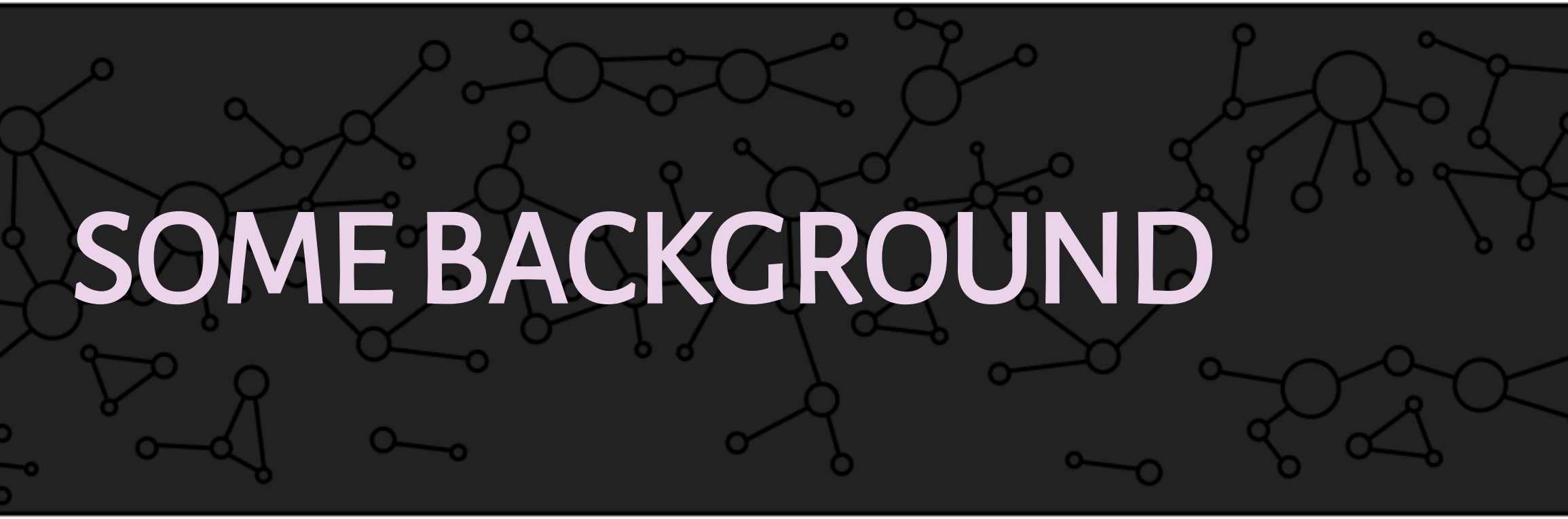
DATA HANDLING, VALIDATION AND MANIPULATION IN R.

Pablo Gomez

To see this slides online go to:
https://cadms.github.io/mpm207/s/w3.html


SOME BACKGROUND

WHAT IS THE PROBLEM?

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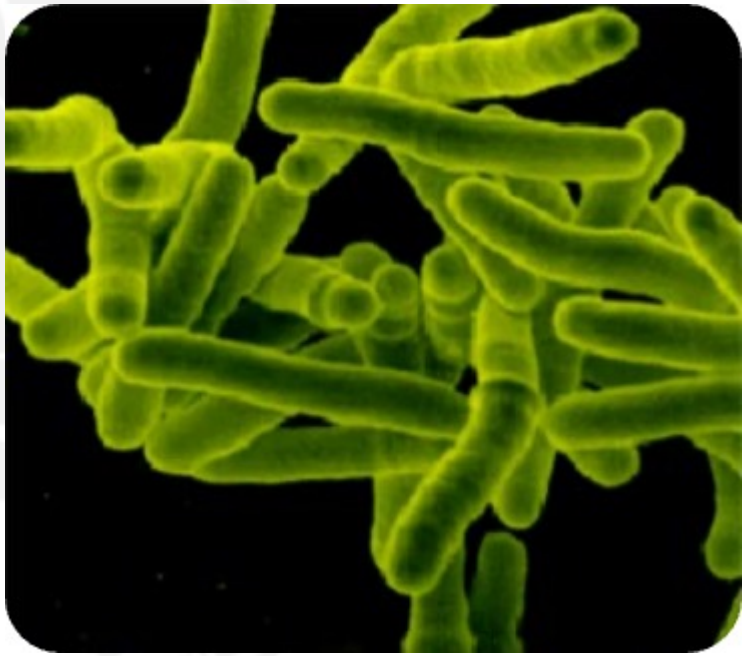
Bovine tuberculosis (bTB), caused by Mycobacterium tuberculosis complex, particularly M. bovis and M. caprae, is a zoonotic bacterial disease that affects a wide range of domestic and wild species all over the world.



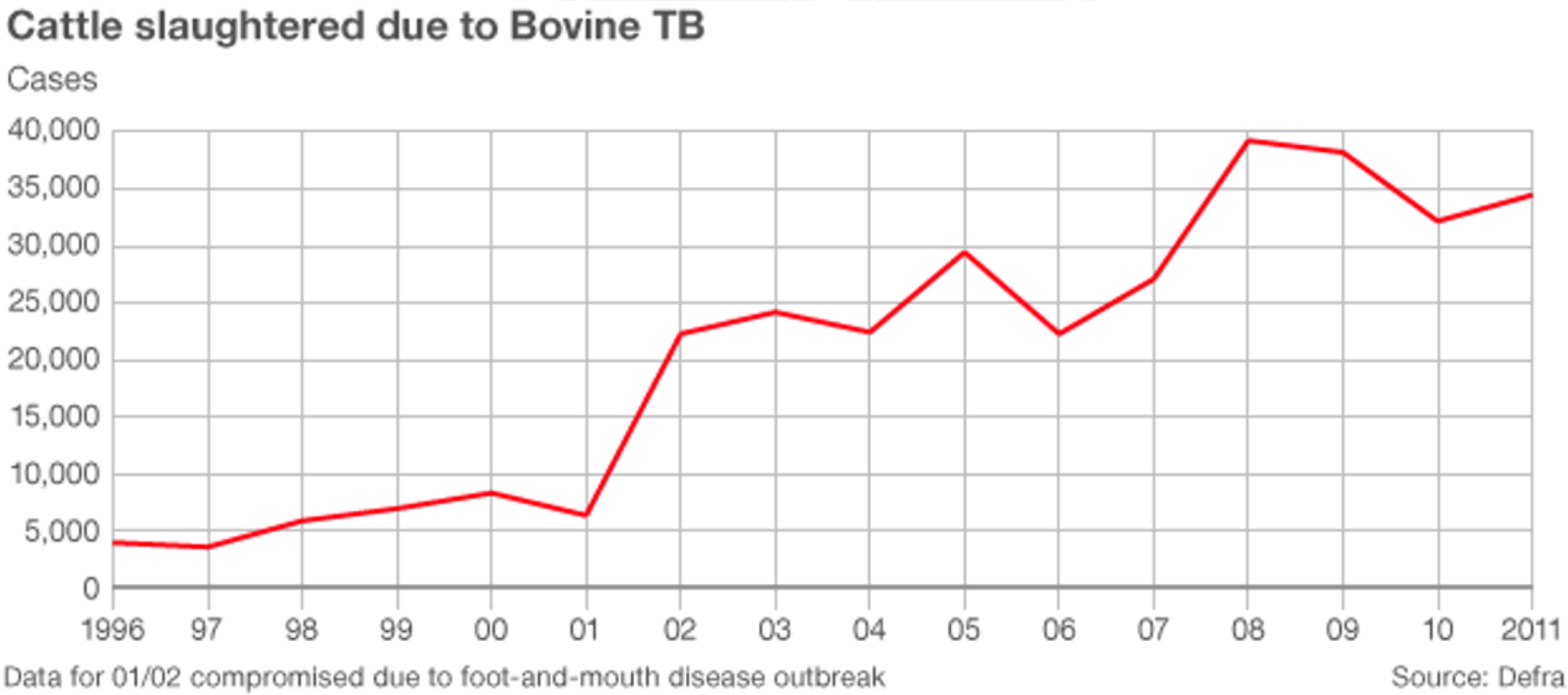
WHAT IS THE PROBLEM?

