

[Programación] R

- R es un lenguaje de programación y un entorno de software libre y de código abierto diseñado específicamente para el análisis estadístico y la visualización de datos.
- Es ampliamente utilizado en diversas disciplinas, incluyendo la ciencia de datos, la bioinformática, la economía, la epidemiología y muchas otras áreas donde se requiere análisis cuantitativo.

1. Introducción y primeros pasos con el lenguaje R

Vectorized Functions

TO USE WITH MUTATE ()

mutate() and **transmute()** apply vectorized functions to columns to create new columns. Vectorized functions take vectors as input and return vectors of the same length as output.

... **vectorized function** ...

OFFSET

dplyr: **lag()** - offset elements by 1
dplyr: **lead()** - offset elements by -1

CUMULATIVE AGGREGATE

dplyr: **cumall()** - cumulative all()
dplyr: **cumany()** - cumulative any()
dplyr: **cummax()** - cumulative max()
dplyr: **cummean()** - cumulative mean()
dplyr: **cummin()** - cumulative min()
dplyr: **cumprod()** - cumulative prod()
dplyr: **cumsum()** - cumulative sum()

RANKING

dplyr: **cume_dist()** - proportion of all values <=

Summary Functions

TO USE WITH SUMMARISE ()

summarise() applies summary functions to columns to create a new table. Summary functions take vectors as input and return single values as output.

... **summary function** ...

COUNT

dplyr: **n()** - number of values/rows
dplyr: **n_distinct()** - # of uniques
dplyr: **sum(!is.na())** - # of non-NA's

POSITION

mean() - mean, also **mean(!is.na())**
median() - median

LOGICAL

mean() - proportion of TRUE's
sum() - # of TRUE's

ORDER

dplyr: **first()** - first value
dplyr: **last()** - last value
dplyr: **nth()** - value in nth location of vector

RANK

quantile() - nth quantile
min() - minimum value
max() - maximum value

SPREAD

IQR() - Inter-Quartile Range
mad() - median absolute deviation
sd() - standard deviation
var() - variance

Combine Tables

COMBINE VARIABLES

bind_cols(..., name_repair) Returns tables placed side by side as a single table. Column lengths must be equal. Columns will NOT be matched by id (to do that look at Relational Data below), so be sure to check that both tables are ordered the way you want before binding.

RELATIONAL DATA

Use a "Mutating Join" to join one table to columns from another, matching values with the rows that they correspond to. Each join retains a different combination of values from the tables.

left_join(x, y, by = NULL, copy = FALSE, suffix = c("x", "y"), ..., keep = FALSE, na_matches = "na") Join matching values from y to x.

right_join(x, y, by = NULL, copy = FALSE, suffix = c("x", "y"), ..., keep = FALSE, na_matches = "na") Join matching values from x to y.

inner_join(x, y, by = NULL, copy = FALSE, suffix = c("x", "y"), ..., keep = FALSE, na_matches = "na") Join data. Retain only rows with matches.

full_join(x, y, by = NULL, copy = FALSE, suffix = c("x", "y"), ..., keep = FALSE, na_matches = "na") Join data. Retain all values, all rows.

COMBINE CASES

bind_rows(..., id = NULL) Returns tables one on top of the other as a single table. Set id to a column name to add a column of the original table names (as pictured).

Use a "Filtering Join" to filter one table against the rows of another.

semi_join(x, y, by = NULL, copy = FALSE, ..., na_matches = "na") Return rows of x that have a match in y. Use to see what will be included in a join.

anti_join(x, y, by = NULL, copy = FALSE, ..., na_matches = "na") Return rows of x that do not have a match in y. Use to see what will not be included in a join.

Use a "Nest Join" to inner join one table to another into a nested data frame.

nest_join(x, y, by = NULL, copy = FALSE, keep = FALSE, name = NULL, ...) Join data, nesting matches from y in a single new data frame column.

COLUMN MATCHING FOR JOINS

Use **by = c("col1", "col2", ...)** to specify one or more common columns to match on.
left_join(x, y, by = "x")

Use a named vector, **by = c("col1" = "col2")**, to match on columns that have different names in each table.
left_join(x, y, by = c("C" = "D"))

Use **suffix** to specify the suffix to give to unmatched columns that have the same name in both tables.
left_join(x, y, by = c("C" = "D"), suffix = c("1", "2"))

SET OPERATIONS

intersect(x, y, ...) Rows that appear in both x and y.

setdiff(x, y, ...) Rows that appear in x but not y.

union(x, y, ...) Rows that appear in x or y. (Duplicates removed). **union_all()** retains duplicates.

