

Alternatives to RStudio

Workflow organisation with R

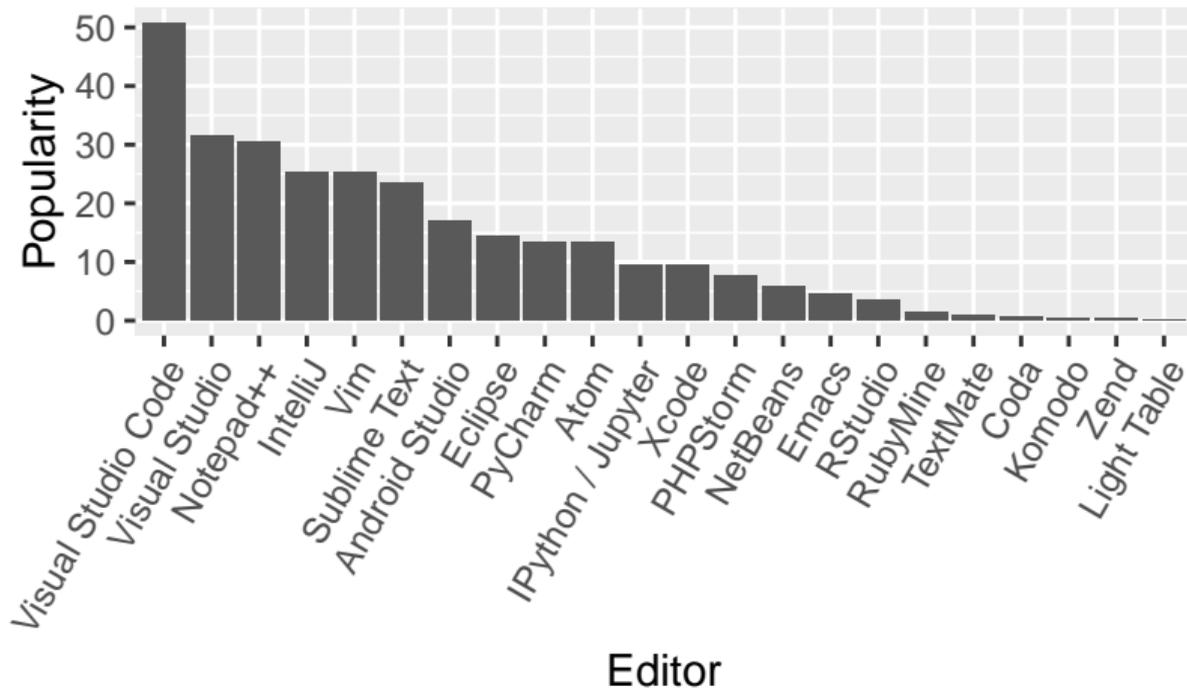
Nikita Gusarov
GAEL (UGA) - G-SCOP (Grenoble INP)

17/12/2020



Introduction

Workflow



Workflow types

- ▶ Text editor
- ▶ Notebook
- ▶ Integrated Development Environment (IDE)

```
# Running the setup first allows you to set the options of R code
```

```
# Note that if you want to load any other dependencies, you can load them here:
```

```
library(ggplot2)

# Getting Started with R

x <- 1
print (x <- x + 1)

# Graphs with RMarkdown

data <- cars
ggplot(data, aes(x = speed, y = dist)) +
  geom_point()

# Tables with R
## Using R Output

View(cars)

## Using grid.draw
## table with grid/gridExtra packages

library(grid)
library(gridExtra)

x <- tableGrob(head(cars, n=10))
grid.draw(x)
```

Entrée [1]:

```
# Running the setup first allows you to set the options of R code
# Note that if you want to load any other dependencies, you can load them here:

library(ggplot2)
```

Entrée [2]:

```
# Getting Started with R

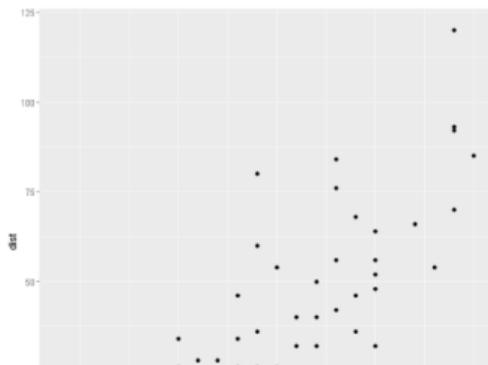
x <- 1
print (x <- x + 1)

[1] 2
```