Public Health

Economic Impact

WHAT IS THE PROBLEM?

Although bTB eradication has been a major objective for developed countries in the last decades, this goal is still far to be accomplished:



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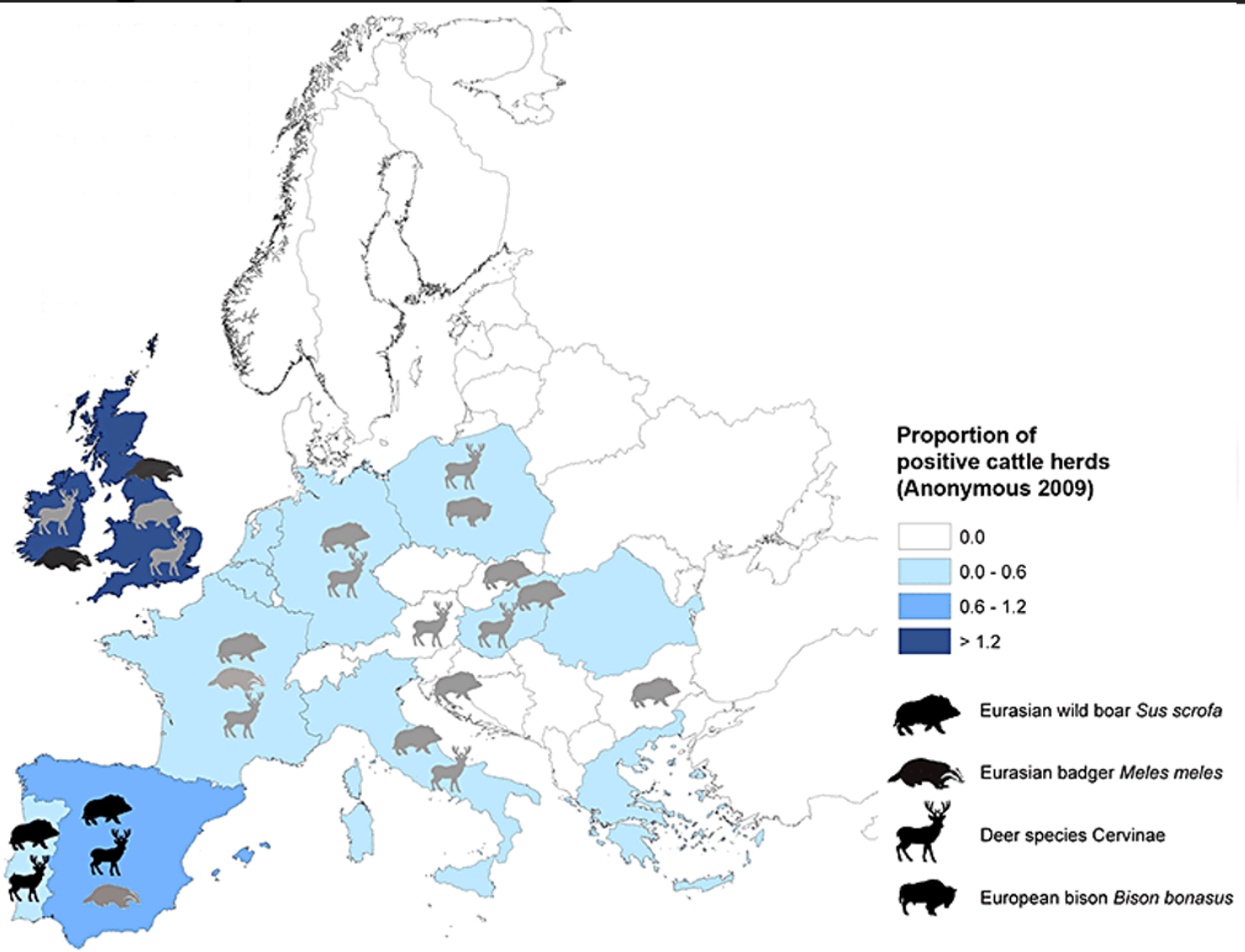
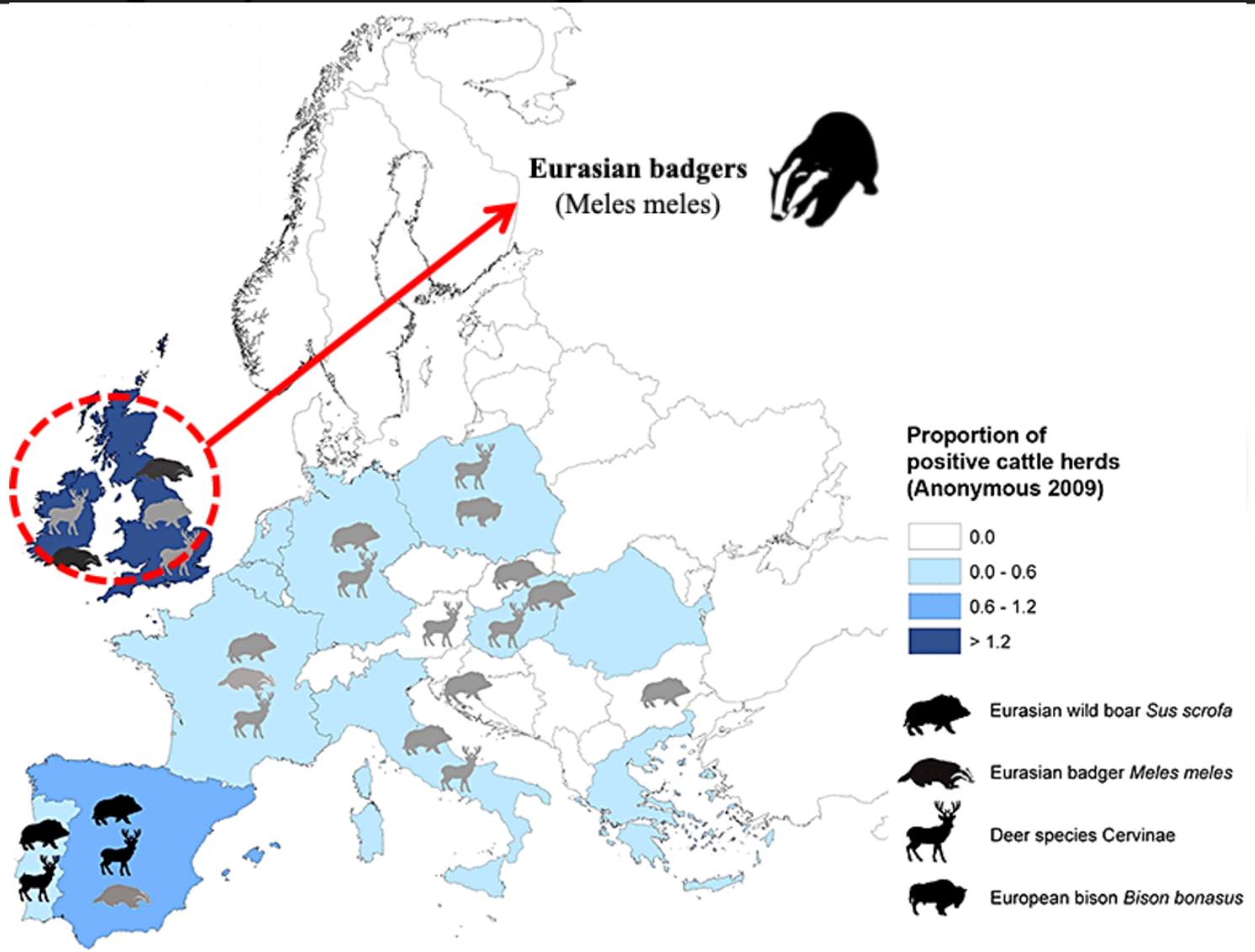


