

# Introduction to




## Lecture 2

Dr. Nikolaos C. Poulios




Montanuniversität Leoben

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# Overview


- 1 Section 1
  - Introduce 
  - Why  ?
- 2 Section 2
  - Introduction to 
- 3 Section 3
  - Introduction to Jupyter lab
- 4 Section 4
  - Introduction to RStudio
- 5 Bibliography

# Talk Overview


- 1 Section 1
  - Introduce 
  - Why  ?
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- 3 Section 3
  - Introduction to Jupyter lab
- 4 Section 4
  - Introduction to RStudio
- 5 Bibliography

# Useful information



 was created by Ihaka (left) and Gentleman (right).

 software is more appropriate for statistical analysis.

 is open-source and free of charge under the GNU General Public Licence.

<https://www.r-project.org/>

A huge number of plot functions that helps into visualization and understand the data structure.


Variables, functions, results, etc. stored in the RAM of a computer, i.e. objects, with a specif name.



Every object starts with a capital or lowercase letter following by numbers and dots.

# Why ?

Extremely powerful programming language.

Easy to use, easy to learn, and excellent flexibility.



Many publications from the Statistical Science field, provide their analysis with .


Secure!  is open-source → anyone who using  can have an access to the code, before doing an analysis.


Amazing graphical environment.

Absolutely free in comparison with other alternatives statistical packages, like Minitab, SPSS, etc.

# Packages

 comes with some packages that are appropriate for the basic functionalities. All functions are stored into a library and this library contains function packages. Package name "*base*" is the heart of the  and includes all the basic functions which are necessary to work with data.

Apart from the previous the  community has been contribute with more than 19000 packages so far.

Some packages must be load to  before we use them.

Infinitely many applications like

Economic Analysis

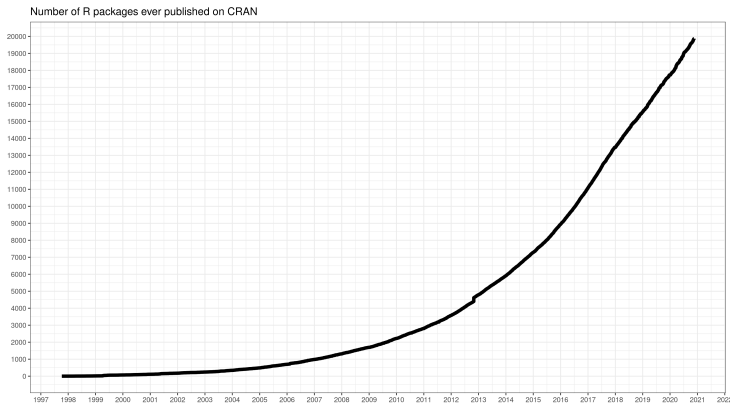
Medicine

Social Sciences

Natural Sciences

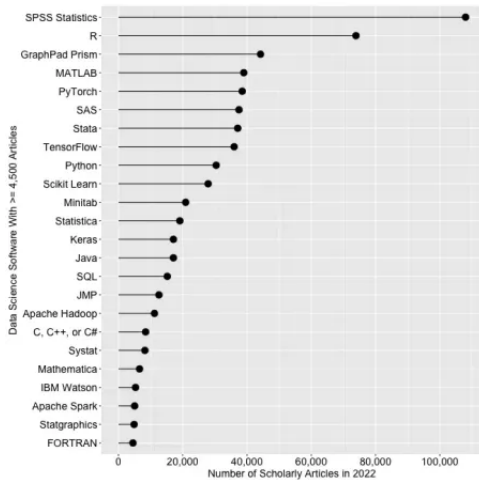
etc.

# Packages of



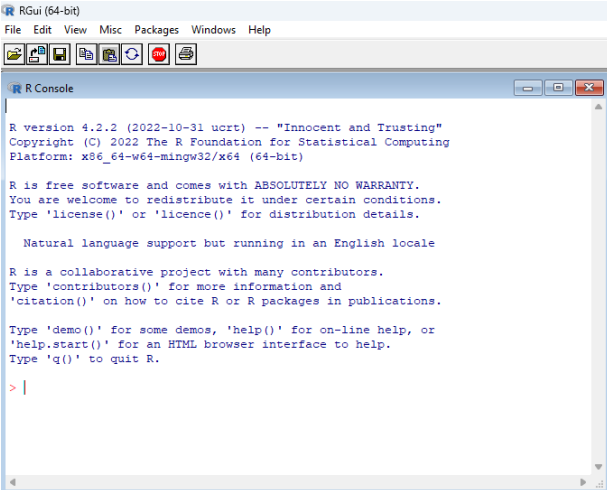
**Figure:** *The growth of submitted packages on CRAN. [Dar24]*

# Popularity of



**Figure:** *Popularity of  vs other software packages. [RAD22]*

# Environment of



The screenshot shows the RGui (64-bit) application window. The title bar reads "RGui (64-bit)". The menu bar includes "File", "Edit", "View", "Misc", "Packages", "Windows", and "Help". Below the menu bar is a toolbar with icons for file operations and execution. The main window is titled "R Console" and contains the following text:

```
R version 4.2.2 (2022-10-31 ucrt) -- "Innocent and Trusting"
Copyright (C) 2022 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (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.

> |
```

Figure: *The  environment.*

## File

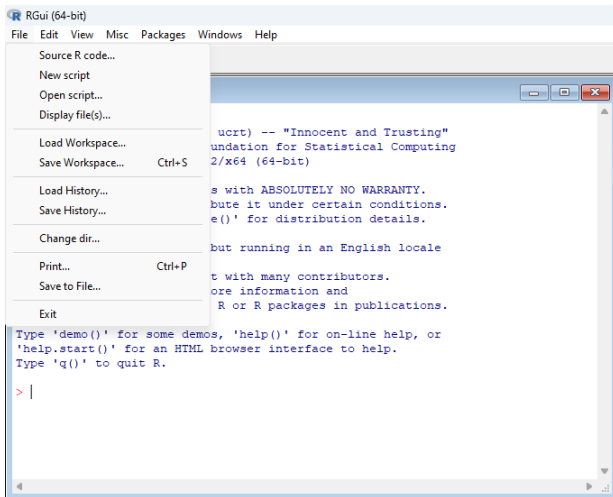


Figure: File option of R.

# File options

## Source code

Import and execution previous commands.

## New Script

Open a new script and print out what we want to do. Select all the typed expression → right click → **Run line or selection** or **Ctrl + R**.

## Open script

To open a file that we have created, for further editing.

## Display file(s)

Shows the available files in our working directory.

## Load / Save Workspace

To **Load** or **Save (Ctrl + S)** previous Workspace results where we have been created.

## Load / Save History

Import or save commands where we have been created.

## Change dir

To change the current working directory.