Entrée [3]:

```
# Graphs with RMarkdown

data <- cars
ggplot(data, aes(x = speed, y = dist)) +
  geom_point()
```



```

1 # Running the setup first allows you to set the options of R code
2 # Note that if you want to load any other dependencies, you can load them here:
3
4 library(ggplot2)
5
6 # getting started with R
7
8 x <- 1
9 print(x <- x + 1)
10
11 # graphs with RMarkdown
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = dist)) +
15   geom_point()
16
17 # Tables with R
18 ## Using R output
19
20 head(cars, n=10)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27
28 x <- tableGrob(head(cars, n=10))
29 grid.draw(x)
  
```

22:1 (Top Level) R Script

Console Terminal Jobs

```

C:\Projects\Testing_R\ #
> x <- 1
> print(x <- x + 1)
[1] 2
> library(ggplot2)
> x <- 1
> print(x <- x + 1)
[1] 2
> data <- cars
> ggplot(data, aes(x = speed, y = dist)) +
+   geom_point()
> head(cars, n=10)
  speed dist
1     4    2
2     4   10
3     7    4
4     7   22
5     8   16
6     9   10
7    10   18
8    10   26
9    10   34
10   11   17
>
  
```

Environment History Connections Tutorial

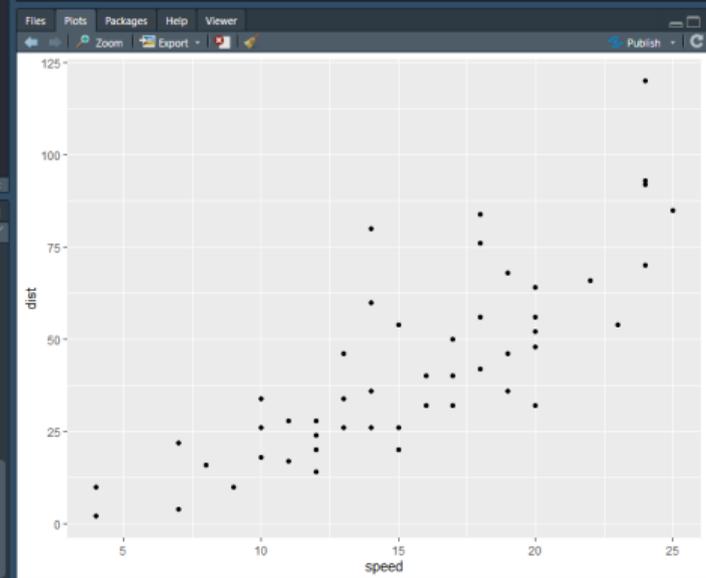
Global Environment

Data

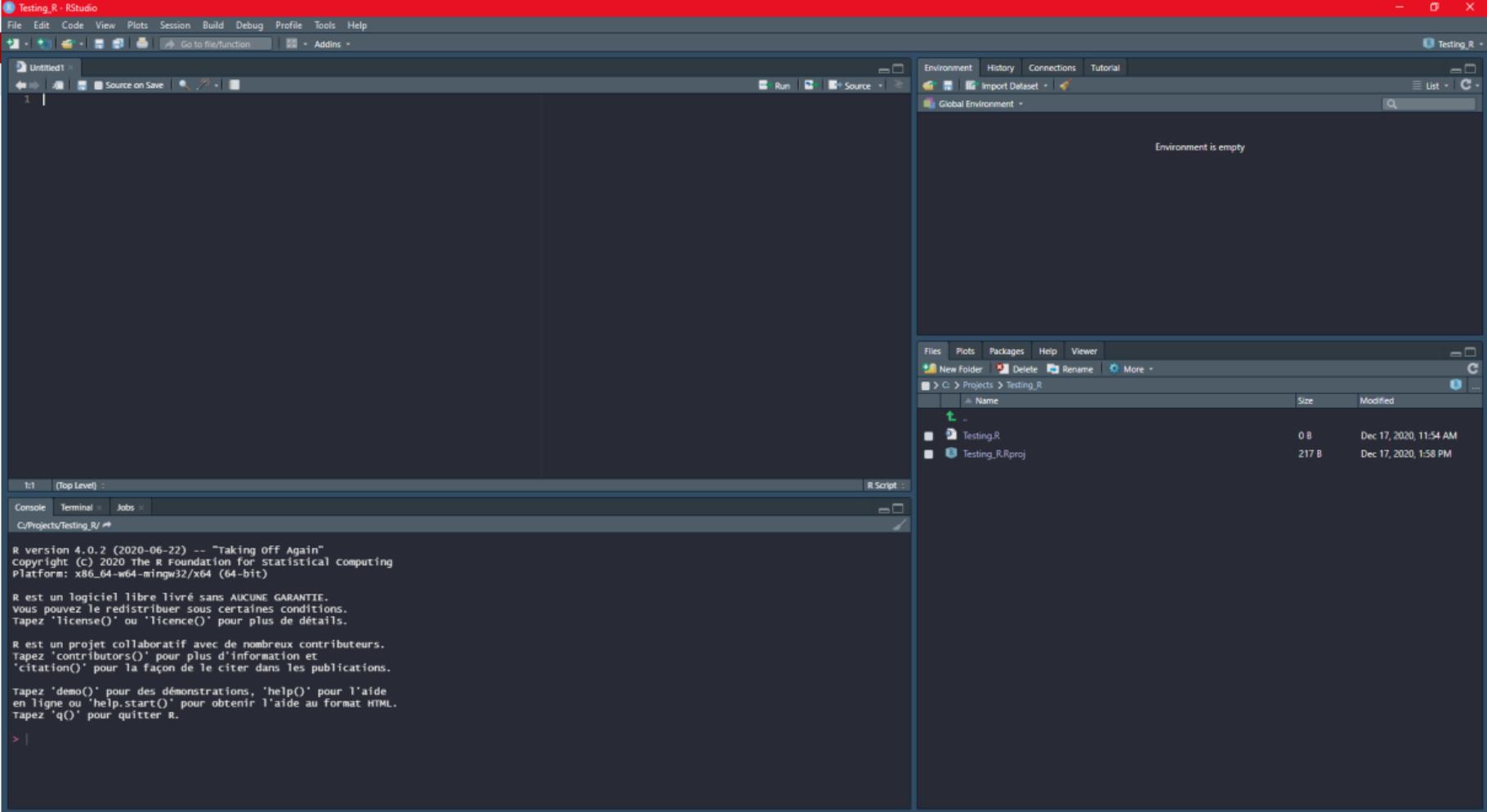
data 50 obs. of 2 variables

Values

x	2
---	---



What is RStudio ?



“An IDE that was built for R”

- ▶ Syntax highlighting, code completion, and smart indentation
- ▶ Execute R code directly from the source editor
- ▶ Quickly jump to function definitions

“Helps bring your workflow together”

- ▶ Integrated R help and documentation
- ▶ Easily manage multiple working directories using projects
- ▶ Workspace browser and data viewer

“Powerful authoring and debugging”

- ▶ Interactive debugger to diagnose and fix errors quickly
