

Introduccion a R y RStudio

Taller de Introduccion a R y manejo de informacion grillada

Eduardo Noriega

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¿Qué es R?

“R es un lenguaje y entorno de libre acceso para la computación estadística y gráficos que proporciona una amplia variedad de técnicas estadísticas y gráficas: modelado lineal y no lineal, pruebas estadísticas, análisis de series temporales, clasificación, clustering, etc.”

- R core group

Descargar R y RStudio



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



<https://www.rstudio.com/products/rstudio/download/>



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

```
Rterm (64-bit)

R version 3.5.0 (2018-04-23) -- "Joy in Playing"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R es un software libre y viene sin GARANTIA ALGUNA.
Usted puede redistribuirlo bajo ciertas circunstancias.
Escriba 'license()' o 'licence()' para detalles de distribucion.

R es un proyecto colaborativo con muchos contribuyentes.
Escriba 'contributors()' para obtener más información y
'citation()' para saber cómo citar R o paquetes de R en publicaciones.

Escriba 'demo()' para demostraciones, 'help()' para el sistema on-line de ayuda,
o 'help.start()' para abrir el sistema de ayuda HTML con su navegador.
Escriba 'q()' para salir de R.

> -
```



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

A screenshot of the RGui (64-bit) window. The title bar says 'RGui (64-bit)'. The menu bar includes 'Archivo', 'Editar', 'Visualizar', 'Misc', 'Paquetes', 'Ventanas', and 'Ayuda'. The toolbar contains icons for file operations and running code. The 'R Console' pane shows the following text:

```
R version 3.5.0 (2018-04-23) -- "Joy in Playing"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

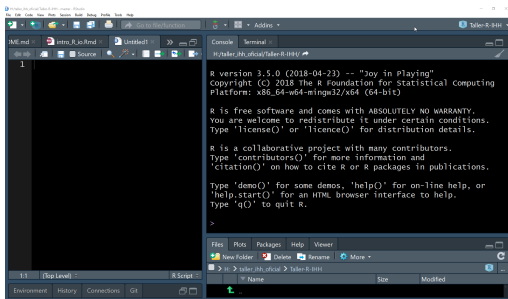
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o 'help.start()' para abrir el sistema de ayuda HTML con su navegador.
Escriba 'q()' para salir de R.

[Previously saved workspace restored]

> |
```



<https://www.rstudio.com/>

```
#install.packages('beepr', repos = 'https://cloud.r-project.org')  
library(beepr)
```

```
## Warning: package 'beepr' was built under R version 3.5.1  
#beep(sound = 8)
```

```
install.packages('raster')  
install.packages('openxls')  
install.packages('ncdf4')  
install.packages('lubridate')
```


Tipos de objetos en R

Vector numérico

```
precipitacion <- c(6, 7, 24, 17, 20.5, 20.5, 20, 12, 11, 14, 38,  
                  9.5, 8, 5.5, 7)
```

```
head(precipitacion)
```

```
## [1] 6.0 7.0 24.0 17.0 20.5 20.5
```

Vector de caracteres

```
fecha <- c('1991-01-01', '1991-01-02', '1991-01-03', '1991-01-04',  
          '1991-01-05', '1991-01-06', '1991-01-07', '1991-01-08',  
          '1991-01-09', '1991-01-10', '1991-01-11', '1991-01-12',  
          '1991-01-13', '1991-01-14', '1991-01-15')
```

```
head(fecha, 4)
```

```
## [1] "1991-01-01" "1991-01-02" "1991-01-03" "1991-01-04"
```

Tipos de objetos en R

Factores

```
(valores <- factor(c('b', 'b', 'd', 'c', 'd'),  
                  levels = c('a', 'b', 'c', 'd'))  
  
## [1] b b d c d  
## Levels: a b c d  
table(valores)  
  
## valores  
## a b c d  
## 0 2 1 2
```

Variables lógicas

```
a <- 2  
b <- 3  
a == b # ¿es a igual a b?  
  
## [1] FALSE
```