WHAT IS THE PROBLEM?



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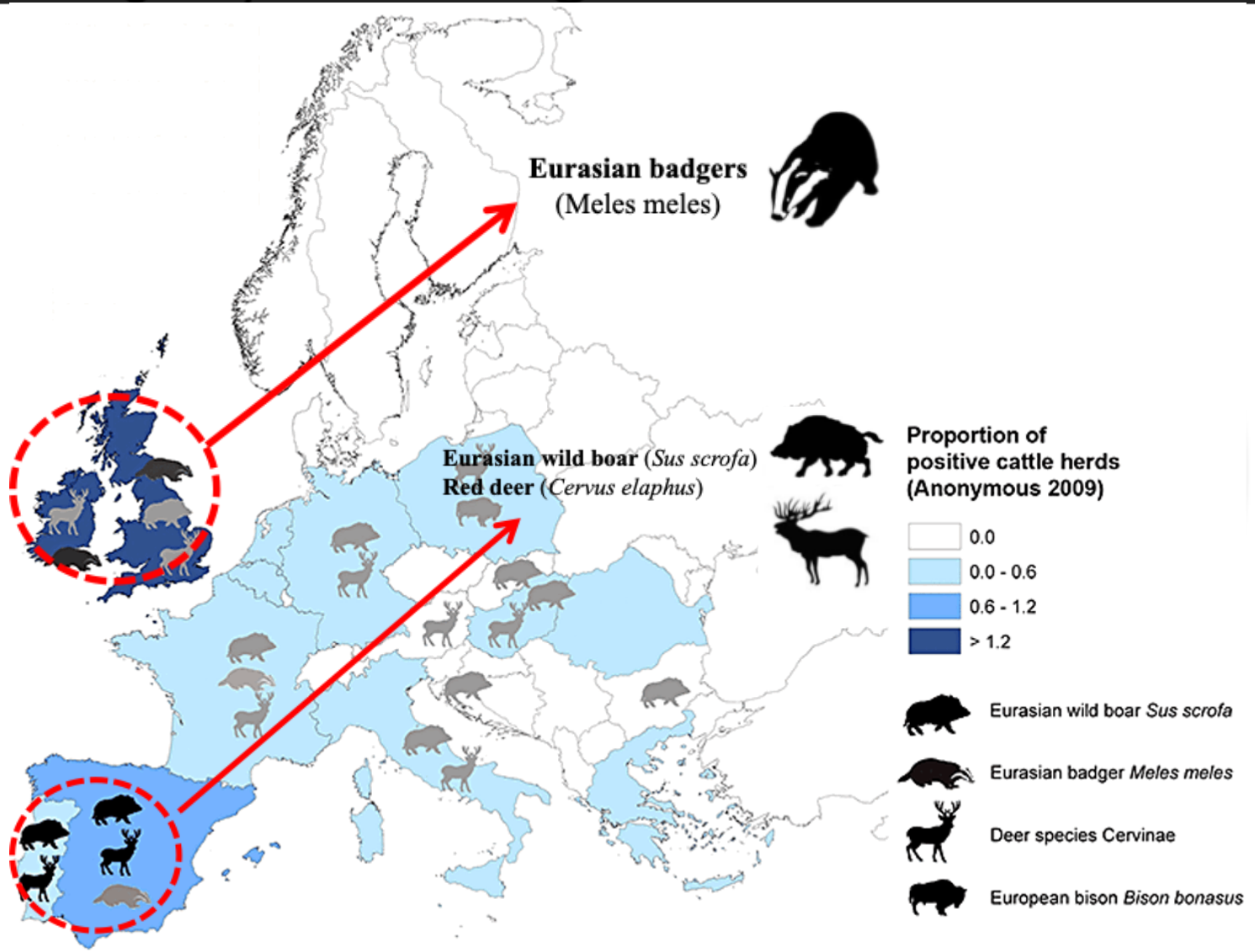
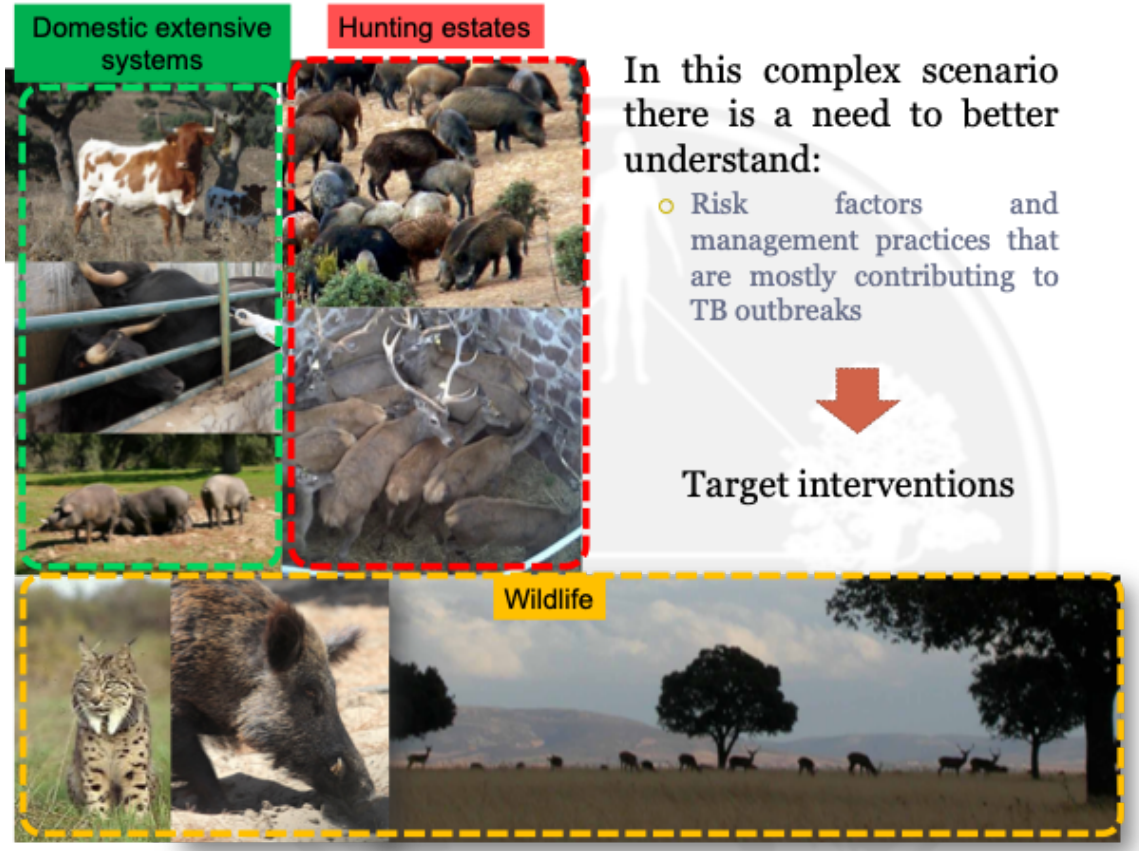