## Edit

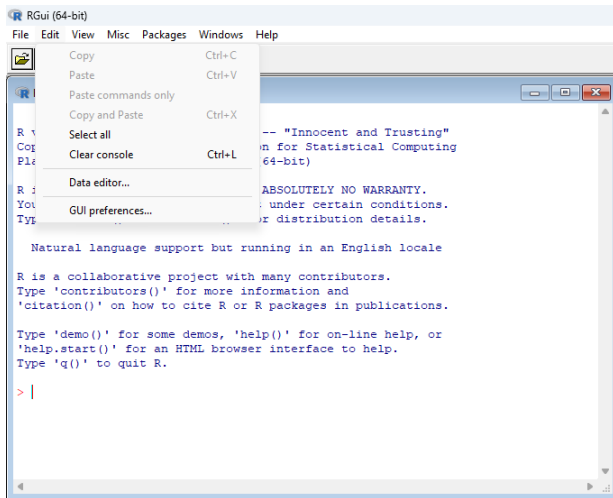


Figure: Edit option of R.

# Edit options

**Copy, Paste, Select all, . . .** → no comments :)

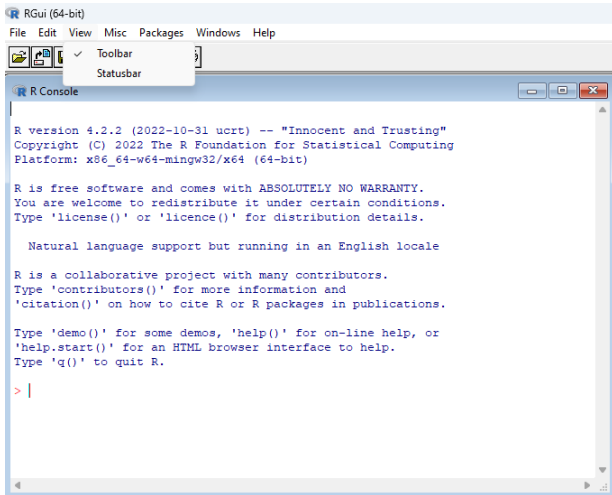
## Data editor

Open data frames and edit them

## GUI Preferences

Change the working environment (fonts, etc.).

## View



```
RGui (64-bit)
File Edit View Misc Packages Windows Help
Toolbar
Statusbar

R Console

R version 4.2.2 (2022-10-31 ucrt) -- "Innocent and Trusting"
Copyright (C) 2022 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)


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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.

> |
```


**Figure:** View option of .

# View Options

## Toolbar

To cover or uncover the toolbar.

## Statusbar

To cover or uncover the statusbar (information regarding the current version of .

## Misc

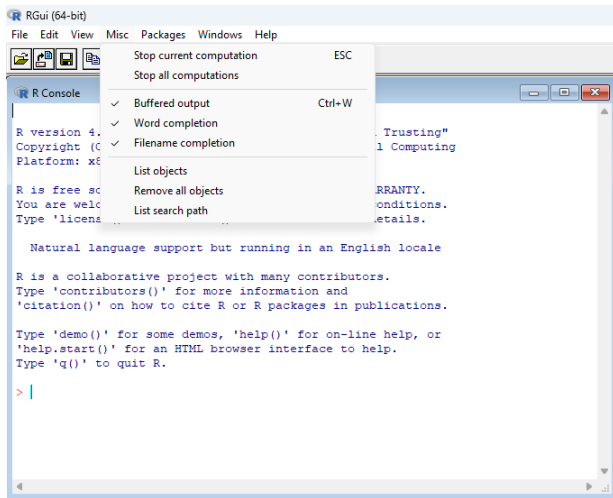


Figure: Misc option of R.

# Misc options

User can stop current or all computations.

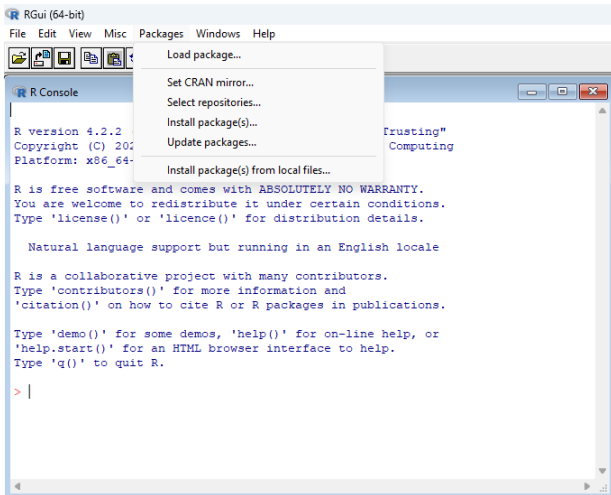
User can stop print results ([buffered output](#) or `Ctrl+W`).

User can access all the objects have been created ([List objects](#)).

User can remove all these objects have been created ([Remove all objects](#)).

User can view which libraries and data frames have been used in the current working environment ([List search path](#)).

# Packages



**Figure:** *Packages* option of R.

# Packages options

A user can load packages that have been already download ([Load Package](#)).

A user can choose from which place of the world wants his packages been download ([Set CRAN mirror](#)).

Interact with the user to choose the package repositories to be used ([Select repositories](#)).

A user can download packages from the CRAN ([Install package\(s\)](#)).

A user can update one or all packages that have been downloaded ([Update package\(s\)](#)).

A user can install packages that have been downloaded priviously and saved locally in the HDD ([Install package\(s\) from local files](#)).

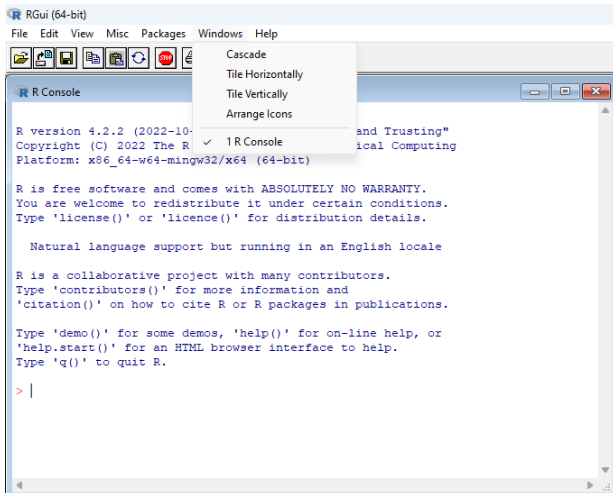
You can install a package with the following command in the  console:

```
install.packages("name of a package")
```

`search()`: Gives a list of attached packages.


`installed.packages()`: Returns details of all packages installed.