Use **setequal()** to test whether two data sets contain the exact same rows (in any order).



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Data visualization with ggplot2 : : CHEAT SHEET

Basics

ggplot2 is based on the **grammar of graphics**, the idea that you can build every graph from the same components: a **data set**, a **coordinate system**, and **geoms**—visual marks that represent data points.



To display values, map variables in the data to visual properties of the geom (**aesthetics**) like **size**, **color**, and **x** and **y** locations.



Complete the template below to build a graph.

```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>)) +
  stat = <STAT>, position = <POSITION> +
  <COORDINATE_FUNCTION> +
  <FACET_FUNCTION> +
  <SCALE_FUNCTION> +
  <THEME_FUNCTION>
```

Not required, sensible defaults supplied

ggplot(data = mpg, aes(x = cty, y = hwy)) Begins a plot that you finish by adding layers to. Add one geom function per layer.

last_plot() Returns the last plot.

ggsave("plot.png", width = 5, height = 5) Saves last plot as 5" x 5" file named "plot.png" in working directory. Matches file type to file extension.

Aes

Common aesthetic values.
color and fill - string ("red", "#RRGGBB")
linetype - integer or string (0 = "blank", 1 = "solid", 2 = "dashed", 3 = "dotted", 4 = "dotdash", 5 = "longdash", 6 = "twodash")
lineend - string ("round", "butt", or "square")
linejoin - string ("round", "mitre", or "bevel")
size - integer (line width in mm)
shape - integer/shape name or a single character ("a")



Geoms

Use a geom function to represent data points, use the geom's aesthetic properties to represent variables. Each function returns a layer.

GRAPHICAL PRIMITIVES

```
a <- ggplot(economics, aes(date, unemployment))
b <- ggplot(seals, aes(x = long, y = lat))
```

a + geom_blank() and **a + expand_limits()**
 Ensure limits include values across all plots.
b + geom_curve()(aes(yend = lat + 1, xend = long + 1, curvature = 1) - x, y, alpha, color, group, linetype, size)
a + geom_path()(lineend = "butt", linejoin = "round", linemitre = 1) - x, y, alpha, color, group, linetype, size
a + geom_polygon()(aes(alpha = 50)) - x, y, alpha, color, fill, group, subgroup, linetype, size
b + geom_rect()(aes(xmin = long, ymin = lat, xmax = long + 1, ymax = lat + 1) - xmax, xmin, ymax, ymin, alpha, color, fill, linetype, size)
a + geom_ribbon()(aes(ymin = unemployment - 900, ymax = unemployment + 900) - x, ymax, ymin, alpha, color, fill, group, linetype, size)

LINE SEGMENTS

common aesthetics: x, y, alpha, color, linetype, size
b + geom_abline()(aes(intercept = 0, slope = 1))
b + geom_hline()(aes(yintercept = lat))
b + geom_vline()(aes(xintercept = long))
b + geom_segment()(aes(yend = lat + 1, xend = long + 1))
b + geom_spoke()(aes(angle = 11155, radius = 1))

ONE VARIABLE continuous

```
c <- ggplot(mpg, aes(hwy)); c2 <- ggplot(mpg)
```

c + geom_area()(stat = "bin")
 x, y, alpha, color, fill, linetype, size
c + geom_density()(kernel = "gaussian")
 x, y, alpha, color, fill, group, linetype, size, weight
c + geom_dotplot()
 x, y, alpha, color, fill
c + geom_freqpoly()
 x, y, alpha, color, group, linetype, size
c + geom_histogram()(binwidth = 5)
 x, y, alpha, color, fill, linetype, size, weight
c2 + geom_qq()(aes(sample = hwy))
 x, y, alpha, color, fill, linetype, size, weight

discrete

```
d <- ggplot(mpg, aes(fill))
```

d + geom_bar()
 x, alpha, color, fill, linetype, size, weight

TWO VARIABLES

both continuous

```
e <- ggplot(mpg, aes(cty, hwy))
```

e + geom_label()(aes(label = cty), nudge_x = 1, nudge_y = 1) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust
e + geom_point()
 x, y, alpha, color, fill, shape, size, stroke
e + geom_quantile()
 x, y, alpha, color, group, linetype, size, weight
e + geom_rug()(sides = "bl")
 x, y, alpha, color, linetype, size
e + geom_smooth()(method = lm)
 x, y, alpha, color, fill, group, linetype, size, weight
e + geom_text()(aes(label = cty), nudge_x = 1, nudge_y = 1) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust

continuous bivariate distribution

```
h <- ggplot(diamonds, aes(carat, price))
```

h + geom_bin2d()(binwidth = c(0.25, 500))
 x, y, alpha, color, fill, linetype, size, weight
h + geom_density_2d()
 x, y, alpha, color, group, linetype, size
h + geom_hex()
 x, y, alpha, color, fill, size

continuous function

```
i <- ggplot(economics, aes(date, unemployment))
```

i + geom_area()
 x, y, alpha, color, fill, linetype, size
i + geom_line()
 x, y, alpha, color, group, linetype, size
i + geom_step()(direction = "hv")
 x, y, alpha, color, group, linetype, size

visualizing error

```
df <- data.frame(grp = c("A", "B"), fit = 4.5, se = 1.2)
```

j <- ggplot(df, aes(grp, fit, ymin = fit - se, ymax = fit + se))

j + geom_crossbar()(fatten = 2) - x, y, ymax, ymin, alpha, color, fill, group, linetype, size
j + geom_errorbar() - x, y, ymax, ymin, alpha, color, group, linetype, size, width
 Also **geom_errorbarh()**.

j + geom_linerange()
 x, ymin, ymax, alpha, color, group, linetype, size
j + geom_pointrange() - x, y, ymin, ymax, alpha, color, fill, group, linetype, shape, size

maps

```
data <- data.frame(murder = USArrests$Murder, state = tolower(rownames(USArrests)))
map <- map_data("state")
k <- ggplot(data, aes(fill = murder))
```

k + geom_map()(aes(map_id = state), map = map) + **expand_limits**(x = map\$long, y = map\$lat)
 map_id, alpha, color, fill, linetype, size

THREE VARIABLES

```
seals$z <- with(seals, sqrt(delta_long^2 + delta_lat^2)); l <- ggplot(seals, aes(long, lat))
```

l + geom_contour()(aes(z = z))
 x, y, z, alpha, color, group, linetype, size, weight
l + geom_contour_filled()(aes(fill = z))
 x, y, alpha, color, fill, group, linetype, size, subgroup

l + geom_raster()(aes(fill = z), hjust = 0.5, vjust = 0.5, interpolate = FALSE)
 x, y, alpha, fill
l + geom_tile()(aes(fill = z))
 x, y, alpha, color, fill, linetype, size, width

Base R

Cheat Sheet

Getting Help

Accessing the help files

?mean
Get help of a particular function.
help.search('weighted mean')
Search the help files for a word or phrase.
help(package = 'dplyr')
Find help for a package.

More about an object

str(iris)
Get a summary of an object's structure.
class(iris)
Find the class an object belongs to.

Using Packages

install.packages('dplyr')
Download and install a package from CRAN.

library(dplyr)
Load the package into the session, making all its functions available to use.

dplyr::select
Use a particular function from a package.

data(iris)
Load a built-in dataset into the environment.

Working Directory

getwd()
Find the current working directory (where inputs are found and outputs are sent).

setwd('C://file/path')
Change the current working directory.

Use projects in RStudio to set the working directory to the folder you are working in.

Vectors

Creating Vectors

c(2, 4, 6)	2 4 6	Join elements into a vector
2:6	2 3 4 5 6	An integer sequence
seq(2, 3, by=0.5)	2.0 2.5 3.0	A complex sequence
rep(1:2, times=3)	1 2 1 2 1 2	Repeat a vector
rep(1:2, each=3)	1 1 1 2 2 2	Repeat elements of a vector

Vector Functions

sort(x) Return x sorted.	rev(x) Return x reversed.
table(x) See counts of values.	unique(x) See unique values.

Selecting Vector Elements

By Position

x[4]	The fourth element.
x[-4]	All but the fourth.
x[2:4]	Elements two to four.
x[-(2:4)]	All elements except two to four.
x[c(1, 5)]	Elements one and five.

By Value

x[x == 10]	Elements which are equal to 10.
x[x < 0]	All elements less than zero.
x[x %in% c(1, 2, 5)]	Elements in the set 1, 2, 5.