STUDY AREA

STUDY AREA



In this complex scenario there is a need to better understand:

- Risk factors and management practices that are mostly contributing to TB outbreaks

Target interventions

STUDY AREA

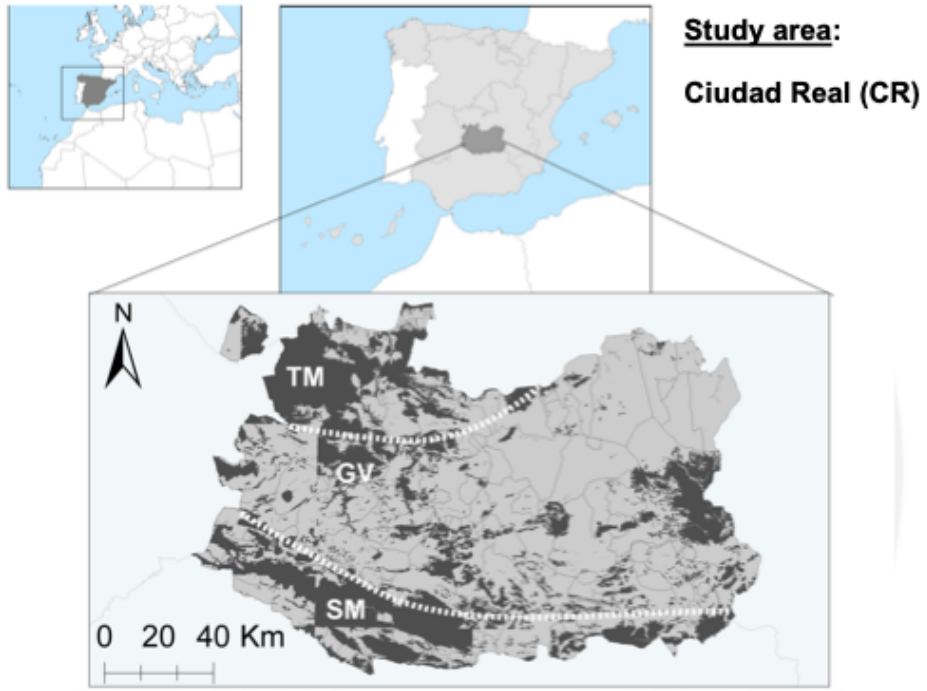


Figure 1. Ciudad Real. TM= Toledo Mountains; SM=Sierra Morena Mountains. GV=Guadiana River Valley.

DATA

Example: An observational study to evaluate factors associated with TB prev/breakdowns in Ciudad Real (CR), in which we have information at a farm-level (766 farms).