Tipos de objetos en R

Matrices

```
(A <- matrix(c(-67, -16, -68.5, -17.5), byrow = FALSE, ncol = 2))
```

```
##      [,1] [,2]  
## [1,]  -67 -68.5  
## [2,]  -16 -17.5
```

Data frames

```
datos <- data.frame(fecha, precipitacion)
```

```
head(datos)
```

```
##      fecha precipitacion  
## 1 1991-01-01          6.0  
## 2 1991-01-02          7.0  
## 3 1991-01-03         24.0  
## 4 1991-01-04         17.0  
## 5 1991-01-05         20.5  
## 6 1991-01-06         20.5
```

Tipos de objetos en R

Listas

```
(mi_lista <- list(matriz = A, data_frame = datos))
```

```
## $matriz
```

```
##      [,1] [,2]
```

```
## [1,]  -67 -68.5
```

```
## [2,]  -16 -17.5
```

```
##
```

```
## $data_frame
```

```
##      fecha precipitacion
```

```
## 1 1991-01-01           6.0
```

```
## 2 1991-01-02           7.0
```

```
## 3 1991-01-03          24.0
```

```
## 4 1991-01-04          17.0
```

```
## 5 1991-01-05          20.5
```

```
## 6 1991-01-06          20.5
```

```
## 7 1991-01-07          20.0
```

```
## 8 1991-01-08          12.0
```

```
## 9 1991-01-09          11.0
```

Tipos de objetos en R

Fechas

```
class(fecha)
## [1] "character"
fecha_formato <- as.Date(fecha) # ojo!
head(fecha_formato, 4)
## [1] "1991-01-01" "1991-01-02" "1991-01-03" "1991-01-04"
class(fecha_formato)
## [1] "Date"
```

Vector

```
fecha_formato[2]
```

```
## [1] "1991-01-02"
```

Matriz y data frame

```
datos[1,2]
```

```
## [1] 6
```

```
head(datos[,2], 11)
```

```
## [1] 6.0 7.0 24.0 17.0 20.5 20.5 20.0 12.0 11.0 14.0 38.0
```

Listas

```
mi_lista[1]
## $matriz
##      [,1] [,2]
## [1,]  -67 -68.5
## [2,]  -16 -17.5
mi_lista[[1]]
##      [,1] [,2]
## [1,]  -67 -68.5
## [2,]  -16 -17.5
```