Named Vectors

x['apple']	Element with name 'apple'.
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Programming

For Loop

```
for (variable in sequence){  
  Do something  
}
```

Example

```
for (i in 1:4){  
  j <- i + 10  
  print(j)  
}
```

While Loop

```
while (condition){  
  Do something  
}
```

Example

```
while (i < 5){  
  print(i)  
  i <- i + 1  
}
```

If Statements

```
if (condition){  
  Do something  
} else {  
  Do something different  
}
```

Example

```
if (i > 3){  
  print('Yes')  
} else {  
  print('No')  
}
```

Functions

```
function_name <- function(var){  
  Do something  
  return(new_variable)  
}
```

Example

```
square <- function(x){  
  squared <- x*x  
  return(squared)  
}
```

Reading and Writing Data

Also see the **readr** package.

Input	Output	Description
df <- read.table('file.txt')	write.table(df, 'file.txt')	Read and write a delimited text file.
df <- read.csv('file.csv')	write.csv(df, 'file.csv')	Read and write a comma separated value file. This is a special case of read.table/write.table.
load('file.Rdata')	save(df, file = 'file.Rdata')	Read and write an R data file, a file type special for R.

Conditions	a == b	Are equal	a > b	Greater than	a >= b	Greater than or equal to	is.na(a)	Is missing
	a != b	Not equal	a < b	Less than	a <= b	Less than or equal to	is.null(a)	Is null

Types

Converting between common data types in R. Can always go from a higher value in the table to a lower value.

as.logical	TRUE, FALSE, TRUE	Boolean values (TRUE or FALSE).
as.numeric	1, 0, 1	Integers or floating point numbers.
as.character	'1', '0', '1'	Character strings. Generally preferred to factors.
as.factor	'1', '0', '1', levels: '1', '0'	Character strings with preset levels. Needed for some statistical models.

Maths Functions

log(x)	Natural log.	sum(x)	Sum.
exp(x)	Exponential.	mean(x)	Mean.
max(x)	Largest element.	median(x)	Median.
min(x)	Smallest element.	quantile(x)	Percentage quantiles.
round(x, n)	Round to n decimal places.	rank(x)	Rank of elements.
signif(x, n)	Round to n significant figures.	var(x)	The variance.
cor(x, y)	Correlation.	sd(x)	The standard deviation.

Variable Assignment

```
> a <- 'apple'  
> a  
[1] 'apple'
```

The Environment

ls()	List all variables in the environment.
rm(x)	Remove x from the environment.
rm(list = ls())	Remove all variables from the environment.

You can use the environment panel in RStudio to browse variables in your environment.

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Matrices

```
m <- matrix(x, nrow = 3, ncol = 3)
```

Create a matrix from x.

 m[2,]	- Select a row
 m[, 1]	- Select a column
 m[2, 3]	- Select an element

t(m)	Transpose
m %*% n	Matrix Multiplication
solve(m, n)	Find x in: m * x = n

Lists

```
l <- list(x = 1:5, y = c('a', 'b'))
```

A list is a collection of elements which can be of different types.

l[[2]]	l[[1]]	l\$x	l[["y"]]
Second element of l.	New list with only the first element.	Element named x.	New list with only element named y.

Also see the **dplyr** package.

Data Frames

```
df <- data.frame(x = 1:3, y = c('a', 'b', 'c'))
```

A special case of a list where all elements are the same length.

x	y
1	a
2	b
3	c

List subsetting

df\$x		df[[2]]	
-------	---	---------	---

Understanding a data frame

View(df)	See the full data frame.
head(df)	See the first 6 rows.

Matrix subsetting

df[, 2]	
df[2,]	
df[2, 2]	

nrow(df)	Number of rows.
ncol(df)	Number of columns.
dim(df)	Number of columns and rows.

cbind

- Bind columns.



rbind

- Bind rows.



Strings

Also see the **stringr** package.

paste(x, y, sep = ' ')	Join multiple vectors together.
paste(x, collapse = ' ')	Join elements of a vector together.
grep(pattern, x)	Find regular expression matches in x.
gsub(pattern, replace, x)	Replace matches in x with a string.
toupper(x)	Convert to uppercase.
tolower(x)	Convert to lowercase.
nchar(x)	Number of characters in a string.

Factors

factor(x)	Turn a vector into a factor. Can set the levels of the factor and the order.
cut(x, breaks = 4)	Turn a numeric vector into a factor by 'cutting' into sections.

Statistics

lm(y ~ x, data=df)	Linear model.	t.test(x, y)	Perform a t-test for difference between means.	prop.test	Test for a difference between proportions.		
glm(y ~ x, data=df)	Generalised linear model.	summary	Get more detailed information out a model.	pairwise.t.test	Perform a t-test for paired data.	aov	Analysis of variance.

