

# CURSO SOBRE BIOHERRAMIENTAS EN BIOESTADISTICA Y BIOINFORMATICA (1ªEdición)

Barcelona, 16, 17 y 18 de Mayo 2017

## Cómo crear aplicaciones con Shiny

### Parte I: Introducción

## ¿Qué es Shiny?

- **Shiny** es un *package* de **R** para crear aplicaciones interactivas en base web.
- Ha sido elaborado por los creadores de **RStudio**. (**Joe Chen**)
- No requiere conocimientos de ningún lenguaje de programación de páginas web (**HTML**, **JavaScript**, **PHP**,...), sólo usa código **R**.
- Con poco código se pueden crear aplicaciones muy flexibles y potentes.
- És útil para hacer que tus funciones o paquetes lo utilicen usuarios no familiarizados con R y que prefieran “clicar”.
- Hacer que tus paquetes escritos originalmente en R sean mucho más “populares”.
- En su página web hay ejemplos y un extenso manual.

# Website de Shiny

# Shiny


by RStudio

A web application framework for R


Turn your analyses into interactive web applications

No HTML, CSS, or JavaScript knowledge required


TUTORIAL ARTICLES GALLERY REFERENCE DEPLOY HELP



Get inspired  
(gallery)



Get started  
(tutorial)



Go deeper  
(articles)

## Shiny by RStudio

Search

OVERVIEW

TUTORIAL

ARTICLES

GALLERY

REFERENCE

DEPLOY


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### Gallery


This gallery contains useful examples to learn from. Visit the [Shiny User Showcase](#) to see an inspiring set of sophisticated apps.

#### Interactive visualizations


Shiny is designed for fully interactive visualization, using JavaScript libraries like [d3](#), [Leaflet](#), and [Google Charts](#).



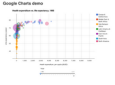
SuperZip example



Bus dashboard




Movie explorer



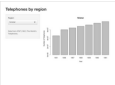
Google Charts

#### Start simple

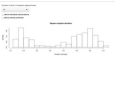
If you're new to Shiny, these simple but complete applications are designed for you to study.




Kmeans example



Telephones by region



Faithful



Word cloud

## Shiny by RStudio

Search

OVERVIEW

TUTORIAL

ARTICLES

GALLERY

REFERENCE

DEPLOY

HELP

### Teach yourself Shiny

#### Who should take the tutorial?

You will get the most out of this tutorial if you already know how to program in R, but not Shiny.

If R is new to you, you may want to check out the learning resources at [www.rstudio.com/training](#) before taking this tutorial. If you are not sure whether you are ready for Shiny, try our [quiz](#).

If you use Shiny on a regular basis, you may want to skip this tutorial and visit the articles section of the Development Center. In the articles section, we cover individual Shiny topics at an advanced level.

#### Get started with Shiny

This seven lesson tutorial will take you from R programmer to Shiny developer. Each lesson takes about 20 minutes and teaches one new Shiny skill. By the end of the lessons, you will know how to build and deploy a Shiny app.

Each lesson includes an exercise. Don't skip the exercises, even if you are tempted to get to the next lesson. The learning occurs in the exercises. How do we know? Because we designed the tutorial to be this way.

Click the Lesson 1 button to get started and say hello to Shiny!

- Lesson 1 - Welcome to Shiny
- Lesson 2 - Layout the user interface
- Lesson 3 - Add control widgets
- Lesson 4 - Display reactive output
- Lesson 5 - Use R scripts and data
- Lesson 6 - Use reactive expressions
- Lesson 7 - Share your apps

[Continue to lesson 1](#)

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Search

OVERVIEW

TUTORIAL

ARTICLES

GALLERY

REFERENCE

DEPLOY

HELP

### Articles

#### The basics

If you've been through the [tutorial](#) and need a refresher, these articles are a good place to start. They describe the lay of the land.

- The basic parts of a Shiny app
- How to build a Shiny app
- How to launch a Shiny app
- How to get help
- The Shiny cheat sheet
- Single-file Shiny apps
- App formats and launching methods

#### Layouts and UI

These articles explain how to control the layout, user-interface, and general appearance of your Shiny apps.