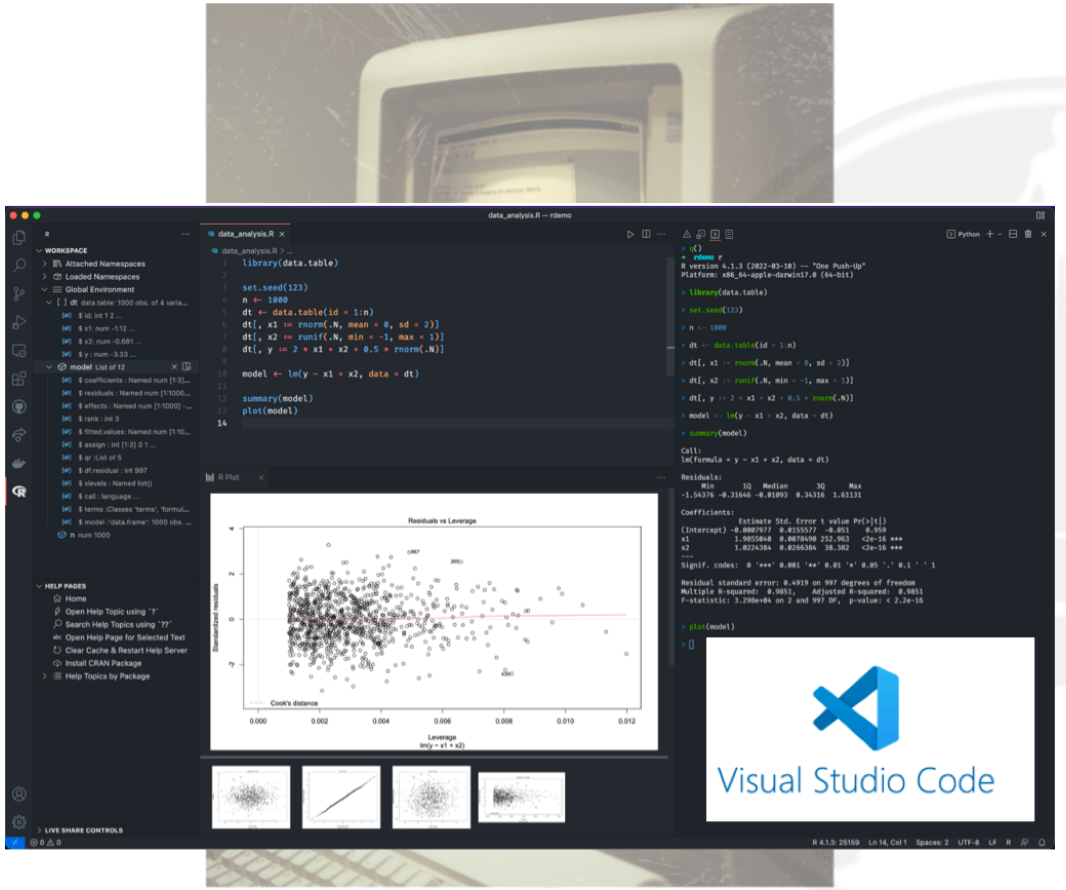
- ID_farm: Unique identifier of the cattle farm
- Mun: Name of municipality where farm is located
- Com: Name of county (i.e. "Comarca") where farm is located
- Census: Census or farm size (number of animals on farm)
- Prev: Prevalence of TB on farm the previous year (2004) (numerically perturbed to preserve confidentiality)
- Incid: TB breakdown on farm (2005 campaign, 1= YES, 0=NO)
- Xcoor: X coordinate (UTM system, numerically perturbed to preserve confidentiality)
- Ycoor: Y coordinate (UTM system, numerically perturbed to preserve confidentiality)
- Type: Type of farm (Beef vs Dairy)
- MOV_year: Average number of cattle incoming shipments per year
- MOV_cen: Cattle incoming shipments adjusted by farm size (cattle incoming shipments divided by the number of animals on farm * 100)
- ANIM_mov: Number of cattle introduced on farm in 2005
- Goat: Goats present on farm (yes=1, no=0)
- Sheep: Sheep present on farm (yes=1, no=0)
- Pig: Pigs present on farm (yes=1, no=0)
- MEANfenced: Mean number of fenced (closed) hunting states in a 3km radius around the farm.

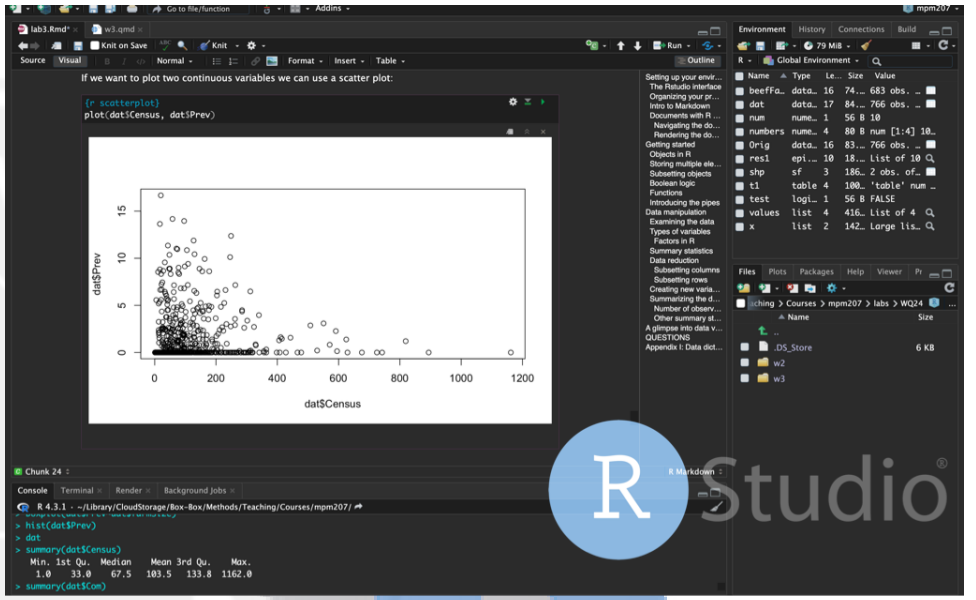

HOW ARE WE DOING
THIS?

