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3 Statistics One - Week 1

3.1 Using Packages

- `install.packages()`
- `library()`

Suppose we wish to use the ***caret*** package for some statistical analyses. As this package is not part of the base `R` installation, we must install it. We use the `install.packages()` command to perform this operation. (N.B. notice the use of the plural packages,as this function may be used for downloading several packages simultaneously, and also the use of the quotation marks.)

Some options will be presented to the user, in particular, the choice of CRAN mirror. Simply select the mirror of the country you are in, or nearest too.

Some packages require the last version of `R` to be installed. This problem is usually avoided by regularly updating your version of `R` on an ongoing basis.

The package may be installed on your PC, but that does not mean that `R` may use that package. The package must be called using the `library()` command (this time not using quotation marks)

```
install.packages("caret")
library(caret)
```

3.2 What packages are avaiulable?

Q3 : What should you type in the R console to check what packages you have installed and loaded on your computer?

To check what packages you have installed and **loaded** on your computer, you would use the `search()` command, with no additional arguments.

```
library()
installed.packages()
search()
```

```
> search()
 [1] ".GlobalEnv"        "package:nlme"      "package:stats"
 [4] "package:graphics"  "package:grDevices" "package:utils"
 [7] "package:datasets"  "package:methods"   "Autoloads"
[10] "package:base"
```

3.3 Getting Help

The command to get help about an object, data set or function is simply `help()`.

```
help(sort)
help(list)
help(iris)

?sort
?list
?iris
```

3.4 Sequences

```
1:10
seq(1,10)
10:20
seq(1,10,length=3)
seq(1,10,by=1.5)
```

```
> 1:10
 [1]  1  2  3  4  5  6  7  8  9 10
> seq(1,10)
 [1]  1  2  3  4  5  6  7  8  9 10
>
> 10:20
 [1] 10 11 12 13 14 15 16 17 18 19 20
> 20:10
 [1] 20 19 18 17 16 15 14 13 12 11 10
>
> seq(1,10,length=3)
[1]  1.0  5.5 10.0
```

```
> seq(1,10,by=1.5)
[1]  1.0  2.5  4.0  5.5  7.0  8.5 10.0
```

3.5 data Frames

Q5 : Create two vectors, the first one named "numbers" including all natural numbers from 1 to 10, and the second one named "words" containing the following series:"One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight", "Nine", "Ten".

```
words <-c("One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight", "Nine", "Ten"
```

From these two vectors, create a dataframe "nw" with each vector as a separate column. What should you type to check the attributes of "nw"?

3.6 attributes of a data frame

The `attribute()` function can access an object's attributes, and returns the object's attribute list. The following code demonstrates how to obtain details on attributes for the iris and Titanic data sets.

```
attributes(iris)
attributes(Titanic)
```

The output for the Titanic data set should look like this.

```
> attributes(Titanic)
$dim
[1] 4 2 2 2

$dimnames
$dimnames$Class
[1] "1st"  "2nd"  "3rd"  "Crew"

$dimnames$Sex
[1] "Male"   "Female"

$dimnames$Age
[1] "Child" "Adult"
```

```
$dimnames$Survived
[1] "No"  "Yes"

$class
[1] "table"
```

3.7 Accessing Cells Rows and Columns of a data frame

Q6 : Question 6 What command should you type to get R to return the number “8” from the dataframe ”nw”?

Question 7 What command should you type to get R to return the word “eight” from the dataframe ”nw”?

3.8 Matrices

Question 8

In this following example, we will create a matrix Mat1 comprising all natural numbers from 1 to 12 in order, structured with 2 rows and 5 columns.

```
dozen <- 1:12
Mat1 <- matrix(dozen, nrow=2)

Mat2 <- matrix(1:12, ncol=4)
```

3.9 Combining Vectors

- `rbind()` combine several vectors by row
- `cbind()` combine several vectors by column

Create a vector "x" comprising all natural numbers from 1 to 6 and another vector "y" comprising all natural numbers from 5 to 10. What should you type to combine them in a matrix of 2 rows and 6 columns? Create a vector "x" comprising all natural numbers from 1 to 6 and another vector "y" comprising all natural numbers from 5 to 10. What should you type to combine them in a matrix of 6 rows and 2 columns?

```
x <- 1:6
y <- 5:10

cbind(x,y)
rbind(x,y)
```

```
> cbind(x,y)
     x  y
[1,] 1  5
[2,] 2  6
[3,] 3  7
[4,] 4  8
[5,] 5  9
[6,] 6 10
>
> rbind(x,y)
  [,1] [,2] [,3] [,4] [,5] [,6]
x    1    2    3    4    5    6
y    5    6    7    8    9   10
```

4 Statistics One - Week 2 Exercise

4.1 Inspecting a Data frame

How many rows of data are in the data file? Answer for Question 1

4.2 Column names

What is the name of the dependent variable? Answer for Question 2

4.3 The summary of a dataframe

What is the mean of SR across all subjects? Answer for Question 3

4.4 Using the psych package

What is the variance of SR across all subjects? Answer for Question 4

What is the mean of SR for all subjects at pretest? Answer for Question 5

What is the standard deviation of SR for all subjects at posttest? Answer for Question 6

What is the median of SR for all subjects at posttest? Answer for Question 7

4.5 groups

Which group has the highest mean at posttest? Answer for Question 8

4.6 Testing Normality

- QQ-plots
- Skew and Kurtosis

Which one best approximates a normal distribution? - WM group at pretest - WM group at postest - PE group at pretest - PE group at posttest - DS group at pretest - DS group at postest

Question 10 Which group showed the biggest gains in SR? Answer for Question 10