- Application layout guide
- Display modes
- Tabsets
- Customize your UI with HTML
- Build your entire UI with HTML
- Build a dynamic UI that reacts to user input

#### Extend Shiny

These packages provide advanced features that can enhance your Shiny apps.

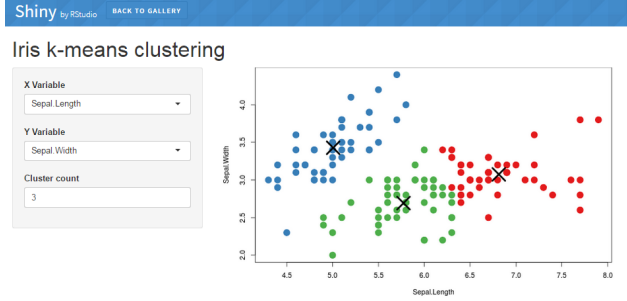
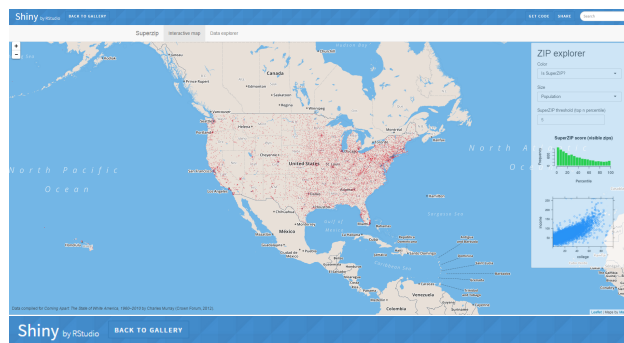
- [shinythemes](#) - CSS themes ready to use with Shiny
- [shinydashboard](#) - Shiny powered dashboards
- [htmlwidgets](#) - A framework for embedding JavaScript visualizations into R. Ready to use examples include: [leaflet](#) - Geo-spatial mapping, [dygraphs](#) - Time series charting, [MetricsGraphics](#) - Scatterplots and line charts with D3
- [networkD3](#) - Graph data visualization with D3
- [DataTables](#) - Tabular data display
- [threejs](#) - 3D scatterplots and globes
- [rCharts](#) - Multiple JavaScript charting libraries

#### Deploying apps

These articles describe the different ways to share your Shiny apps with users.

- Getting started with [shinyapps.io](#)
- [Shinyapps.io](#) Scaling and Performance Tuning
- Migrating [shinyapps.io](#) authentication
- Share data across sessions with [shinyapps.io](#)
- Introduction to Shiny Server
- Save your app as a function

## Ejemplos



More Widgets

Choose a dataset:

rock

Number of observations to view:

10

Note: while the data view will show only the specified number of observations, the summary will still be based on the full dataset.

Update View

Summary

	area	peri	shape	perm
Min.	: 1816	: 308.6	Min.	: 0.00833
1st Qu.	: 5395	1st Qu.: 1414.9	1st Qu.: 0.16226	1st Qu.: 76.45
Median	: 7487	Median: 2536.2	Median: 0.19886	Median: 139.50
Mean	: 7128.0	Mean : 2652.2	Mean : 0.21511	Mean : 415.45
3rd Qu.	: 8870	3rd Qu.: 3989.5	3rd Qu.: 0.26267	3rd Qu.: 777.50
Max.	: 12212	Max.: 4864.2	Max.: 0.46413	Max.: 1380.00

Observations

	area	peri	shape	perm
1	4990	2791.90	0.09	6.30
2	7062	3892.60	0.15	6.30
3	7558	3930.66	0.18	6.30
4	7352	3869.32	0.12	6.30
5	7943	3948.54	0.22	17.10
6	7979	4010.18	0.17	17.10
7	9333	4345.75	0.19	17.10
8	8209	4344.75	0.16	17.10
9	8393	3682.04	0.20	119.00
10	6425	3098.65	0.16	119.00

# Interfaces gráficas de packages

Step 1. Load data

Step 2. Select variables

Step 3. Settings

Step 4. Display

Step 5. Save table

Selected

Discarded

group

sex

age

smoke

lrm

waist

with

htn

diab

hyperchol

famhist

hormo

glf4

event

Update

ABOUT DATA TABLE PLOT SNPs

View options (Show)