- ▶ Extensive package development tools
- ▶ Authoring with Sweave and R Markdown

And more . . .

- ▶ Runs on most desktops or on a server and accessed over the web
- ▶ Integrates the tools you use with R into a single environment
- ▶ Includes powerful coding tools designed to enhance your productivity
- ▶ Enables rapid navigation to files and functions

And more . . .

- ▶ Makes it easy to start new or find existing projects
- ▶ Has integrated support for Git and Subversion
- ▶ Supports authoring HTML, PDF, Word Documents, and slide shows
- ▶ Supports interactive graphics with Shiny and ggvis

Testing_R - RStudio

```
1 # Running the setup first allows you to set the options of R code
2 # Note that if you want to load any other dependencies, you can load them here:
3
4 library(ggplot2)
5
6 # getting started with R
7
8 x <- 1
9 print(x <- x + 1)
10
11 # graphs with RMarkdown
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = dist)) +
15   geom_point()
16
17 # Tables with R
18 ## Using R output
19
20 head(cars, n=10)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27
28 x <- tableGrob(head(cars, n=10))
29 grid.draw(x)
```

22:1 (Top Level) R Script

Console Terminal Jobs

```
C:\Projects\Testing_R\ #
> x <- 1
> print(x <- x + 1)
[1] 2
> library(ggplot2)
> x <- 1
> print(x <- x + 1)
[1] 2
> data <- cars
> ggplot(data, aes(x = speed, y = dist)) +
+   geom_point()
> head(cars, n=10)
  speed dist
1     4    2
2     4   10
3     7    4
4     7   22
5     8   16
6     9   10
7    10   18
8    10   26
9    10   34
10   11   17
> |
```

Testing_R

Environment History Connections Tutorial

Global Environment

Data

data 50 obs. of 2 variables

Values

x	2
---	---

Files Plots Packages Help Viewer

Zoom Export Publish

dist

speed

What RStudio is not ...