Manipulación de información

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Estación:	San Calixto								Latitud Sud:	16° 29' 43"			
2	Departamento:	La Paz								Longitud Oeste:	68° 7' 57"			
3	Provincia:	Munillo								Altitud m/s/n/m:	3658			
4	DATOS DE : PRECIPITACIÓN DIARIA (mm)													
5	1981													
6	DIA	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	TOTAL
7	1	8.0	0.3	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	19.2
8	2	0.8	4.5	1.6	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9
9	3	11.9	0.0	3.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	4.7	21.0
10	4	22.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	22.8	0.0	0.0	0.2	45.7
11	5	8.1	0.0	2.1	0.0	0.0	0.0	0.0	3.7	0.0	9.4	3.2	0.0	26.5
12	6	1.0	18.2	2.3	0.7	0.0	0.0	0.0	9.4	0.0	0.7	1.5	0.0	33.8
13	7	0.0	29.1	13.1	3.8	0.0	0.0	0.0	1.4	0.0	5.0	0.0	0.0	52.4
14	8	3.6	3.5	12.1	0.0	0.0	0.0	0.0	0.3	0.0	8.5	6.6	0.0	34.6
15	9	1.1	7.4	17.8	10.2	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	37.3
16	10	7.8	6.3	0.5	11.3	0.0	0.0	0.0	9.1	0.0	0.0	0.0	0.0	35.0
17	11	3.8	0.0	0.0	20.5	2.2	0.0	0.0	0.6	0.0	0.0	0.0	2.0	29.1
18	12	3.7	0.0	6.8	0.0	0.7	0.0	0.0	0.4	0.1	0.0	0.0	0.0	11.7
19	13	5.7	19.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	27.9
20	14	5.3	2.6	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	9.3
21	15	1.9	3.1	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	2.2	8.1
22	16	22.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	24.4
23	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.7
24	18	9.4	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	11.2
25	19	7.8	0.5	3.4	0.0	0.0	0.0	0.0	0.0	2.0	0.0	3.3	1.7	18.7
26	20	0.5	11.5	0.0	0.0	1.3	0.0	0.0	0.0	0.7	0.0	0.0	1.1	15.1
27	21	4.7	0.1	0.0	0.0	0.0	0.0	0.0	8.3	0.8	0.5	7.0	21.4	
28	22	0.0	5.0	0.6	0.0	0.0	0.0	0.0	0.0	0.9	3.5	0.0	0.0	10.0
29	23	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.5	2.0	4.9
30	24	0.0	13.8	0.0	0.0	0.0	0.0	0.0	8.7	6.0	0.3	2.7	31.5	
31	25	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	3.5	7.7	0.0	15.5	
32	26	7.1	3.2	0.3	0.0	0.0	0.0	0.0	0.0	5.5	6.6	0.0	2.0	24.7
33	27	19.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	14.2	0.0	3.5	37.4	
34	28	2.6	4.3	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.2	0.0	11.4	
35	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.1	4.9	
36	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	6.0	6.3	
37	31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.4	7.2	
38	SUM	159.0	137.7	75.4	48.8	4.2	0.0	0.0	27.4	51.1	70.3	28.0	42.9	644.8
39	MED	7.2	6.9	4.2	7.0	1.4	0.0	0.0	3.0	4.6	5.0	2.3	2.5	4.4
40	MAX	22.8	29.1	17.8	20.5	2.2	0.0	0.0	9.4	22.8	14.2	7.7	7.0	29.1
41	MIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	N	22.0	20.0	18.0	7.0	3.0	0.0	0.0	9.0	11.0	14.0	12.0	17.0	133.0
43	AÑO: 1982													
44	DIA	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	TOTAL
45	1	1.0	0.0	11.7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0	14.2
46	2	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	2.1
47	3	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6
48	4	6.4	0.0	24.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.6	31.5
49	5	5.6	0.0	3.7	3.8	0.0	0.0	0.0	0.0	2.7	0.3	0.0	11.5	27.6
50	6	2.4	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	15.3
51	7	9.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	12.6
52	8	6.7	1.7	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.6	10.5
53	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	A	B
1	fecha	San_Calixto
2	01/01/1981	8
3	02/01/1981	0.8
4	03/01/1981	11.9
5	04/01/1981	22.4
6	05/01/1981	8.1
7	06/01/1981	1
8	07/01/1981	0
9	08/01/1981	3.6
10	09/01/1981	1.1
11	10/01/1981	7.8
12	11/01/1981	3.8
13	12/01/1981	3.7
14	13/01/1981	5.7
15	14/01/1981	5.3
16	15/01/1981	1.9
17	16/01/1981	22.8
18	17/01/1981	0
19	18/01/1981	9.4
20	19/01/1981	7.8
21	20/01/1981	0.5
22	21/01/1981	4.7
23	22/01/1981	0
24	23/01/1981	0
25	24/01/1981	0
26	25/01/1981	0
27	26/01/1981	7.1
28	27/01/1981	19
29	28/01/1981	2.6
30	29/01/1981	0
31	30/01/1981	0
32	31/01/1981	0
33	01/02/1981	0.3
34	02/02/1981	4.5
35	03/02/1981	0
36	04/02/1981	0
37	05/02/1981	0
38	06/02/1981	18.2
39	07/02/1981	29.1
40	08/02/1981	3.5
41	09/02/1981	7.4
42	10/02/1981	6.3
43	11/02/1981	0
44	12/02/1981	0
45	13/02/1981	19

Slide with Plot