	Control N=2042	MedDiet + Nuts N=2100	MedDiet + VOO N=2182	p-overall
Intervention group:				0.000
Control	100%	0.00%	0.00%	
MedDiet + Nuts	0.00%	100%	0.00%	
MedDiet + VOO	0.00%	0.00%	100%	
Sex:				<0.001
Male	39.8%	46.1%	47.2%	
Female	60.2%	53.9%	52.8%	
Age	67.3±6.28	66.7±6.02	67.0±6.21	0.003
Smoking:				0.444
Never	62.8%	60.0%	61.9%	
Current	13.2%	14.1%	13.4%	
Former	24.0%	26.0%	24.7%	
Body mass index	30.3±5.06	29.7±5.77	29.9±5.71	<0.001
Waist circumference	101±10.8	100±10.6	100±10.4	0.045
Waist-to-height ratio	0.63 (0.58;0.68)	0.62 (0.58;0.66)	0.62 (0.58;0.67)	<0.001
Hypertension	83.8%	82.9%	81.9%	0.249
Type-2 diabetes	47.5%	45.2%	49.6%	0.017
Dyslipidemia	72.4%	73.3%	71.5%	0.423
Family history of premature CHD	22.0%	21.9%	23.2%	0.581
Hormone-replacement therapy	1.68%	1.61%	1.84%	0.850
Mediet Adherence score	8.00 (7.00;10.0)	9.00 (8.00;10.0)	9.00 (8.00;10.0)	<0.001
AMI, stroke, or CV Death	4.75%	3.33%	3.90%	0.064

CA on the children dataset

Graphs Values Summary of dataset Data

Warning : thisQty, fctQty, wcm\_fctQty have NA : they are considered as supplementary column  
Warning : confInt, diagreement, world, to\_line have NA : they are considered as supplementary row

CA factor map

Download as png

Save graphs as:

PKG  
PNG  
PDF

MAWAS: Meta-Analysis via Shiny

Input Examples Correlation Model Measures Dichotomous Model Options Categorical Estimation Publication Bias

Effect Size Calculator About MAWAS

Data Analysis and Input Options:

- Mean Difference (in SE SD)
- Mean Difference (in Effect size d)
- Correlations (in r)
- Log Odds Ratio
- The Data contains a categorical moderator (subgroup) variable

Update Value

Click here to update your results, you need to do this after you change the data, model, or any of the settings

Quit

Press Quit to exit the application

Note: Input values must be separated by tabs. Copy and paste from Excel.  
Your data needs to have exactly the same header (variable names) in the first row.  
For examples of how this data should look click on the Input Examples tab

	Study	Mod1	SE	SE1	SE2	SE3	SE4	SE5	SE6
1	Study 01	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05
2	Study 02	0.2	0.06	0.06	0.06	0.06	0.06	0.06	0.06
3	Study 03	0.3	0.07	0.07	0.07	0.07	0.07	0.07	0.07
4	Study 04	0.4	0.08	0.08	0.08	0.08	0.08	0.08	0.08
5	Study 05	0.5	0.09	0.09	0.09	0.09	0.09	0.09	0.09
6	Study 06	0.6	0.10	0.10	0.10	0.10	0.10	0.10	0.10
7	Study 07	0.7	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8	Study 08	0.8	0.12	0.12	0.12	0.12	0.12	0.12	0.12
9	Study 09	0.9	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10	Study 10	1.0	0.14	0.14	0.14	0.14	0.14	0.14	0.14
11	Study 11	1.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12	Study 12	1.2	0.16	0.16	0.16	0.16	0.16	0.16	0.16
13	Study 13	1.3	0.17	0.17	0.17	0.17	0.17	0.17	0.17
14	Study 14	1.4	0.18	0.18	0.18	0.18	0.18	0.18	0.18
15	Study 15	1.5	0.19	0.19	0.19	0.19	0.19	0.19	0.19
16	Study 16	1.6	0.20	0.20	0.20	0.20	0.20	0.20	0.20
17	Study 17	1.7	0.21	0.21	0.21	0.21	0.21	0.21	0.21
18	Study 18	1.8	0.22	0.22	0.22	0.22	0.22	0.22	0.22
19	Study 19	1.9	0.23	0.23	0.23	0.23	0.23	0.23	0.23
20	Study 20	2.0	0.24	0.24	0.24	0.24	0.24	0.24	0.24
21	Study 21	2.1	0.25	0.25	0.25	0.25	0.25	0.25	0.25
22	Study 22	2.2	0.26	0.26	0.26	0.26	0.26	0.26	0.26
23	Study 23	2.3	0.27	0.27	0.27	0.27	0.27	0.27	0.27
24	Study 24	2.4	0.28	0.28	0.28	0.28	0.28	0.28	0.28
25	Study 25	2.5	0.29	0.29	0.29	0.29	0.29	0.29	0.29
26	Study 26	2.6	0.30	0.30	0.30	0.30	0.30	0.30	0.30
27	Study 27	2.7	0.31	0.31	0.31	0.31	0.31	0.31	0.31
28	Study 28	2.8	0.32	0.32	0.32	0.32	0.32	0.32	0.32
29	Study 29	2.9	0.33	0.33	0.33	0.33	0.33	0.33	0.33
30	Study 30	3.0	0.34	0.34	0.34	0.34	0.34	0.34	0.34