The screenshot displays the RStudio environment with the following components:

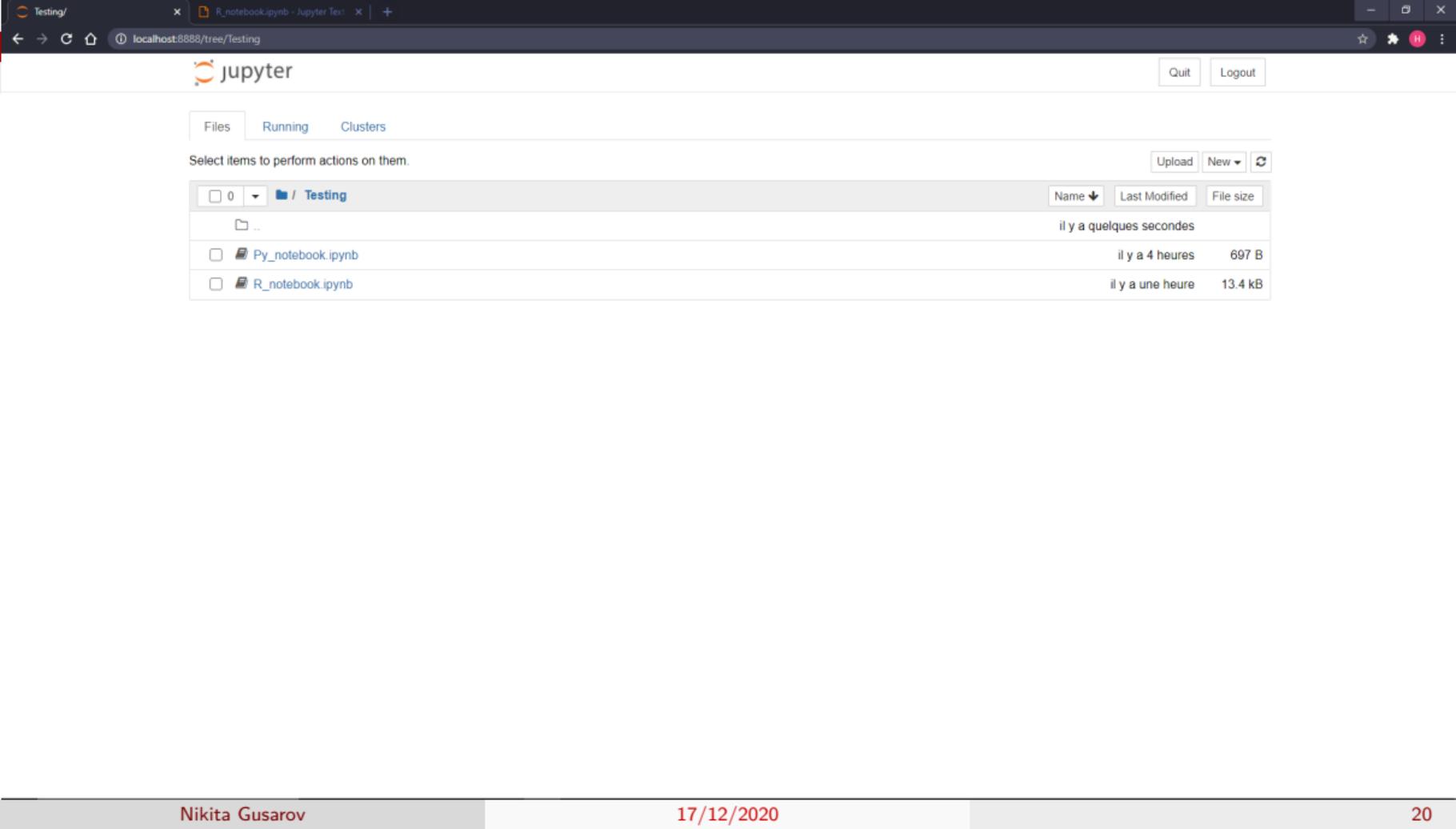
- File Menu:** Opened, showing options like 'New File', 'New Project...', 'Open File...', 'Save', 'Print...', 'Close', and 'Quit Session...'. The 'C++ File' option is highlighted.
- Environment Panel:** Shows 'Global Environment' with a 'data' object containing '50 obs. of 2 variables'. The 'Values' section shows 'x' with the value '2'.
- Console:** Contains R code and its output:


```

      > x <- 1
      > print(x <- x + 1)
      [1] 2
      > library(ggplot2)
      > x <- 1
      > print(x <- x + 1)
      [1] 2
      > data <- cars
      > ggplot(data, aes(x = speed, y = dist)) +
      +   geom_point()
      > head(cars, n=10)
      speed dist
      1     4     2
      2     4    10
      3     7     4
      4     7    22
      
```
- Scatter Plot:** A plot of 'dist' (y-axis, 0-125) vs 'speed' (x-axis, 0-100). It shows a positive correlation between speed and distance.