## Windows



**Figure:** *Windows* option of **R**.

# Windows options

A user can arrange all opened windows have been produces by  and arrange them in four different ways:

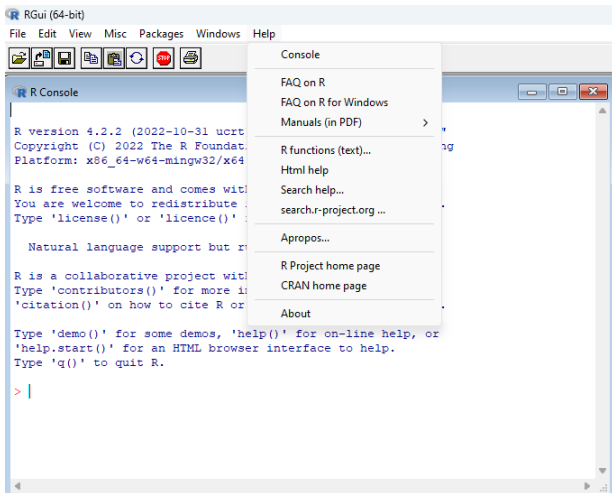
Cascade.

Tile Horizontally.

Tile Vertically.




Arange Icons.

# Help




**Figure:** *Help option of R.*

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# Numerical operators

Symbol	Operation
+	Addition
-	Substraction
×	Multiplication
÷	Divisor
^	Power
$x\%/%y$	Integer division
$x\%%y$	Modulus (remainder)

**Table:** *Numerical Operations of *.

# Installation of R

The screenshot shows the R Project website. At the top, there is a navigation bar with links for Section 1, Section 2, Section 3, and Section 4. The main header reads "Installation of R". Below this, the website content is visible. On the left, there is a sidebar with navigation links: Home, Download (CRAN), R Project (About R, Logo, Contributors, What's New?, Reporting Bugs, Conferences, Search, Get Involved, Mailing Lists, Get Involved: Contributing, Developer Pages, R Blog), R Foundation (Foundation, Board, Members, Donors, Donate), Help With R (Getting Help), Documentation (Manuals, FAQs, The R Journal, Books, Certification, Other), and Links (Bioconductor, R-Forge, R-Hub, CRAN). The main content area is titled "The R Project for Statistical Computing" and "Getting Started". It explains that R is a free software environment for statistical computing and graphics. Below this, there is a "News" section with several bullet points: R version 4.3.3 (Angel Food Cake) prerelease versions will appear starting Monday 2024-02-19; Final release is scheduled for Thursday 2024-02-29; Registration for useR! 2024 has opened with early bird deadline March 31 2024; R version 4.3.2 (Eye Holes) has been released on 2023-10-31; R version 4.2.3 (Shortstop Beagle) has been released on 2023-05-15; and you can support the R Foundation with a renewable subscription as a supporting member. Below the news is a "News via Mastodon" section featuring a Mastodon post from userR\_conf about the useR! 2024 conference in Salzburg, Austria, on July 8-11, 2024. The post includes details about early bird tickets, sponsorship, venue (Wyndham Grand Salzburg Conference Centre), dates, and a link to the website. Below the text is a promotional image for the conference with the text "8-11 July, 2024 | Salzburg, Austria + Virtual", "#useR2024", and "REGISTER NOW".

Figure: The R project. <https://www.r-project.org/>

# Installation of

CRAN Mirrors

The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: [main page](#), [windows release](#), [windows old release](#).

If you want to host a new mirror at your institution, please have a look at the [CRAN Mirror HOWTO](#).

0-Cloud  
<https://cloud.r-project.org/>

Argentina  
<http://mirror.uba.ar/CRAN/>

Australia  
<https://cran.csiro.au/>  
<https://mirror.aarnet.edu.au/pub/CRAN/>  
<https://cran.us.winnethi.edu.au/>

Austria  
<https://cran.wu.ac.at/>

Belgium  
<https://www.frorstatistics.org/cran/>  
<https://du.be/ies.be/mirror/CRAN/>

Brazil  
<https://cran.r.fdn.br/>  
<https://cran.focuz.br/>  
<https://ys.fevz.usp.br/CRAN/>  
<https://brevier.esalq.usp.br/CRAN/>

Bulgaria  
<https://ftp.uni-sofia.bg/CRAN/>

Canada  
<https://mirror.ror.sfu.ca/mirror/CRAN/>  
<https://mirror.ca/mirror/cran/>  
<https://mirror.ca/lab.waterloo.ca/CRAN/>

Chile  
<https://cran.dcc.uchile.cl/>

China  
<https://mirrors.tuna.tsinghua.edu.cn/CRAN/>  
<https://mirrors.bnu.edu.cn/CRAN/>  
<https://mirrors.pku.edu.cn/CRAN/>  
<https://mirrors.ustc.edu.cn/CRAN/>  
<https://mirrors.szu.edu.cn/CRAN/>  
<https://mirror.hk.hktds.net/CRAN/>  
<https://mirrors.e-education.cn/CRAN/>  
<https://mirrors.glu.edu.cn/CRAN/>  
<https://mirror.lzu.edu.cn/CRAN/>  
<https://mirrors.nyu.edu.cn/CRAN/>  
<https://mirrors.sjtu.edu.cn/CRAN/>  
<https://mirrors.nust.edu.cn/CRAN/>  
<https://mirrors.nwafu.edu.cn/cran/>

Columbia

Automatic redirection to servers worldwide, currently sponsored by Posit

Universidad Nacional de La Plata

CSIRO  
 AARNET  
 School of Mathematics and Statistics, University of Melbourne

Wirtschaftsuniversität Wien

Patrick Weena  
 Belnet, the Belgian research and education network

Universidade Federal do Paraná  
 Osvaldo Cruz Foundation, Rio de Janeiro  
 University of Sao Paulo, Sao Paulo  
 University of Sao Paulo, Piracicaba

Sofia University

Simon Fraser University, Burnaby  
 Manitoba Unix User Group  
 University of Waterloo

Departamento de Ciencias de la Computación, Universidad de Chile

TUNA Team, Tsinghua University  
 Beijing Foreign Studies University  
 Peking University  
 University of Science and Technology of China  
 Zhejiang University  
 KoDDoS in Hong Kong  
 Elite Education  
 Qilu University of Technology  
 Lanzhou University Open Source Society  
 eSource Center, Nanjing University  
 Shanghai Jiao Tong University  
 Southern University of Science and Technology (SUSTech)  
 Northwest A&F University (NWAFU)

Figure: The  project.

# Installation of R

The screenshot shows the CRAN website with the following content:

**Download and Install R**

Precompiled binary distributions of the base system and contributed packages, Windows and Mac users most likely want one of these versions of R:

- Download R for Linux (Debian, Fedora/Redhat, Ubuntu)
- Download R for macOS
- Download R for Windows

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2023-10-31, Eye Holes) [R 4.3.2 tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R, alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#)

Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

Supporting CRAN

CRAN operations, most importantly hosting, checking, distributing, and archiving of R add-on packages for various platforms, crucially rely on technical, emotional, and financial support by the R community.