Effect size and sampling variance

ES = Effect size (Cohen's d)  
SV = Sampling variance (var(CO)) = 0.04

Study Moderator SE SE1 SE2 SE3 SE4 SE5 SE6 SV

1 Study 01 0.1 0.05 0.05 0.05 0.05 0.05 0.05 0.04

2 Study 02 0.2 0.06 0.06 0.06 0.06 0.06 0.06 0.04

3 Study 03 0.3 0.07 0.07 0.07 0.07 0.07 0.07 0.04

4 Study 04 0.4 0.08 0.08 0.08 0.08 0.08 0.08 0.04

5 Study 05 0.5 0.09 0.09 0.09 0.09 0.09 0.09 0.04

## Cómo usarlo: (1) En local

### Pasos

1. Se escribe la parte **UI** en un archivo llamado “**ui.R**” y la parte **Server** en un archivo llamado “**server.R**”. Ambos archivos se tienen que llamar así y tienen que estar en la misma carpeta.
2. Se carga el *package* **shiny**.
3. Se ejecuta la función **runApp()**.

### Alternativa

Guardar el código de la parte **UI** y el de la parte **Server** en dos objetos (**ui** y **server**) y llamar a la función **runApp(list(ui, server))** ó la función **shinyApp(ui, server)**

### Requisitos:

Hay que tener instalado **R** y **Shiny** y los *packages* necesarios actualizados en el PC ó Mac.

## Cómo usarlo: (II) en un servidor remoto

### EN UN SERVIDOR PROPIO

- Ventajas
- Accesible desde cualquier dispositivo que tenga navegador.
- No hace falta **R** ni **Shiny** ni otros paquetes.
- Requisitos
- **R** y **Shiny** y otros posibles paquetes instalados en el servidor.
- Instalar los programas necesarios. Más info aquí.
- El sistema operativo del servidor tiene que ser Linux.

### EN EL SERVIDOR DE SHINY

- Ventajas
- Es muy simple: sólo hay que instalar **shinyapps** y registrarse en [www.shinyapps.io/](http://www.shinyapps.io/).
- Accesible desde cualquier dispositivo que tenga navegador.
- **Shiny server** ofrece unas estadísticas del uso de la app.
- Inconvenientes
- El servicio es gratuito hasta un máximo de horas y número de usuarios.

## Extensiones de Shiny

Paquetes disponibles en CRAN para mejorar el aspecto y funcionalidad de la aplicación.