What about alternatives ?

Jupyter



Key advertising factors

- ▶ A web application
- ▶ Notebook documents

Features

- ▶ In-browser editing for code
- ▶ Automatic syntax highlighting, indentation, and tab completion
- ▶ The ability to execute code from the browser
- ▶ Results of computations is attached to the code which generated them

Features

- ▶ Displaying the result of computation using rich media representations (HTML, LaTeX, PNG, SVG, etc)
- ▶ In-browser editing for rich text using the Markdown markup language
- ▶ Commentary for the code is not limited to plain text
- ▶ Include mathematical notation within markdown cells using LaTeX, and rendered natively by MathJax.

Testing | R_notebook - Jupyter Notebook | localhost:8888/notebooks/Testing/R_notebook.ipynb

Jupyter R_notebook Dernière Sauvegarde : il y a 2 heures (modifié) Logout

File Edit View Insert Cell Kernel Widgets Help

Exécuter Code

Entrée [1]:

```
# Running the setup first allows you to set the options of R code
# Note that if you want to load any other dependencies, you can load them here:

library(ggplot2)
```

Entrée [2]:

```
# Getting Started with R

x <- 1
print (x <- x + 1)
```

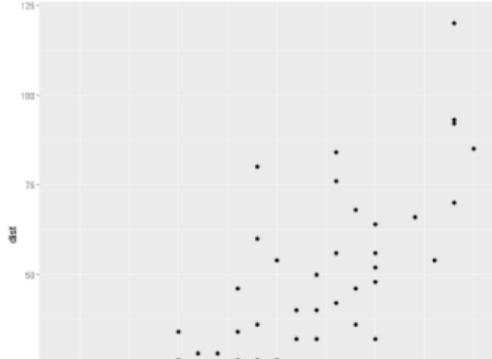


```
[1] 2
```

Entrée [3]:

```
# Graphs with RMarkdown

data <- cars
ggplot(data, aes(x = speed, y = dist)) +
  geom_point()
```



Nikita Gusarov 17/12/2020 24

Drawbacks

Version control

The .ipynb Jupyter Notebook files are blobs of JSON that also store cell output as well as metadata.

```
1 {
2   "cells": [
3     {
4       "cell_type": "code",
5       "execution_count": 1,
6       "metadata": {},
7       "outputs": [],
8       "source": [
9         "# Running the setup first allows you to set the options of R code\n",
10        "# Note that if you want to load any other dependencies, you can load them here:\n",
11        "\n",
12        "library(ggplot2)"
13      ]
14    },
15    {
16      "cell_type": "code",
17      "execution_count": 2,
18      "metadata": {},
19      "outputs": [
20        {
21          "name": "stdout",
22          "output_type": "stream",
23          "text": [
24            "[1] 2\n"
25          ]
26        }
27      ],
28      "source": [
29        "# Getting Started with R\n",
30        "\n",
31        "x <- 1 \n",
32        "print (x <- x + 1)"
33      ]
34    },
35    {
36      "cell_type": "code",
37      "execution_count": 3,
38      "metadata": {},
39      "outputs": [
```

Inline Code Rendering

In Jupyter Notebooks, it is impossible to use the inline expressions without additional markdown modules.

