

# Programming for Data Science

## How to create a package in R

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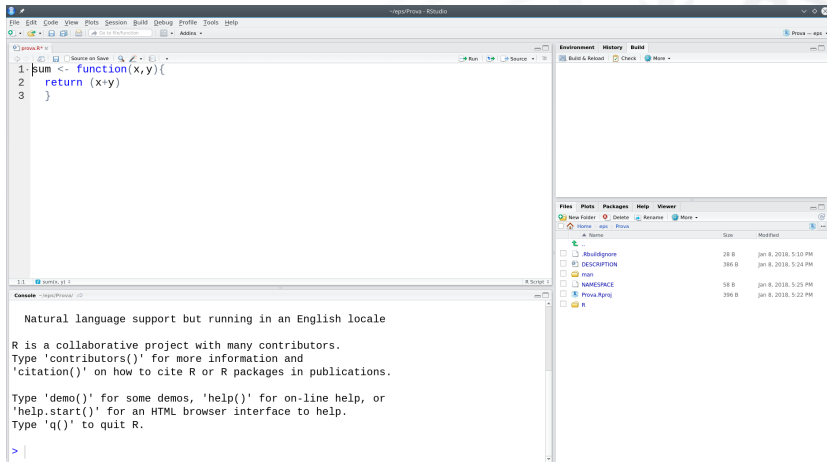


# How to create a R package

- we describe how to create an R package using RStudio;
- Obviously it is possible to build R Packages with Command Line Tools, but RStudio has built-in tools that will make easier this task;
- the **devtools** package must be installed in RStudio.  
    >**install.packages("devtools")**

# How to create a R package

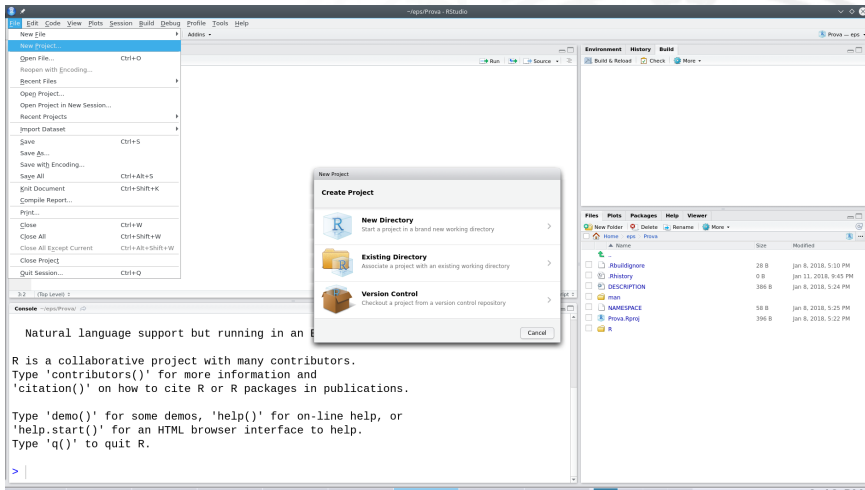
- Open a new .R file;



- Write the code for your functions in this .R file. You can create one file with all of your functions or create separate files for each function. Save these files somewhere where you can easily find them.

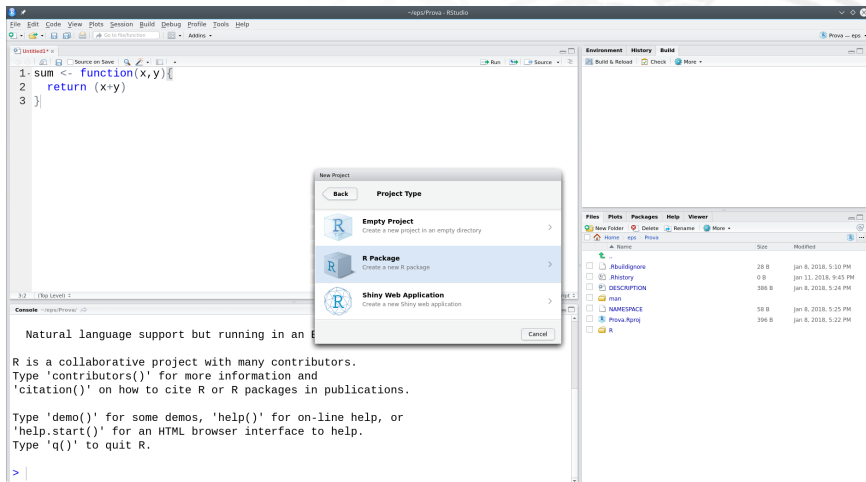
# How to create a R package

- Open a new project in RStudio. Go to the **File** menu and click on **New Project**. Then select **New Directory**, and **R Package** to create a new R package.