Los que usaremos en el curso son:

- **shinyBS**: para crear *popups*, modales, etc. Visita su página web [aquí](#)
- **shinyjs**: para crear *toggles*, etc. Visita su página web [aquí](#)
- **shinythemes**: par cambiar el estilo. Visita su página web [aquí](#)

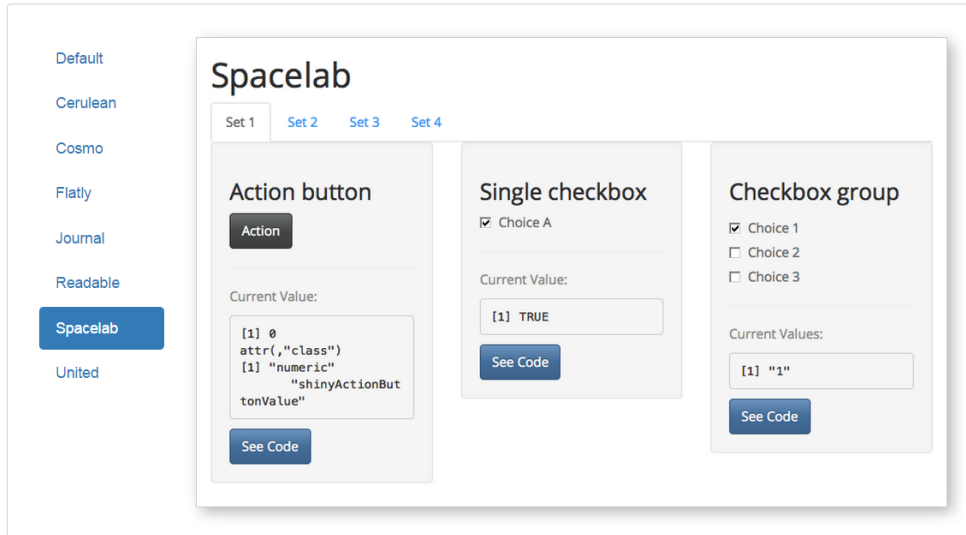
=====

**shinythemes**

<https://rstudio.github.io/shinythemes/>

## Shiny Themes

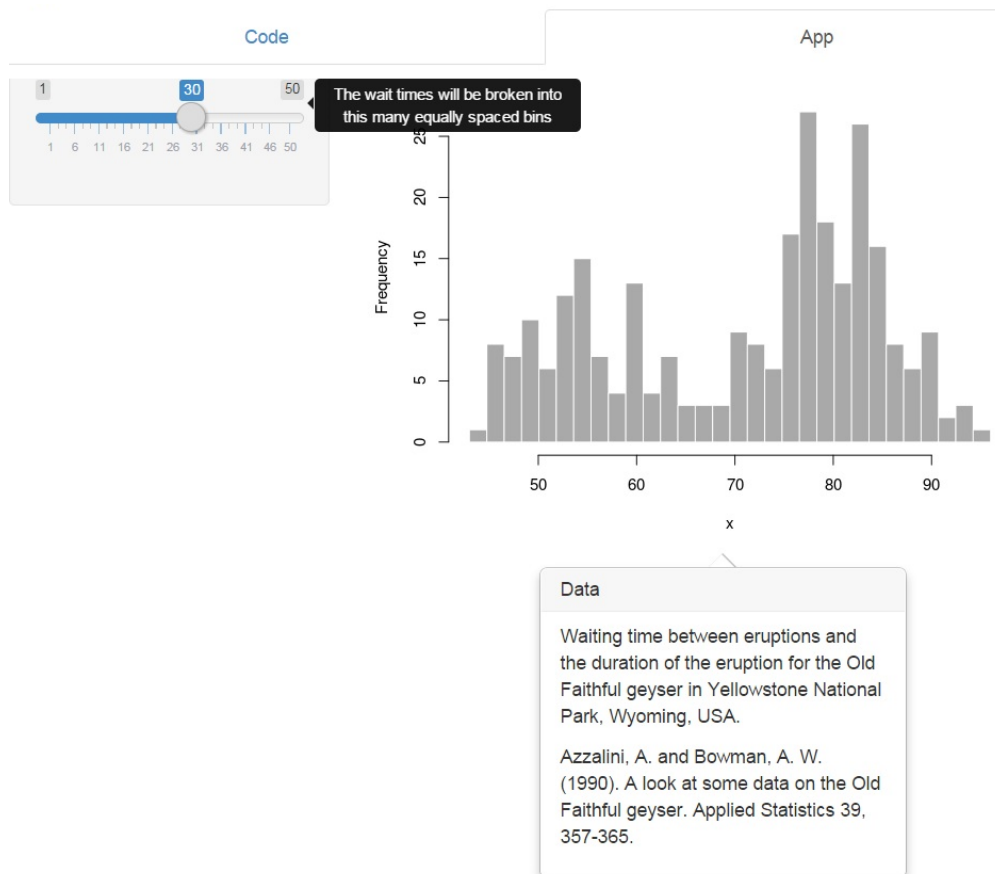
The **shinythemes** package makes it easy to alter the overall appearance of your Shiny applications. Here are screenshots of the same applications with different themes:



**shinyBS**

<https://ebailey78.github.io/shinyBS/>

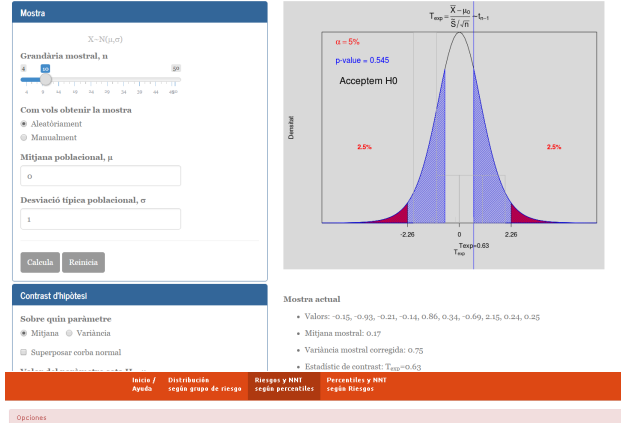




# Más ejemplos

<http://apps.datarus.eu/onesample/> <http://apps.datarus.eu/splines> <http://apps.datarus.eu/fresco/> <http://apps.datarus.eu/riskcalculator/>

## Contrast d'hipòtesi sobre una població normal



## Cardiovascular risk calculator

developed by REGICOR group

**STEP 1: Load data**

**STEP 2: Variables**

Variable names:

Sex

sex

Age

age

Total cholesterol

chol

HDL cholesterol

hdl

Syst. Blood Pressure

sbp

Diast. Blood Pressure

dbp

Diabetes status

diab

Smoking

smoke

Categorical variables codes:

Male

Female

Diabetic

Non-diabetic

Yes

No

**Summary** **Raw data** **Table with risk**

**View options (How)**

Risk equation

REGICOR

REGICOR

Riesgo REGICOR %

FRAMINGHAM

FRAM

Riesgo FRAMINGHAM %

Select the number of decimals for risk

1

Show 11 entries

id	sex	age	chol	hdl	sbp	dbp	diab	smoke	REGICOR	FRAM
1	Female	47	311	65	100	60	Yes	Never or former <1y	1.9	4.5
2	Male	67	199	81	116	71	Yes	Never or former <1y	3.6	10.7
3	Male	74	178	48	138	67	No	Never or former <1y	7.0	20.1

## ¿Cómo funciona? Caso práctico

### Lectura datos

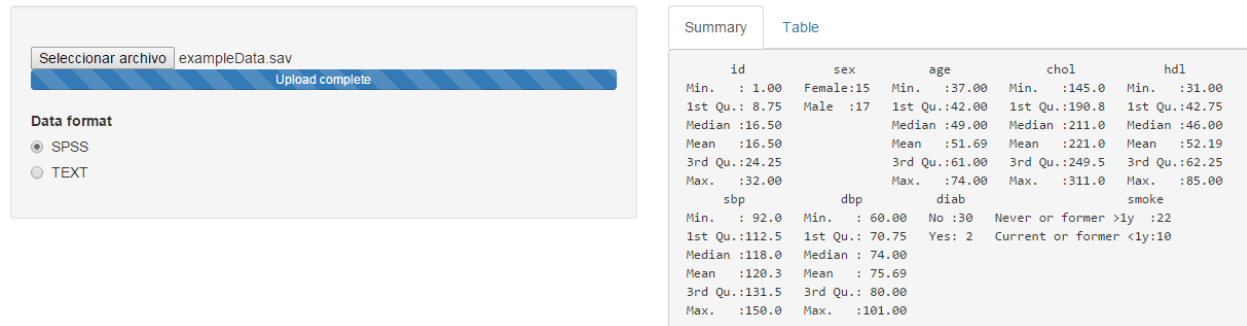


Figure 1:

### Lectura datos

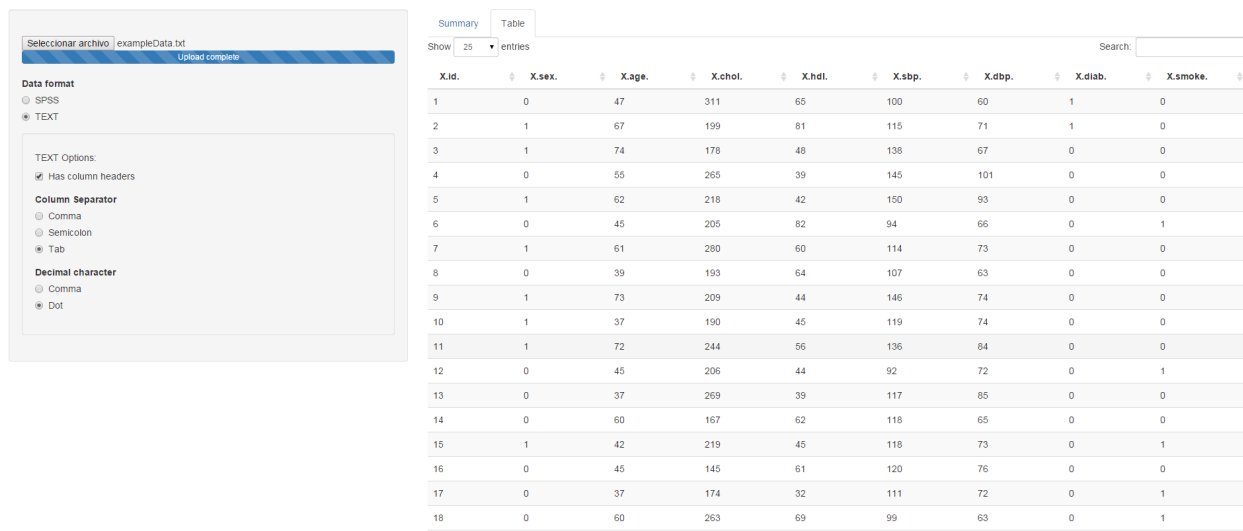


Figure 2:

## INPUTS

- `file` : Fichero (`fileInput`).
- `datatype`: Tipo de datos (`radioButtons`).
- Si los datos son de tipo texto:
  - `header`: ¿Contiene cabecera? (`checkboxInput`).
  - `sep`: Caracter separador de columnas (`radioButtons`).
  - `dechar`: Tipo de datos (`radioButtons`).

## OUTPUTS

- `summary`: Descriptivas de las variables (`verbatimTextOutput`).
- `dataTable`: Muestra la tabla de datos (`dataTableOutput`).

## Fichero “ui.R”

```
fluidPage(  
  
  titlePanel("Lectura datos"),  
  
  sidebarLayout(  
  
    sidebarPanel(  
      fileInput("file", ""),  
      radioButtons("datatype", "Data format", c("SPSS"=1, "TEXT"=2),1),  
      conditionalPanel(  
        condition="input.datatype==2",  
        wellPanel(  
          h5("TEXT Options:"),  
          checkboxInput("header", "Has column headers", TRUE),  
          radioButtons("sep", "Column Separator", c(Comma=",", Semicolon=";", Tab="\t")),  
          radioButtons("dechar", "Decimal character", c(Comma=",", Dot="."), "Dot")  
        )  
      )  
    ),  
  
    mainPanel(  
      tabsetPanel(type = "tabs",  
        tabPanel("Summary", verbatimTextOutput("summary")),  
        tabPanel("Table", dataTableOutput("dataTable"))  
      )  
    )  
  )  
)
```

## Fichero “server.R”

```
function(input, output) {  
  dataset<-reactive({  
    inFile<-input$file  
    if (input$datatype==2){  
      dataset<- read.table(inFile$datapath,header=input$header,  
        sep=input$sep,quote=input$quote,dec=input$dechar)  
    } else {  
      dataset<-spss.get(inFile$datapath)  
    }  
    return(dataset)  
  })  
  
  output$dataTable <- renderDataTable({  
    dataset()  
  })  
  
  output$summary <- renderPrint({  
    summary(dataset())  
  })  
}
```