VS Code

File Edit Selection View Go Run Terminal Help testing_RR - Untitled (Workspace) - Visual Studio Code

EXPLORER ... script.md testing_RR X

OPEN EDITORS rstudio_alternatives > testing_RR > ...

UNTITLED (WORKSPACE)

- > literature_behavioural
- > projet_doctoral
- > simulator
- > bayes_r
- > rstudio_alternatives

```
1 # Running the setup first allows you to set the options of R code
2 # Note that if you want to load any other dependencies, you can load them here:
3
4 library(ggplot2)
5
6 # Getting Started with R
7
8 x <- 1
9 print(x <- x + 1)
10
11 # Graphs with RMarkdown
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = dist)) +
15   geom_point()
16
17 # Tables with R
18 ## Using R Output
19
20 head(cars, n=10)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27
28 x <- tableGrob(head(cars, n=10))
29 grid.draw(x)
```

main* 0 0 0 4

R: 6632 Ln 29, Col 13 Spaces: 4 UTF-8 CRLF R [off]

VS Code selling features

- ▶ Simplicity of a source code editor
- ▶ Powerful developer tooling (IntelliSense, code completion and debugging)

Available for macOS, Linux, and Windows

Visual Studio Code supports macOS, Linux, and Windows - so you can hit the ground running, no matter the platform.

“Edit, build, and debug with ease”

- ▶ Lightning fast source code editor
- ▶ Support for hundreds of languages
- ▶ Intuitive keyboard shortcuts, easy customization and community-contributed mappings
- ▶ Interactive debugger
- ▶ Build and scripting tools to perform common tasks
- ▶ Support for Git so you can work with source control without leaving the editor including viewing pending changes diffs

“Make it your own”

- ▶ Customization through extensions
- ▶ Open-source project

EXPLORER

OPEN EDITORS

- UNTITLED (WORKSPACE)
- litterature_behavioural
- projct_doctoral
- simulator
- bayes_r
- rstudio_alternatives

OUTLINE

TIMELINE

NPM SCRIPTS

```

script.md
testing_RF
>
1 # Running the setup
2 # Note that if you
3
4 library(ggplot2)
5
6 # Getting Started with ggplot2
7
8 x <- 1
9 print(x <- x + 1)
10
11 # Graphs with RMark
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = wt))
15   geom_point()
16
17 # Tables with R
18 ## Using R Output
19
20 head(cars, n=10)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27
28 x <- tableGrob(head(cars, n=10))
29 grid.draw(x)

```

recently used

- R: Create R terminal
- Preferences: Open Workspace Settings
- Preferences: Language Extensions
- Git: Clone
- Preferences: Open Keyboard Shortcuts
- Merge Conflict: Compare Current Conflict
- Git: Undo Last Commit
- View: Reset Zoom

other commands

- Add Browser Breakpoint
- Add Cursor Above
- Add Cursor Below
- Add Cursors To Bottom
- Add Cursors to Line Ends
- Add Cursors To Top

The image shows the Visual Studio Code editor interface. The left pane displays an R script named 'testing_R.R'. The script contains several sections: a header with instructions on how to run the setup, a simple arithmetic loop, a ggplot2 plot, and a table visualization using the grid package. The right pane shows the terminal output, which displays the R version (4.0.2), copyright information, and the standard R startup message in French. The terminal prompt is currently at the '>' character.

```
script.md testing_R.R X
rstudio_alternatives > testing_R.R > ...
1 # Running the setup first allows you to set the options of R code
2 # Note that if you want to load any other dependencies, you can load them here:
3
4 library(ggplot2)
5
6 # Getting Started with R
7
8 x <- 1
9 print(x <- x + 1)
10
11 # Graphs with RMarkdown
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = dist)) +
15   geom_point()
16
17 # Tables with R
18 ## Using R Output
19
20 head(cars, n=10)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27
28 x <- tableGrob(head(cars, n=10))
29 grid.draw(x)
```

