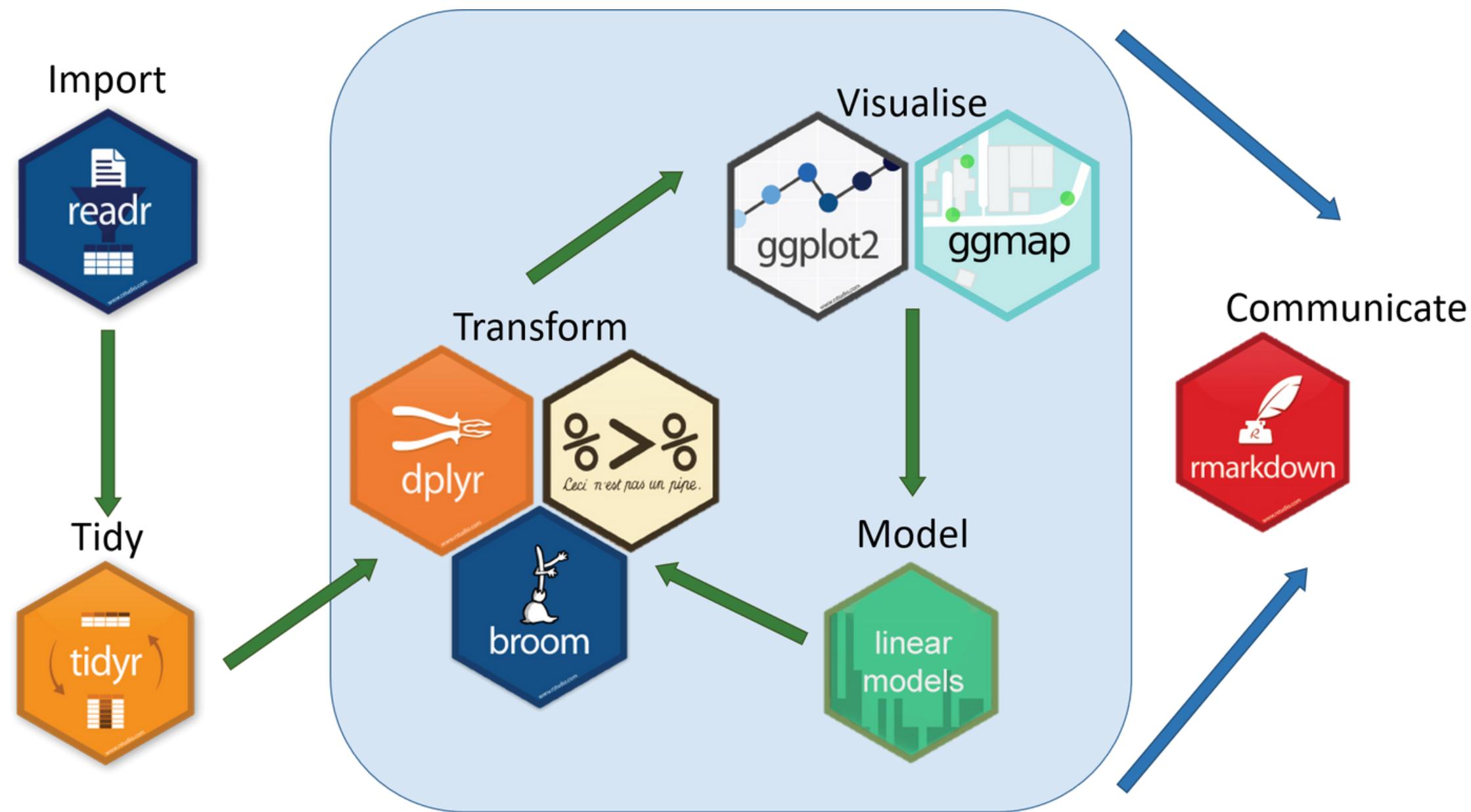


# Finding the Right Package

- We can search for R packages (curated) via CRAN (Comprehensive R Archive Network).  
There are currently 18273 packages available on CRAN.
- We can search packages by topic in CRAN Task View