Distributions

	Random Variates	Density Function	Cumulative Distribution	Quantile
Normal	rnorm	dnorm	pnorm	qnorm
Poisson	rpois	dpois	ppois	qpois
Binomial	rbinom	dbinom	pbinom	qbinom
Uniform	runif	dunif	punif	qunif

Plotting

Also see the **ggplot2** package.

plot(x)	Values of x in order.	plot(x, y)	Values of x against y.	hist(x)	Histogram of x.
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Dates

See the **lubridate** package.

Learn more at [web page](#) or [vignette](#) • package version • Updated: 3/15

RStudio IDE : : GUÍA RÁPIDA



Documentos y apps

RStudio desarrolla herramientas gratuitas y abiertas para R. Su entorno de desarrollo integrado (IDE) facilita el análisis de datos con R.

También ofrece: muchos paquetes R (e.g. tidyverse, sparklyr, ggplot2, dplyr), incluidos Shiny (crea aplicaciones web sencillas en R) y R Markdown (te permite convertir tus análisis en documentos, informes, presentaciones y paneles de alta calidad; compártirlos y reproducirlos).

Escribe tu código

Annotations for the Editor pane:

- Abrir en una nueva ventana
- Guardar
- Encontrar y reemplazar
- Ejecutar el código seleccionado
- Historial de comandos
- Mostrar presentaciones de diapositivas .RPres Archivo>Nuevo archivo>Presentación R
- Importar datos con asistente
- Cursor del usuario
- Ejecutar el código previo
- Ejecutar el código completo
- Esquema del archivo
- Selección: Alt + arrastre del mouse.
- Código de diagnóstico que aparece en el margen. Pase el mouse sobre los símbolos de diagnóstico para obtener más detalles.
- Resultado de sintaxis.
- Autocompletar mediante tabulación: nombres de funciones, rutas de archivos, argumentos y más.
- Resaltar la función en el archivo
- Cambia el tipo de archivo
- Directorio de trabajo
- Presiona ↑ para ver el historial de comandos
- Arrastra los límites
- Maximiza/minimiza los paneles

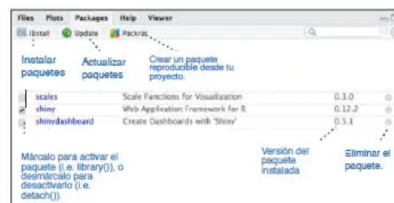
Soporte R



GRÁFICOS



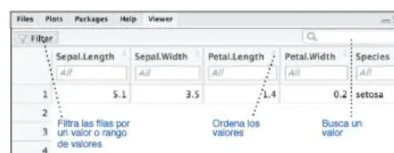
PAQUETES



AYUDA



PANEL DE VISIÓN



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Estadística descriptiva : : GUÍA RÁPIDA



Resumen numérico

Conceptos básicos

VISUALIZA LOS DATOS

```
head(mtcars)
View(mtcars)
str(mtcars)
```



Tipos de variables:

- Continua (números reales)
- Discretas (números enteros)
- Ordinales (categorías con orden)
- Nominale (categorías sin orden)

funciones de resumen

Una variable categórica:

```
table(mtcars$cyl)
prop.table(table(mtcars$cyl))
```

Más de una variable categórica:

```
table(mtcars$cyl, mtcars$vs)
gmodels::CrossTable(mtcars$cyl,
mtcars$vs)
ftable(mtcars$cyl, mtcars$vs,
mtcars$am)
```

Una variable numérica:

```
mean(mtcars$mpg)
```

Una numérica y una categórica

```
by(mtcars$mpg, mtcars$cyl, mean)
plyr::ddply(mtcars, "cyl", summarise,
N=length(mpg),
mean=mean(mpg),
sd=sd(mpg))
```

Variables numéricas y categóricas:

```
summary(mtcars)
```

ESTADÍSTICOS DESCRIPTIVOS

Posición central

```
mean(mtcars$mpg, tr=.2)
median(mtcars$mpg)
DescTools::Mode(mtcars$mpg)
```

opcional

Posición no central

```
quantile(mtcars$mpg, c(.05, .95))
```

opcional

Dispersión

```
var(mtcars$mpg)
sd(mtcars$mpg)
IQR(mtcars$mpg)
WRS2::trimse(mtcars$mpg, tr=.2)
msmedse(mtcars$mpg, sewarn=T)
```

opcional

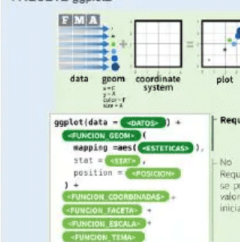
Forma

```
fBasics::skewness(mtcars$mpg)
fBasics::kurtosis(mtcars$mpg)
```