GETTING STARTED WITH R

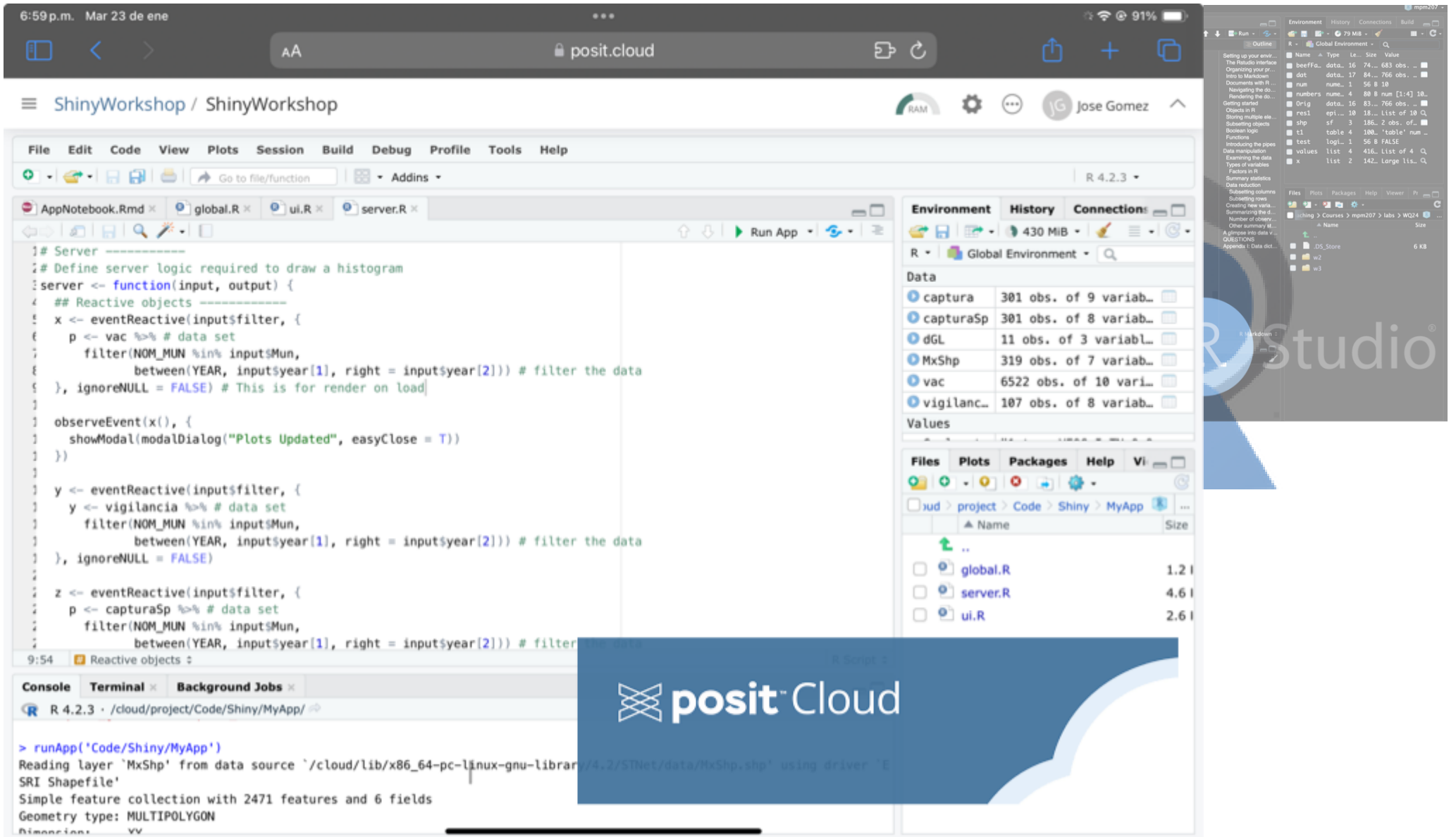
GETTING STARTED WITH R

GETTING STARTED WITH R

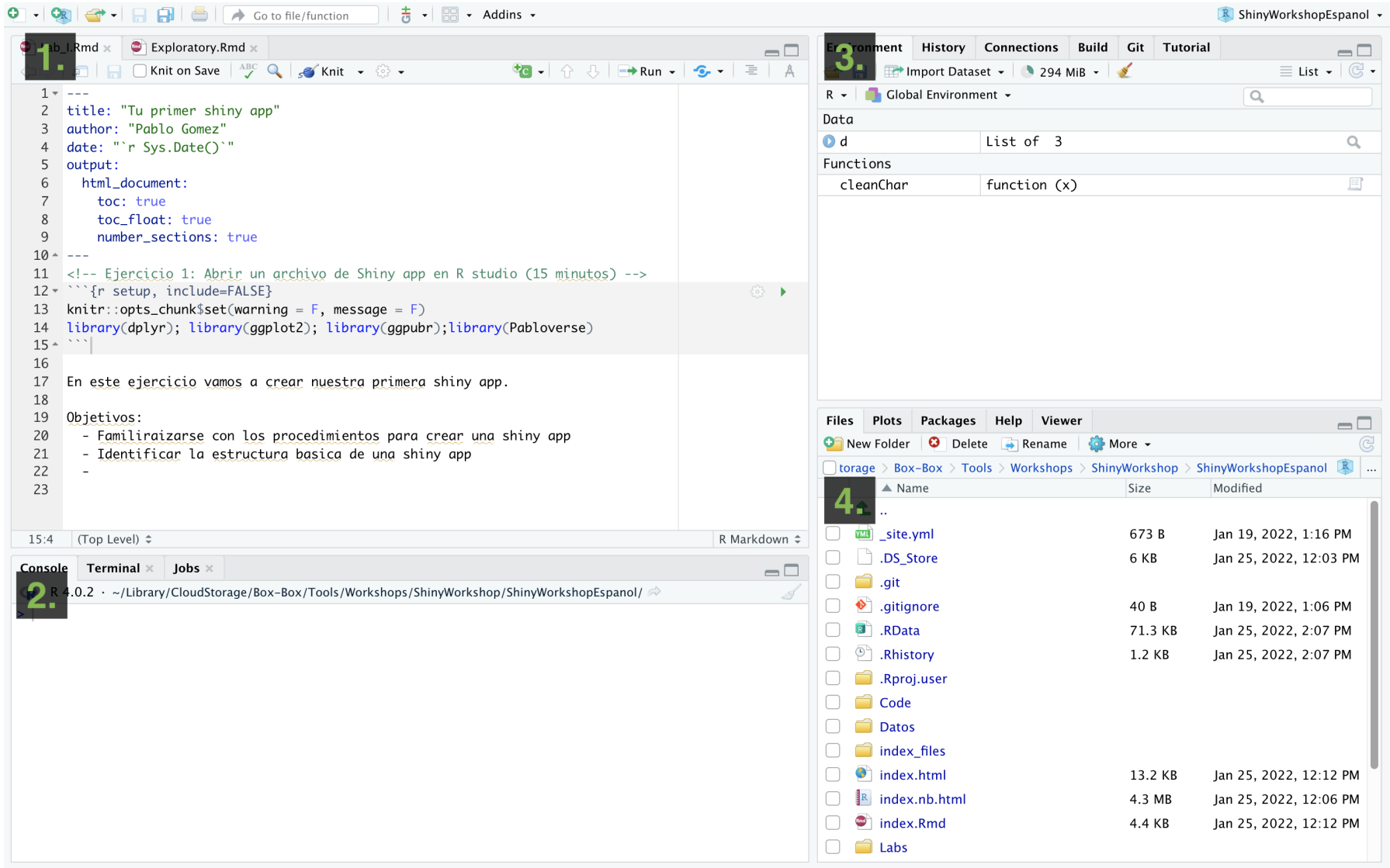




GETTING STARTED WITH R



R STUDIO


Go to file/function
Addins
ShinyWorkshopEspanol
1.
Exploratory.Rmd
Knit on Save
Knit
Run
---
title: "Tu primer shiny app"
author: "Pablo Gomez"
date: "`r Sys.Date()`"
output:
html_document:
toc: true
toc_float: true
number_sections: true