Please consider making [financial contributions](#) to the R Foundation for Statistical Computing.

What are R and CRAN?

R is "GNU S", a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modeling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R project homepage](#) for further information.

CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Submitting to CRAN

To "submit" a package to CRAN, check that your submission meets the [CRAN Repository Policy](#) and then use the [web form](#).

If this fails, send an email to [CRAN-submissions@R-project.org](mailto:CRAN-submissions@R-project.org) following the policy. Please do not attach submissions to emails, because this will clutter up the mailboxes of half a dozen people.

Note that we generally do not accept submissions of precompiled binaries due to security reasons. All binary distribution listed above are compiled by selected maintainers, who are in charge for all binaries of their platform, respectively.

Figure: The R project.

# Installation of R

https://cran.r-project.org

R for Windows

Subdirectories:

- [base](#) Binaries for base distribution. This is what you want to **install R for the first time**.
- [contrib](#) Binaries of contributed CRAN packages (for R >= 3.4.x).
- [old.contrib](#) Binaries of contributed CRAN packages for outdated versions of R (for R < 3.4.x).
- [Rtools](#) Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

CRAN  
 Mirrors  
 What's new?  
 Search  
 CRAN Team  
 About R  
 R Homepage  
 The R Journal  
 Software  
 R Sources  
 R Binaries  
 Packages  
 Task Views  
 Other  
 Documentation  
 Manuals  
 FAQs  
 Contributed  
 Donations  
 Donate

Figure: The R project.

# Installation of R

Download R-4.3.2 for Windows (79 megabytes, 64 bit)

README on the Windows binary distribution  
New features in this version

This build requires UCRT, which is part of Windows since Windows 10 and Windows Server 2016. On older systems, UCRT has to be installed manually from [here](#).

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the [md5 sums](#) of the .exe to the [fingerprints](#) on the master server.

Frequently asked questions

- Does R run under my version of Windows?
- How do I update packages in my previous version of R?

Please see the [R FAQ](#) for general information about R and the [R Windows FAQ](#) for Windows-specific information.

Other builds

- Patches to this release are incorporated in the [patched snapshot build](#).
- A build of the development version (which will eventually become the next major release of R) is available in the [R-devel snapshot build](#).
- [Previous releases](#)

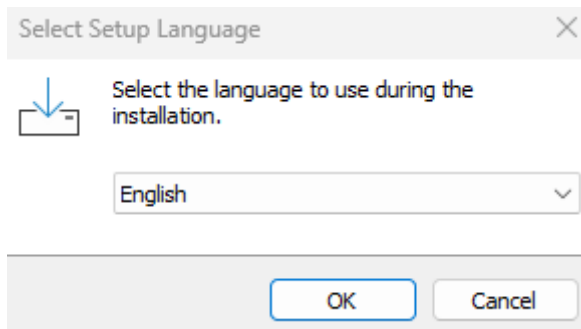
Note to webmasters: A stable link which will redirect to the current Windows binary release is [CRAN MIRROR:bin/windows/base/release.html](#).

Last change: 2023-10-31

CRAN  
Mirrors  
What's new?  
Search  
CRAN Team  
About R  
R Homepage  
The R Journal  
Software  
R Sources  
R Binaries  
Packages  
Task Views  
Other  
Documentation  
Manuals  
FAQs  
Contributed  
Donations  
Donate

Figure: The R project.

# Installation of R



**Figure:** *The R project.*

# Installation of R

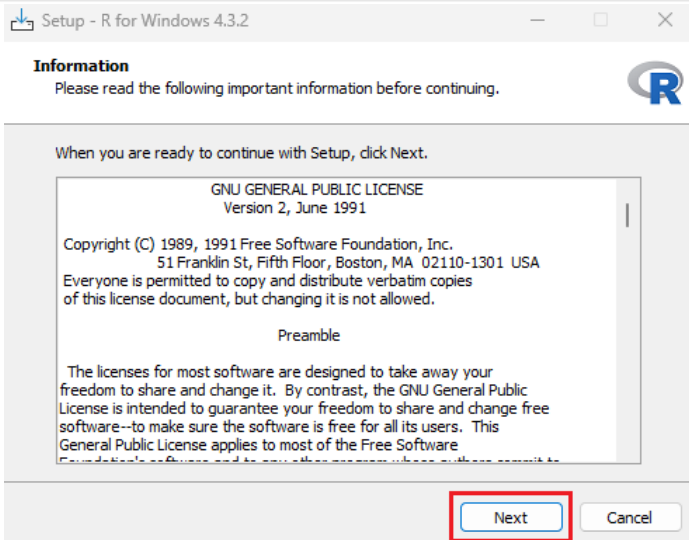


Figure: The R project.