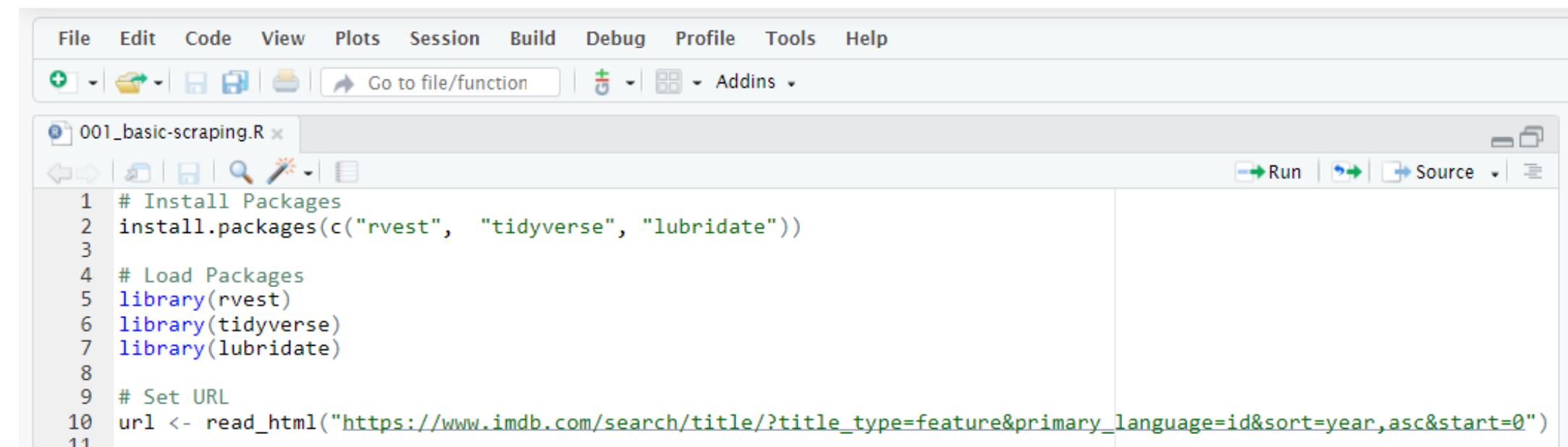
Available CRAN Packages By Name	
<a href="#">A</a> <a href="#">B</a> <a href="#">C</a> <a href="#">D</a> <a href="#">E</a> <a href="#">F</a> <a href="#">G</a> <a href="#">H</a> <a href="#">I</a> <a href="#">J</a> <a href="#">K</a> <a href="#">L</a> <a href="#">M</a> <a href="#">N</a> <a href="#">O</a> <a href="#">P</a> <a href="#">Q</a> <a href="#">R</a> <a href="#">S</a> <a href="#">T</a> <a href="#">U</a> <a href="#">V</a> <a href="#">W</a> <a href="#">X</a> <a href="#">Y</a> <a href="#">Z</a>	
<a href="#">A3</a>	Accurate, Adaptable, and Accessible Error Metrics for Predictive Models
<a href="#">aaSEA</a>	Amino Acid Substitution Effect Analyser
<a href="#">AATtools</a>	Reliability and Scoring Routines for the Approach-Avoidance Task
<a href="#">ABACUS</a>	Apps Based Activities for Communicating and Understanding Statistics
<a href="#">abbyyR</a>	Access to Abbyy Optical Character Recognition (OCR) API
<a href="#">abc</a>	Tools for Approximate Bayesian Computation (ABC)
<a href="#">abc.data</a>	Data Only: Tools for Approximate Bayesian Computation (ABC)
<a href="#">ABC.RAP</a>	Array Based CpG Region Analysis Pipeline
<a href="#">abcADM</a>	Fit Accumulated Damage Models and Estimate Reliability using ABC
<a href="#">ABCanalysis</a>	Computed ABC Analysis
<a href="#">abcdeFBA</a>	ABCDE_FBA: A-Biologist-Can-Do-Everything of Flux Balance Analysis with this package
<a href="#">ABCoptim</a>	Implementation of Artificial Bee Colony (ABC) Optimization
<a href="#">ABCp2</a>	Approximate Bayesian Computational Model for Estimating P2
<a href="#">abcrf</a>	Approximate Bayesian Computation via Random Forests
<a href="#">abcrlda</a>	Asymptotically Bias-Corrected Regularized Linear Discriminant

# Tidyverse



# Use A Package

- Packages that will be used must be installed and loaded first.
- The installation is only done once, the load is carried out every time it is used (Similar to the working principle of computer applications)
- Each package has its own purpose and function, just install/load what you need.



```
File Edit Code View Plots Session Build Debug Profile Tools Help
+ | Go to file/function | Addins |
001_basic-scraping.R x
Run | Source |
1 # Install Packages
2 install.packages(c("rvest", "tidyverse", "lubridate"))
3
4 # Load Packages
5 library(rvest)
6 library(tidyverse)
7 library(lubridate)
8
9 # Set URL
10 url <- read_html("https://www.imdb.com/search/title/?title_type=feature&primary_language=id&sort=year,asc&start=0")
11
```

# Use A Package



Install

```
install.packages()
```



Load

```
Load: library()  
Detach: detach()
```

Help

```
package?  
help(package="x")
```

 **LED Book Light**

17207

#### OPERATION

- Push the tip of the book light in and lift up to turn it on.
- Clip the book light onto the book or magazine you wish to read.
- Adjust the light to the desired viewing angle by moving the lid and/or moving the LED bulb in its socket.
- Close the book light to turn it off.

#### REPLACEMENT BATTERY INSTALLATION

- Slide out the battery cover.
- Follow the polarity instructions to install 2 new batteries type CR2032.
- Replace the battery cover.

NOTE: Do not mix old and new batteries. This will keep the unit from performing as intended. If the light will not be in use for an extended period, remove the batteries from the product.