Gráficos

Conceptos básicos

PAQUETE ggplot2



Requerido

No
Requerido,
se proveen
valores
predeterminados

Una variable numérica:

```
c<-ggplot(mtcars,aes(mpg))
```

```
c+geom_histogram(binwidth=5)
c+geom_density()
```

```
c<-ggplot(mtcars,aes(x="",y=mpg))
```

```
c+geom_boxplot()
```

Una variable categórica:

```
c<-ggplot(mtcars,aes(as.factor(am)))
```

```
c+geom_bar()
```

si no es un factor

Una variable numérica y una categórica:

```
c<-ggplot(mtcars,aes(x=mpg,
fill=as.factor(cyl)))
```

```
c+geom_histogram(binwidth=5)
```

```
c+geom_density()
```

Una variable categórica:

```
c<-ggplot(mtcars,
aes(x=as.factor(am),
fill=as.factor(cyl)))
```

si no son factores

```
c+geom_bar()
```

```
c+geom_bar(position="dodge")
```

FACETAS

Dividen el gráfico en subgráficos según una o más variables.

```
c<-ggplot(mtcars,aes(x=mpg,
fill=as.factor(cyl)))
```

```
c+geom_histogram(binwidth=5)+face
t_grid(~as.factor(am))
```

```
c+geom_histogram(binwidth=5)+face
t_grid(as.factor(am)~.)
```

```
c+geom_histogram(binwidth=5)+face
t_grid(as.factor(am)~
as.factor(vs))
```

```
c+geom_histogram(binwidth=5)+face
t_wrap(~as.factor(am))
```



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Introducción al lenguaje R : : GUÍA RÁPIDA



Pedir ayuda

PÁGINAS DE AYUDA

?mean
help.search('median')
help(package='dplyr')

para una función
para una palabra o frase

SOBRE UN OBJETO

Resumen de la estructura del objeto

str(iris)

Utilizar paquetes

Extiende las funciones de R mediante paquetes

install.packages('dplyr')
library(dplyr)

activa un paquete
instala un paquete

Accede a una base de datos de R

data(iris)

Utiliza una función de un paquete

dplyr::select

Directorio de trabajo

getwd()
setwd(dplyr)

muestra tu directorio
cambia tu directorio

Asignación

a<- 'group' o a<-1



Tipos de datos

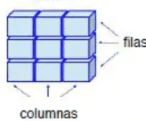
vector y factor



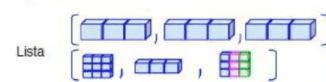
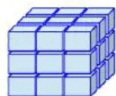
data frame o tabla



matriz



array



Vectores y factores

CREAR

x<-c(2,4,5)

opción	descripción
c(2,4,5)	une los elementos en un vector
2:6	crea una secuencia de enteros
seq(2,3,by=.5)	crea una secuencia más
rep(1,2, times, each)	repita elementos
factor(x)	convierte un vector en factor

SELECCIONAR

Por posición

opción	descripción
x[4]	el cuarto elemento
x[-4]	todos menos el cuarto
x[2:4]	elementos desde el 2º al 4º
x[c(1,3)]	1º y 3º elementos

Por valor o nombre

opción	descripción
x[x==10]	elementos con valor 10
x[x<0]	elementos menores a 0
x[x %in% c(1,3)]	elementos en el conjunto 1,3
x['group']	elementos con nombre 'group'

CARACTERÍSTICAS

unique(x)
sort(x)
length(x)

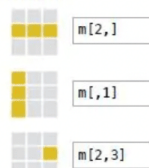
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Matrices

CREAR

m<-matrix(x=1:9,nrow=3,ncol=3)

SELECCIONAR



CARACTERÍSTICAS



Listas

CREAR

l<-list(x=1:5, y=c('a','b'))

SELECCIONAR

opción	descripción
l[[2]]	segundo elemento de l
l[[1]]	primer elemento de l
l\$x	elemento llamado 'x'
l\$y	elemento llamado 'y'

Data frames

CREAR

df<-data.frame(x=1:3,y=c('a','b','cs'))

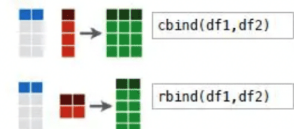
SELECCIONAR



CARACTERÍSTICAS

View(df)
head(df)
nrow(df) o ncol(df)

UNIR



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