# How to create a R package

- Open a new project in RStudio. Go to the **File** menu and click on **New Project**. Then select **New Directory**, and **R Package** to create a new R package.



The screenshot shows the RStudio interface with the 'New Project' dialog box open. The dialog box has a 'Project Type' section with three options: 'Empty Project', 'R Package', and 'Shiny Web Application'. The 'R Package' option is selected and highlighted in blue. The background shows the RStudio editor with a simple R function:

```
1 sum <- function(x,y){  
2   return(x+y)  
3 }
```

The console window at the bottom displays the following text:

```
Natural language support but running in an  
  
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 right-hand pane shows the 'Environment' and 'Files' panels. The 'Files' panel displays a directory tree with the following items:

Name	Size	Modified
..		
..buildignore	28 B	Jan 8, 2018, 5:10 PM
..Rhistory	0 B	Jan 11, 2018, 9:45 PM
DESCRIPTION	396 B	Jan 8, 2018, 5:24 PM
main		
NAMESPACE	58 B	Jan 8, 2018, 5:25 PM
Prova.Rproj	396 B	Jan 8, 2018, 5:22 PM
R		

# How to create a R package

- Type the name of your package, then upload the .R file you created in step 1 under **Create package based on source files**. Click **Create project**.

1: `sum <- function(x,y){`  
2: `return (x+y)`  
3: `}`

**Create R Package**

Type: Package Package name: Prova

Create package based on source files:  Add... Remove

Create project as subdirectory of: ~/.Rproj Browse...

Create a git repository

Open in new session

Create Project Cancel

Natural language support but running in an R console.

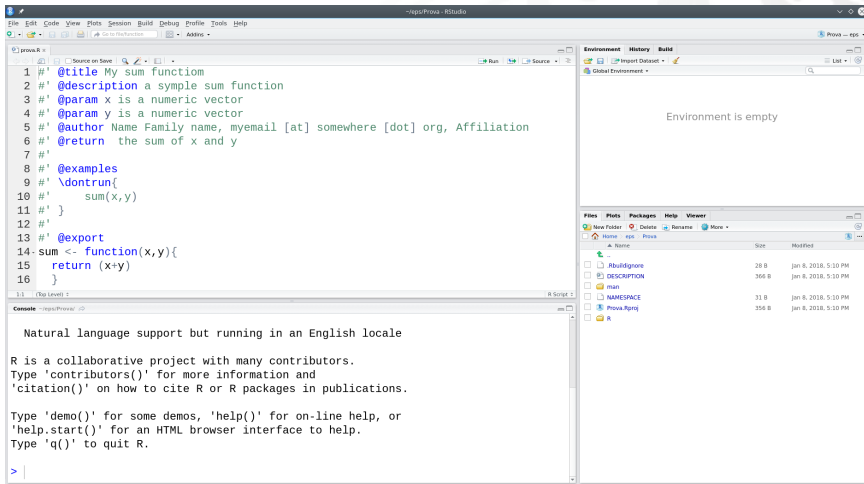
R is a collaborative project with many contributors. Type 'contributors()' for more information and 'citation()' on how to cite R or R packages in publications.

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.

>

# How to create a R package

- Documentation can be automatically created using **roxygen2** package.



The screenshot shows the RStudio interface. The script editor contains the following code:

```
1 #' @title My sum function
2 #' @description a symple sum function
3 #' @param x is a numeric vector
4 #' @param y is a numeric vector
5 #' @author Name Family name, myemail [at] somewhere [dot] org, Affiliation
6 #' @return the sum of x and y
7 #'
8 #' @examples
9 #' \dontrun{
10 #'   sum(x,y)
11 #' }
12 #'
13 #' @export
14 sum <- function(x,y){
15   return (x+y)
16 }
```

The console output shows the following text:

```
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("roxygen2")**

# How to create a R package

- The functions must be commented using the following tags:

```
#' @title My sum functiom
#' @description a symple sum function
#' @param x is a numeric vector
#' @param y is a numeric vector
#' @author Name Family name, myemail [at] somewhere [dot] org, Affiliatio
#' @return the sum of x and y
#'
#' @examples
#' \dontrun{
#'   sum(x,y)
#' }
#'
#' @export
sum <- function(x,y){
  return (x+y)
}
```



# How to create a R package

- To enable the generation of package documentation using **roxygen2**

The screenshot shows the RStudio interface with the following elements:

- Source Editor:** Contains R code for a package named 'My sum function'. The code includes fields for title, description, parameters, author, return value, examples, and an export statement for a 'sum' function.
- Project Options Dialog:** Shows 'Project build tools' set to 'Package'. The 'Build Tools' section is active, showing options for building and checking the package.
- Roxygen Options Dialog:** Shows 'Use roxygen to generate' checked, with sub-options for 'Rd files', 'Collate file', 'NAMESPACE file', and 'Vignettes'.
- Environment Panel:** Shows 'Environment is empty'.
- Files Panel:** Shows a list of files in the project directory, including 'Prova - eps'.
- Console:** Displays the output of the 'dontrun' function, showing natural language support and instructions on how to cite R or R packages in publications.