PROBLEMS 4 TERMINAL ... 1: R Interactive + - X

```
R version 4.0.2 (2020-06-22) -- "Taking Off Again"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R est un logiciel libre livré sans AUCUNE GARANTIE.
Vous pouvez le redistribuer sous certaines conditions.
Tapez 'license()' ou 'licence()' pour plus de détails.

R est un projet collaboratif avec de nombreux contributeurs.
Tapez 'contributors()' pour plus d'information et
'citation()' pour la façon de le citer dans les publications.

Tapez 'demo()' pour des démonstrations, 'help()' pour l'aide
en ligne ou 'help.start()' pour obtenir l'aide au format HTML.
Tapez 'q()' pour quitter R.

> []
```

main* 0 0 0 4 R: 1460 Ln 9, Col 19 Spaces: 4 UTF-8 CRLF R [off]

```

script.md testing_RR X
rstudio_alternatives > testing_RR > ...
10
11 # Graphs with RMarkdown
12
13 data <- cars
14 ggplot(data, aes(x = speed, y = dist)) +
15   geom_point()
16
17 # Tables with R
18 ## Using R Output
19
20 View(cars)
21
22 ## Using grid.draw
23 ## table with grid/gridExtra packages
24
25 library(grid)
26 library(gridExtra)
27

```



Search:

	speed	dist
1	4	2
2	4	10
3	7	4
4	7	22
5	8	16
6	9	10
7	10	18
8	10	26
9	10	34
10	11	17
11	11	28

```

PROBLEMS 3 TERMINAL ... 1: R Interactive
> # Note that if you want to load any other dependencies, you can load them here
>
> library(ggplot2)
> # Getting Started with R
>
> x <- 1
> print(x <- x + 1)
[1] 2
> # Graphs with RMarkdown
>
> data <- cars
> ggplot(data, aes(x = speed, y = dist)) +
+   geom_point()
> # Tables with R
> ## Using R Output
>
> head(cars, n=10)
  speed dist
1     4    2
2     4   10
3     7    4
4     7   22
5     8   16
6     9   10
7    10   18
8    10   26
9    10   34
10    11   17
> ## Using grid.draw
> ## table with grid/gridExtra packages
>
> library(grid)
> ## Using grid.draw
> ## table with grid/gridExtra packages
>
> library(grid)
> library(gridExtra)
> x <- tableGrob(head(cars, n=10))
> grid.draw(x)
> # Tables with R
> ## Using R Output
>
> View(cars)
>

```

EXPLORER

OPEN EDITORS

- UNTITLED (WORKSPACE)
- litterature_behavioural
- projct_doctoral
- simulator
- bayes_r
- rstudio_alternatives
 - .vscode
 - captures
 - files
 - .-lock.testing_XL.xlsx
 - testing_R.R
 - testing_Rmd.pdf
 - testing_Rmd.Rmd
 - testing_Rmd.tex
 - testing_XL.xlsx
 - presentation
 - presentation.pdf
 - presentation.Rmd
 - presentation.tex
 - .gitignore
 - script.md

OUTLINE

TIMELINE

NPM SCRIPTS

```

4 ---
5
6 Run Chunk | Run Above
7 ```{r setup, include=FALSE}
8 knitr::opts_chunk$set(
9   echo = TRUE)
10 ---
11 ## R Markdown
12
13 This is an R Markdown document. Markdown is a simple formatting syntax
14 for creating a document that can be rendered to HTML slides, PDF, and
15 other formats.
16
17 When you click the Knit button a document will be generated that
18 contains all of the code you enter, along with any outputs generated
19 within that code.
20
21 Run Chunk | Run Above
22 ```{r cars}
23 summary(cars)
24 ---
25 ## Including Plots
26
27 You can also embed plots, for example:
28
29 Run Chunk | Run Above
30 ```{r pressure, echo=FALSE}
31 plot(pressure)
32 ---
33
34 Note that the `echo = FALSE` parameter was added to the code chunk
35 to prevent the output from being printed to the console.
  
```

testing_XL.xlsx

rstudio_alternatives > files > testing_XL.xlsx

Normal Arial 10 B I U

	A	B	C	D	E	F
1	1	2				
2	2	3				
3	3	4				
4	4	5				
5	5	6				
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

Sheet1

References

- ▶ StackOverflow survey
- ▶ Visual Studio Code
- ▶ RStudio and features
- ▶ Discussion of editors
- ▶ Jupyter against RStudio
- ▶ VS Code against RStudio
- ▶ Starting with R in VS Code
- ▶ VS Code and Atom