# Installation of R

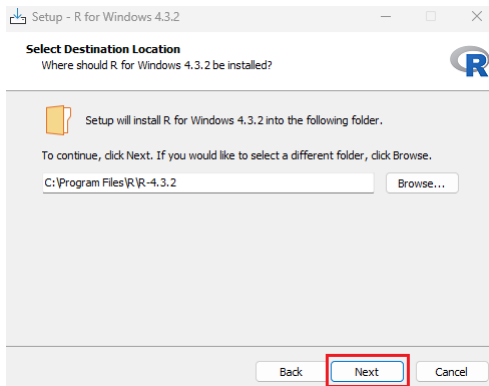


Figure: *The R project.*

# Installation of R

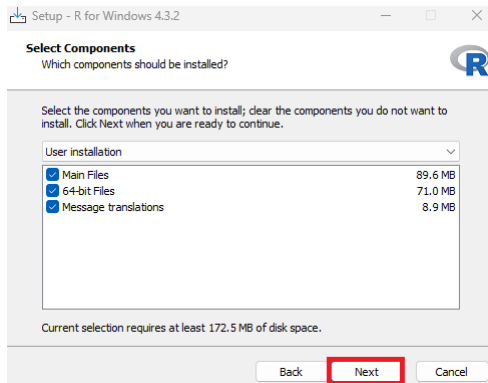


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# Installation of R

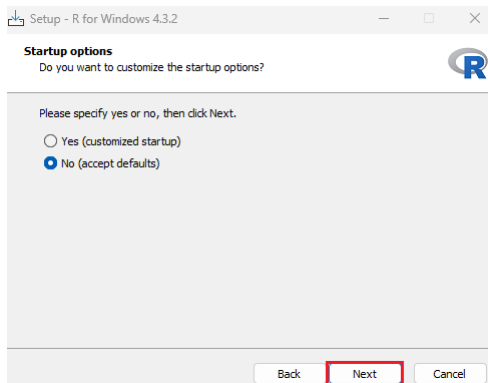


Figure: *The R project.*

# Installation of R

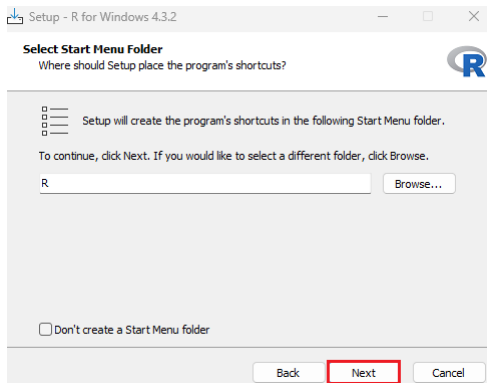


Figure: *The R project.*

# Installation of R

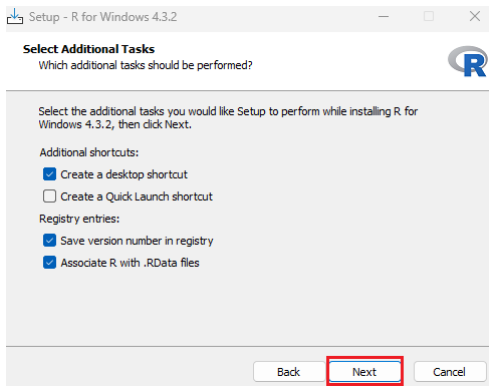
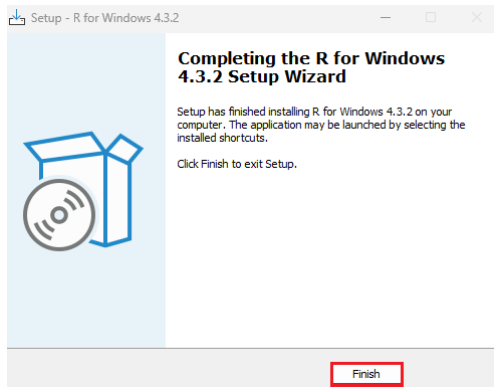


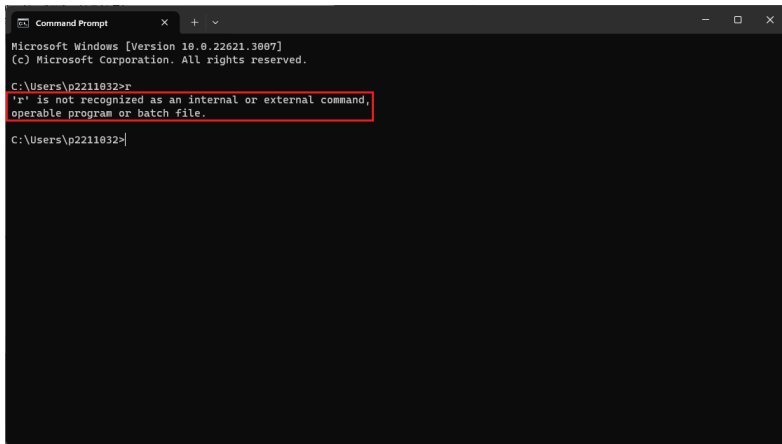
Figure: *The R project.*

# Installation of



**Figure:** *The  project.*

# Installation of R



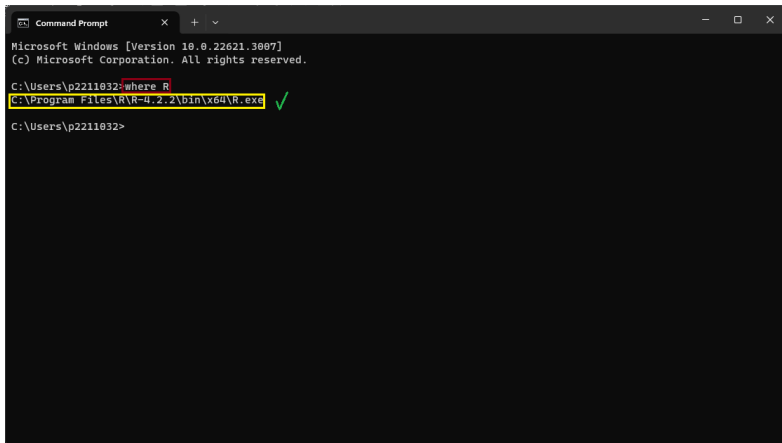
```
Command Prompt
Microsoft Windows [Version 10.0.22621.3007]
(c) Microsoft Corporation. All rights reserved.

C:\Users\p2211032>r
'r' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\p2211032>
```

Figure: The R project.

# Installation of R



```
Command Prompt
Microsoft Windows [Version 10.0.22621.3007]
(c) Microsoft Corporation. All rights reserved.

C:\Users\p2211032>where R
C:\Program Files\R\R-4.2.2\bin\x64\R.exe ✓

C:\Users\p2211032>
```

**Figure:** *The R project.*

# Installation of R

## Add R path to Environment Variables

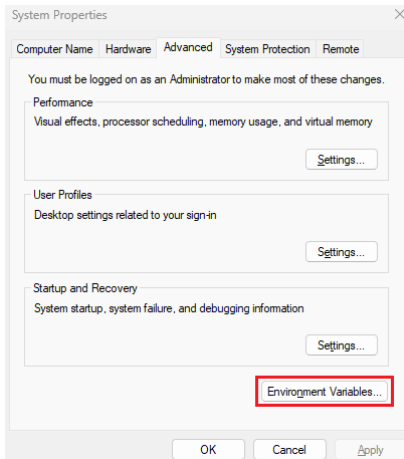


Figure: The R project.

# Installation of

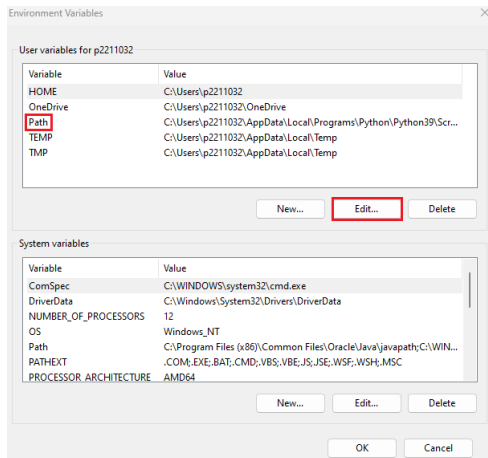


Figure: The  project.