# How to create a R package

- Documentation is generated by clicking on **Build** → **Documentation**

The screenshot shows the RStudio interface with the 'Build' menu open and the 'Documentation' option selected. The source file 'Prova.R' contains the following code:

```
1 % Generated by hand
2 % Please edit accordingly
3 \name{sum}
4 \alias{sum}
5 \title{My sum function}
6 \usage{
7   sum(x, y)
8 }
9 \arguments{
10  \item{x}{is a numeric vector}
11 }
12 \item{y}{is a numeric vector}
13 }
14 \value{
15   the sum of x and y
16 }
```

The 'Environment' pane on the right shows the following output:

```
==> devtools::document(roclets=c('rd', 'collate', 'namespace'))
Updating Prova documentation
Loading Prova
Writing NAMESPACE
Documentation completed
```

The 'Files' pane on the right shows the directory structure:

Name	Size	Modified
AbalIgnore	28 B	Jan 8, 2018, 5:10 PM
DESCRIPTION	386 B	Jan 8, 2018, 5:24 PM
man	58 B	Jan 8, 2018, 5:25 PM
NAMESPACE	58 B	Jan 8, 2018, 5:25 PM
Prova.Rproj	396 B	Jan 8, 2018, 5:22 PM
R		

The 'Console' pane at the bottom shows the following output:

```
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.
> |
```

# How to create a R package

- Package can be built and loaded by clicking on **Build** → **Build and Reload**

The screenshot shows the RStudio interface with the 'Build' menu open, highlighting 'Build and Reload'. The source file 'Prova.R' contains the following code:

```
1 % Generated by hand
2 % Please edit manually
3 \name{sum}
4 \alias{sum}
5 \title{My sum function}
6 \usage{
7   sum(x, y)
8 }
9 \arguments{
10  \item{x}{is a numeric vector}
11
12  \item{y}{is a numeric vector}
13 }
14 \value{
15   the sum of x and y
16 }
```

The console shows the following output:

```
Restarting R session...
> library(Prova)
Attaching package: 'Prova'
The following object is masked from 'package:base':
    sum
> ?sum
>
```

The Environment pane shows the package 'Prova' with its help files:

```
CONVERTING help for package 'Prova'
** preparing package for lazy loading
** help
*** installing help indices
    finding HTML links ...      sum
                                html
done
** building package indices
** testing if installed package can be loaded
* DONE (Prova)
```

The Files pane shows the package structure:

Name	Size	Modified
..		
..buildignore	28 B	Jan 8, 2018, 5:10 PM
DESCRIPTION	396 B	Jan 8, 2018, 5:24 PM
man		
NAMESPACE	58 B	Jan 8, 2018, 5:25 PM
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R		

# How to create a R package

- Package can be built and loaded by clicking on **Build** → **Build and Reload**

The screenshot displays the RStudio interface with the following components:

- Source Editor:** Contains the R package file `sum.Rd` with the following content:

```
1 % Generated by roxygen2: do not edit by hand
2 % Please edit documentation in R/prova.R
3 \name{sum}
4 \alias{sum}
5 \title{My sum function}
6 \usage{
7   sum(x, y)
8 }
9 \arguments{
10  \item{x}{is a numeric vector}
11
12  \item{y}{is a numeric vector}
13 }
14 \value{
15   the sum of x and y
16 }
```
- Console:** Shows the execution of the following commands:

```
> library(Prova)
Attaching package: 'Prova'
The following object is masked from 'package:base':
    sum
> ?sum
> |
```
- Build Panel:** Shows the output of the `Build and Reload` action:

```
CONVERTING help for package 'Prova'
** preparing package for lazy loading
** help
*** installing help indices
    finding HTML links ...      sum
                                html
done
** building package indices
** testing if installed package can be lo
aded
* DONE (Prova)
```
- Viewer Panel:** Displays the documentation for the `sum` function:

```
My sum function
Description
  a symple sum function
Usage
  sum(x, y)
Arguments
  x  is a numeric vector
  y  is a numeric vector
Value
  the sum of x and y
Author(s)
  Name Family name, myemail [at] somewhere [dot] org, Affiliation
Examples
## Not run:
```