# Installation of R

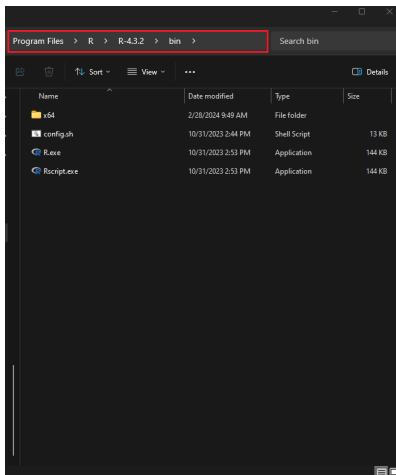


Figure: The R project.

# Installation of R

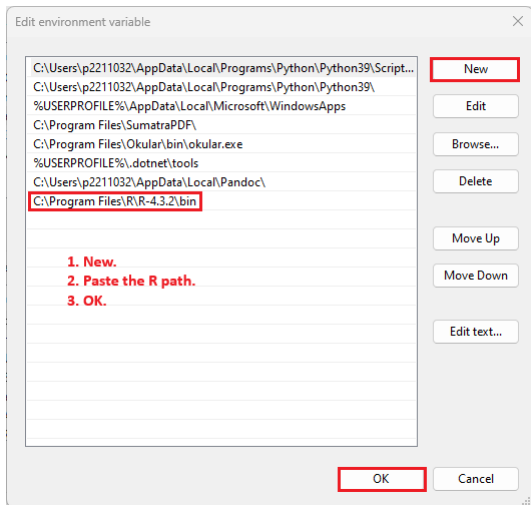


Figure: *The R project.*

# Installation of

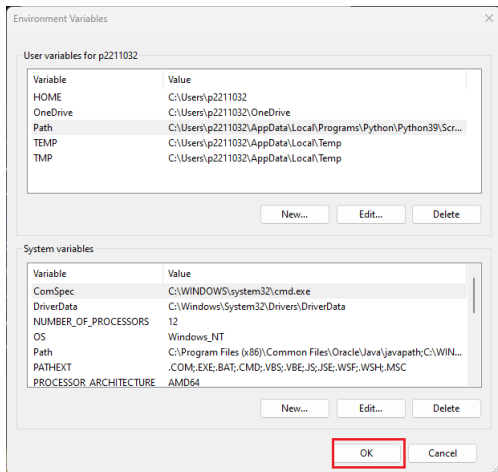
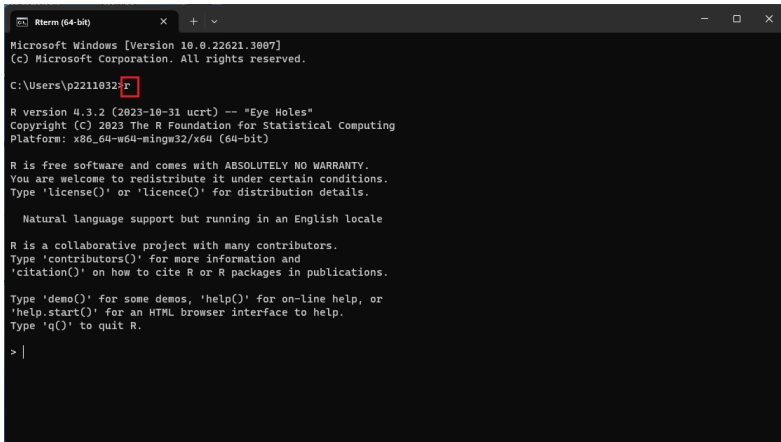


Figure: The  project.

# Installation of

Done!! We are ready to go!



```
Microsoft Windows [Version 10.0.22621.3007]
(c) Microsoft Corporation. All rights reserved.

C:\Users\p2211032>r

R version 4.3.2 (2023-10-31 ucrt) -- "Eye Holes"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (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.
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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.

> |
```

Figure: *The  project.*

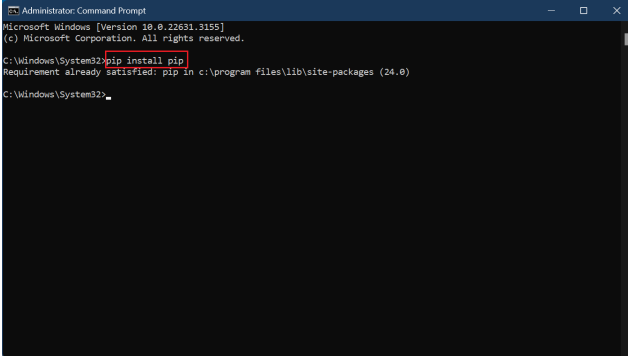
# Talk Overview

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- 2 Section 2
  - Introduction to 
- 3 Section 3**
  - Introduction to Jupyter lab
- 4 Section 4
  - Introduction to RStudio
- 5 Bibliography

# Introduction to Jupyter lab

## Install Jupyter on Windows


The pip package: <https://pypi.org/project/pip/>



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

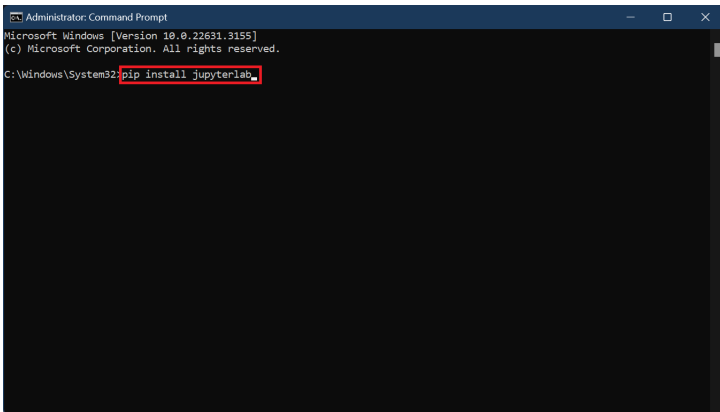
C:\Windows\System32>pip install pip
Requirement already satisfied: pip in c:\program files\lib\site-packages (24.0)

C:\Windows\System32>
```

Figure: The  project.


# Introduction to Jupyter lab

The Jupyter environment: <https://jupyter.org/>



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32> pip install jupyterlab
```


Figure: *The  project.*

# Introduction to Jupyter lab

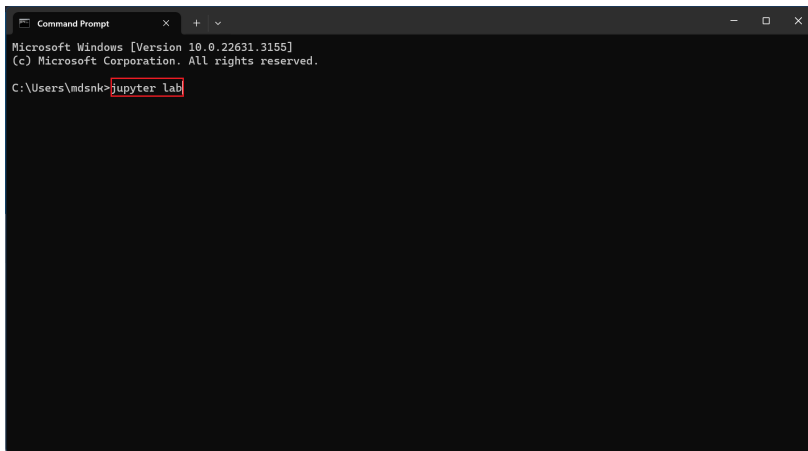
```

Administrator: Command Prompt
----- 66.4/66.4 kB 3.5 MB/s eta 0:00:00
Downloading pycparser-2.21-py2.py3-none-any.whl (118 kB)
----- 118.7/118.7 kB 7.2 MB/s eta 0:00:00
Downloading types_python_dateutil-2.8.19.20240106-py3-none-any.whl (9.7 kB)
Installing collected packages: webencodings, wcwidth, pywin32, pure-eval, fastjsonschema, websocket-client, webcolors, u
rllib3, uri-template, types-python-dateutil, traitlets, tornado, tinycss2, soupsieve, sniffio, six, send2trash, rpds-py,
rfc3986-validator, pyzmq, pyyaml, pywinpty, python-json-logger, pygments, pycparser, psutil, prompt-toolkit, prometheus
-client, platformdirs, parso, pandocfilters, packaging, overrides, nest-asyncio, mistune, MarkupSafe, jupyterlab-pygment
s, jsonpointer, json5, idna, h11, fqdn, executing, defusedxml, decorator, debugpy, colorama, charset-normalizer, certifi
, babel, attrs, async-lru, terminado, rfc3339-validator, requests, referencing, python-dateutil, matplotlib-inline, jupy
ter-core, jinja2, jedi, httpcore, comm, cffi, bleach, beautifulsoup4, asttokens, anyio, stack-data, jupyter-server-termi
nals, jupyter-client, jsonschema-specifications, httpx, arrow, argon2-cffi-bindings, jsonschema, isoduration, ipython, a
rgon2-cffi, nbformat, ipykernel, nbclient, jupyter-events, nbconvert, jupyter-server, notebook-shim, jupyterlab-server,
jupyter-lsp, jupyterlab
Successfully installed MarkupSafe-2.1.5 anyio-4.3.0 argon2-cffi-23.1.0 argon2-cffi-bindings-21.2.0 arrow-1.3.0 asttokens
-2.4.1 async-lru-2.0.4 attrs-23.2.0 babel-2.14.0 beautifulsoup4-4.12.3 bleach-6.1.0 certifi-2024.2.2 cffi-1.16.0 charset
-normalizer-3.3.2 colorama-0.4.6 comm-0.2.1 debugpy-1.8.1 decorator-5.1.1 defusedxml-0.7.1 executing-2.0.1 fastjsonscem
a-2.19.1 fqdn-1.5.1 h11-0.14.0 httpcore-1.0.4 httpx-0.27.0 idna-3.6 ipykernel-6.29.3 ipython-8.22.1 isoduration-20.11.0
jedi-0.19.1 jinja2-3.1.3 json5-0.9.17 jsonpointer-2.4 jsonschema-4.21.1 jsonschema-specifications-2023.12.1 jupyter-clie
nt-8.6.0 jupyter-core-5.7.1 jupyter-events-0.9.0 jupyter-lsp-2.2.3 jupyter-server-2.12.5 jupyter-server-terminals-0.5.2
jupyterlab-4.1.2 jupyterlab-pygments-0.3.0 jupyterlab-server-2.25.3 matplotlib-inline-0.1.6 mistune-3.0.2 nbclient-0.9.0
nbconvert-7.16.1 nbformat-5.9.2 nest-asyncio-1.6.0 notebook-shim-0.2.4 overrides-7.7.0 packaging-23.2 pandocfilters-1.5
.1 parso-0.8.3 platformdirs-4.2.0 prometheus-client-0.20.0 prompt-toolkit-3.0.43 psutil-5.9.8 pure-eval-0.2.2 pycparser-
2.21 pygments-2.17.2 python-dateutil-2.8.2 python-json-logger-2.0.7 pywin32-306 pywinpty-2.0.13 pyyaml-6.0.1 pyzmq-25.1
.2 referencing-0.33.0 requests-2.31.0 rfc3339-validator-0.1.4 rfc3986-validator-0.1.1 rpds-py-0.18.0 send2trash-1.8.2 six
-1.16.0 sniffio-1.3.1 soupsieve-2.5 stack-data-0.6.3 terminado-0.18.0 tinycss2-1.2.1 tornado-6.4 traitlets-5.14.1 types-
python-dateutil-2.8.19.20240106 uri-template-1.3.0 urllib3-2.2.1 wcwidth-0.2.13 webcolors-1.13 webencodings-0.5.1 websoc
ket-client-1.7.0
C:\windows\System32>


```

Figure: *The  project.*

# Introduction to Jupyter lab



```
Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.
C:\Users\mdsnk>jupyter lab
```

Figure: *The  project.*

# Introduction to Jupyter lab

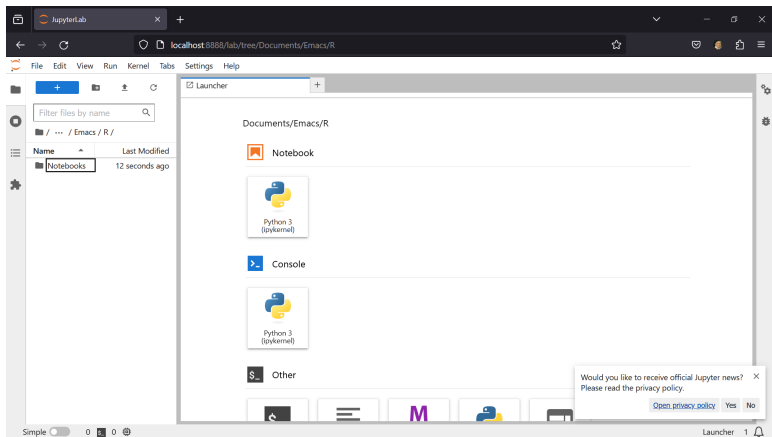

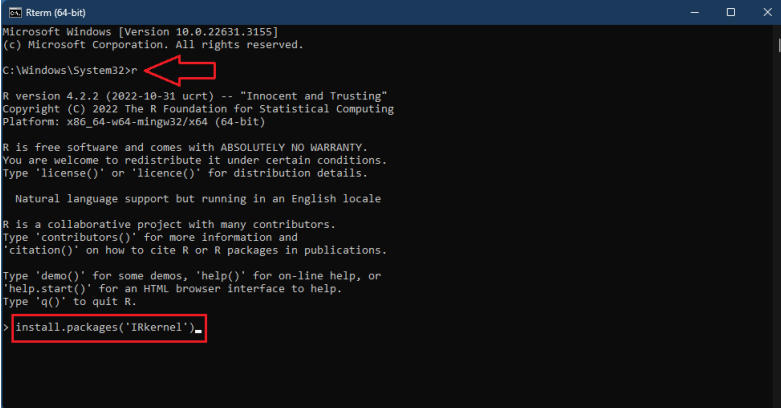


Figure: The  project.

# Introduction to Jupyter lab

`install.packages('IRkernel')` Keep in mind step 2!



```
Rterm (64-bit)
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32>

R version 4.2.2 (2022-10-31 ucrt) -- "Innocent and Trusting"
Copyright (C) 2022 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (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.

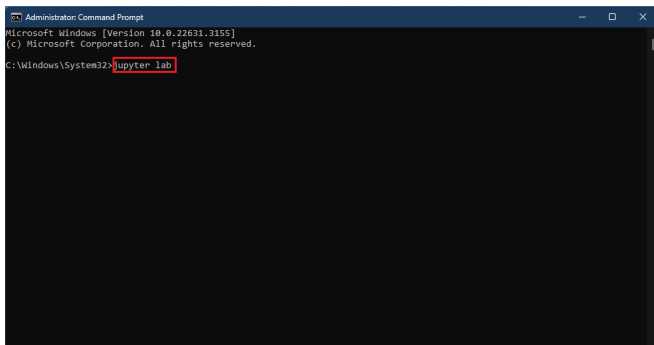
> install.packages('IRkernel')
```

Figure: The  project. <https://irkernel.github.io/installation/>




# Introduction to Jupyter lab

Type: `jupyter lab`



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32> jupyter lab
```

Figure: *The  project.*

# Introduction to Jupyter lab

The  environment

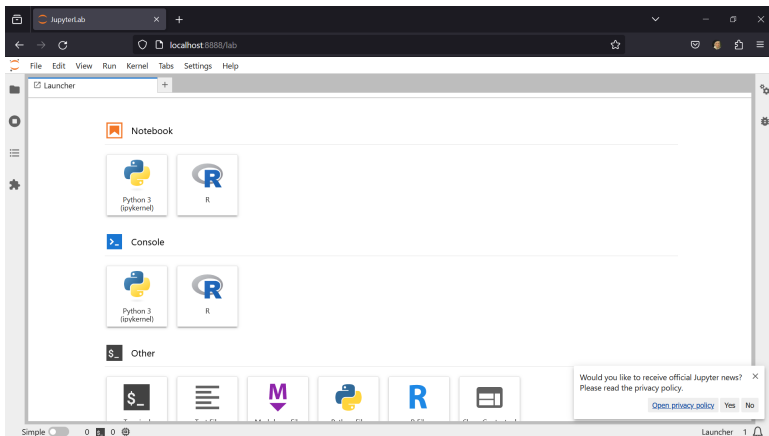



Figure: The  project.

# Introduction to Jupyter lab

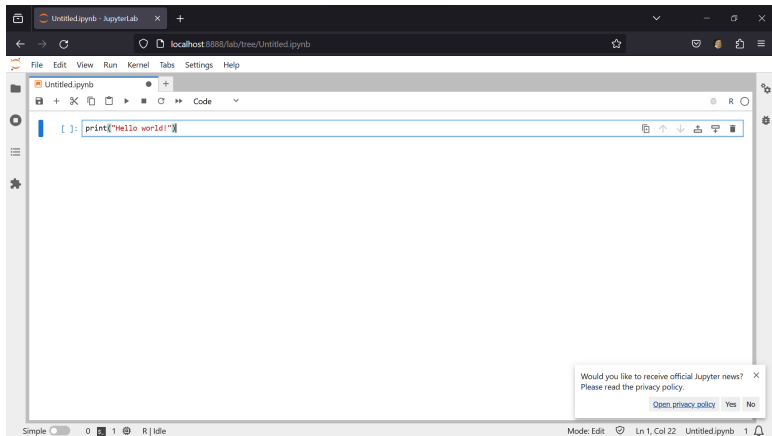



Figure: The  project.

# Introduction to Jupyter lab

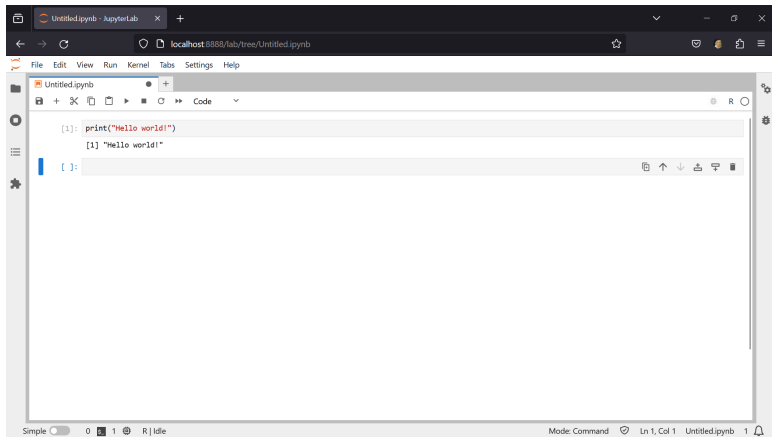






Figure: The  project.

# Talk Overview

- 1 Section 1
  - Introduce 
  - Why  ?
- 2 Section 2
  - Introduction to 
- 3 Section 3
  - Introduction to Jupyter lab
- 4 Section 4**
  - Introduction to RStudio**
- 5 Bibliography

# Introduction to RStudio

The screenshot shows the RStudio interface with the following callout boxes:

- Set your working directory to a specific folder.** (Two boxes, one above the other)
- Session -> Set Working Directory -> Choose Directory (Ctrl + Shift + H)**
- Import Dataset: Choose between different data file types.**
- Type your commands and press Run to execute them. Results are shown in the Console.**
- All files and folders can be viewed here. The Packages tab shows all available installed or uninstalled packages. The Help tab shows a manual about R, checks for how a package works, etc. The plots tab shows all graphs that have been produced.**

The console output shows the R version and license information:

```
R 4.3.2 -- (2023-10-31 ucrt) -- "Eye Holes"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (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.

>
The default R prompt.
```

Figure: RStudio. <https://posit.co/download/rstudio-desktop/>

# Talk Overview

- 1 Section 1
  - Introduce 
  - Why  ?
- 2 Section 2
  - Introduction to 
- 3 Section 3
  - Introduction to Jupyter lab
- 4 Section 4
  - Introduction to RStudio
- 5 Bibliography

# References

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# End of lecture 2

Thank you!