<!-- Ejercicio 1: Abrir un archivo de Shiny app en R studio (15 minutos) -->
```{r setup, include=FALSE}
knitr::opts_chunk$set(warning = F, message = F)
library(dplyr); library(ggplot2); library(ggpubr);library(Pabloverse)
```
En este ejercicio vamos a crear nuestra primera shiny app.
Objetivos:
- Familiraizarse con los procedimientos para crear una shiny app
- Identificar la estructura basica de una shiny app
-
15:4
(Top Level)
R Markdown
2.
Console
Terminal
Jobs
R 4.0.2 · ~/Library/CloudStorage/Box-Box/Tools/Workshops/ShinyWorkshop/ShinyWorkshopEspanol/
3.
History
Connections
Build
Git
Tutorial
Import Dataset
294 MiB
List
R
Global Environment
Data
d
List of 3
Functions
cleanChar
function (x)
4.
Files
Plots
Packages
Help
Viewer
New Folder
Delete
Rename
More
torage
Box-Box
Tools
Workshops
ShinyWorkshop
ShinyWorkshopEspanol
Name
Size
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..
_site.yml
673 B
Jan 19, 2022, 1:16 PM
.DS_Store
6 KB
Jan 25, 2022, 12:03 PM
.git
.gitignore
40 B
Jan 19, 2022, 1:06 PM
.RData
71.3 KB
Jan 25, 2022, 2:07 PM
.Rhistory
1.2 KB
Jan 25, 2022, 2:07 PM
.Rproj.user
Code
Datos
index_files
index.html
13.2 KB
Jan 25, 2022, 12:12 PM
index.nb.html
4.3 MB
Jan 25, 2022, 12:06 PM
index.Rmd
4.4 KB
Jan 25, 2022, 12:12 PM
Labs

SOME PROGRAMMING CONCEPTS

COMMENTS

COMMENT AS MUCH AS POSSIBLE!

```
1 # This is a comment in R it will be only for the user
2 This is not a comment and will cause an error
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What is the difference between line 1 and 2?

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```
1  10 + 10 # Everything after will be a comment
2  7 + 4
```

OPERATORS

Operators are characters with a specific function in R for example

```
3 + 3 # this is a sum operator
```

```
[1] 6
```

```
3 - 2 # this is a subtract operator
```

```
[1] 1
```

```
4 * 4 # This is a multiplication
```

```
[1] 16
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```
[1] 16
```

Later we will see other kind of operators, but... DONT STRESS about learning everything.

OBJECTS

Objects in R are containers for information, we can create objects with any names we want that start with a letter

```
1 myNumber <- 4
2 myResult <- 4 * 5
```

STORING MULTIPLE ELEMENTS

Using the c( ) function

```
1  x <- c(1, 3, 5) # using the c() function
2  x
```

```
[1] 1 3 5
```

STORING MULTIPLE ELEMENTS

Using the `c()` function

```
1 x <- c(1, 3, 5) # using the c() function
2 x
```

```
[1] 1 3 5
```

Using the `list()` function

```
1 y <- list(1, 3, 5) # using the list() function
2 y
```

```
[[1]]
[1] 1

[[2]]
[1] 3

[[3]]
[1] 5
```

BOOLEAN LOGIC

```
1 == 1 # is it equal?
```

```
[1] TRUE
```

```
1 != 1 # is it NOT equal?
```

```
[1] FALSE
```

```
1 %in% c(1, 2, 3) # is the number contained in the sequence?
```

```
[1] TRUE
```

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```

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```

Notice that we are using operators to make the comparisons

FUNCTIONS

Functions are a special kind of object. Functions are objects that require arguments, the arguments needs to be inside parentheses.

```r
# create a sequence of numbers
seq(
  from = 0, # Starting number
  to = 80, # Ending number
  by = 20 # number increment of the sequence
)
```

```
[1]  0 20 40 60 80
```

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We can create our own functions, which we will talk more about in the labs

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- *integer* , Whole numbers WITHOUT decimal values. For example: Number of animals, number of shipments, etc..
- *character* , Alphanumeric variables. For example: name of a region, name of a disease, farm ID.
- *factor* , Alphanumeric variable with specific categories or levels. For example: type of product imported, type of farm, etc...

TEST TIME!

```r
x <- seq(from = 5, to = 23, length.out = 10) # create a sequence of numbers
y <- seq(from = 0.1, to = 0.78, length.out = 10) # Create another sequence
mean(x*y) # Get the mean of the multiplication
```

```
[1] 7.406667
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Objects:

- x
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Operators:

- *
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Objects:

- x
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Operators:

- *
- <-
- =

Functions:

- seq()
- mean()

Arguments:

- from
- to
- lengt.out

INTRODUCING THE PIPES %>%

Pipes (%>%), can connect several functions to an object.

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INTRODUCING THE PIPES %>%

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For example, if we want to execute a function `F1()` followed by another function `F2()` for the object `x`:

```
1  F2(F1(x))
```

is equivalent to:

```
1  x %>% F1() %>% F2()
```

FOR EXAMPLE

$$\sqrt{\sum_{1}^{n} x}$$

Instead of this:

```
1  sqrt(sum(x))
```

FOR EXAMPLE

$$\sqrt{\sum_{1}^{n} x}$$

Instead of this:

```
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```

We can write it like this:

```
1  x %>% sum() %>% sqrt()
```

FOR EXAMPLE

Instead of this:

```
1  # Get the number of outgoing and incoming shipments
2  Out <- rename(summarise(group_by(mov, id_orig), Outgoing = n()), id = id_or
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We can write this:

```
1 # Get the number of outgoing and incoming shipments
2 Out <- mov %>%
3   group_by(id_orig) %>%
4   summarise(Outgoing = n()) %>%
5   rename(id = id_orig)
```

FOR EXAMPLE

Instead of this:

```
1 # Get the number of outgoing and incoming shipments
2 Out <- rename(summarise(group_by(mov, id_orig), Outgoing = n()), id = id_or
```

We can write this:

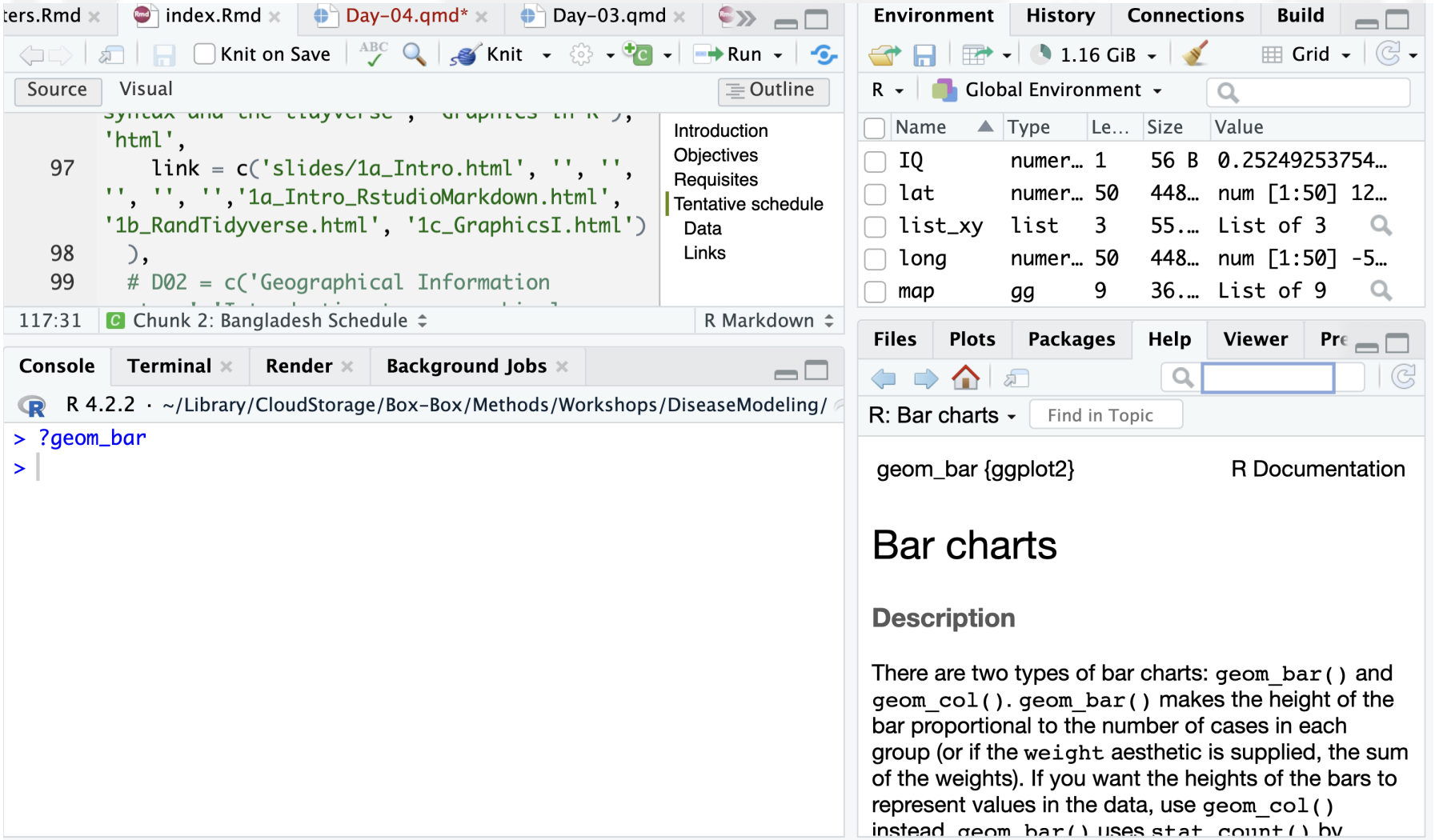
```
1 # Get the number of outgoing and incoming shipments
2 Out <- mov %>% # This is the movement data set
3   group_by(id_orig) %>% # Group by origin
4   summarise(Outgoing = n()) %>% # Count the number of observations
5   rename(id = id_orig) # Rename the variable
```

And we can break down the code easier!

HOW CAN WE FIND HELP WITH R?

HOW CAN WE FIND HELP WITH R?

Using the ? operator:


ters.Rmd
index.Rmd
Day-04.qmd*
Day-03.qmd
Knit on Save
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Source
Visual
Outline
'html',
97 link = c('slides/1a_Intro.html', '', '', '', '', '','1a_Intro_RstudioMarkdown.html', '1b_RandTidyverse.html', '1c_GraphicsI.html')
98),
99 # D02 = c('Geographical Information
Introduction
Objectives
Requisites
Tentative schedule
Data
Links
117:31
Chunk 2: Bangladesh Schedule
R Markdown
Console
Terminal
Render
Background Jobs
R 4.2.2 · ~/Library/CloudStorage/Box-Box/Methods/Workshops/DiseaseModeling/
> ?geom_bar
>
Environment
History
Connections
Build
1.16 GiB
Grid
R
Global Environment
Name
Type
Le...
Size
Value
IQ
numer...
1
56 B
0.25249253754...
lat
numer...
50
448...
num [1:50] 12...
list_xy
list
3
55....
List of 3
long
numer...
50
448...
num [1:50] -5...
map
gg
9
36....
List of 9
Files
Plots
Packages
Help
Viewer
R: Bar charts
Find in Topic
geom_bar {ggplot2}
R Documentation
Bar charts
Description
There are two types of bar charts: geom_bar() and geom_col(). geom_bar() makes the height of the bar proportional to the number of cases in each group (or if the weight aesthetic is supplied, the sum of the weights). If you want the heights of the bars to represent values in the data, use geom_col()
instead. geom_bar() uses stat_count() by

HOW CAN WE FIND HELP WITH R?

geom_path {ggplot2} R Documentation

Connect observations

Description

`geom_path()` connects the observations in the order in which they appear in the data. `geom_line()` connects them in order of the variable on the x axis. `geom_step()` creates a stairstep plot, highlighting exactly when changes occur. The `group` aesthetic determines which cases are connected together.

Usage

```
geom_path(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  ...,
  lineend = "butt",
  linejoin = "round",
  linemitre = 10,
  arrow = NULL,
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)
```

HOW CAN WE FIND HELP WITH R?

Arguments

`mapping`	Set of aesthetic mappings created by `aes()`. If specified and `inherit.aes = TRUE` (the default), it is combined with the default mapping at the top level of the plot. You must supply `mapping` if there is no plot mapping.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.

HOW CAN WE FIND HELP WITH R?

Examples

Run examples

```
# geom_line() is suitable for time series
ggplot(economics, aes(date, unemploy)) + geom_line()
ggplot(economics_long, aes(date, value01, colour = variable)) +
  geom_line()

# You can get a timeseries that run vertically by setting the orientation
ggplot(economics, aes(unemploy, date)) + geom_line(orientation = "y")

# geom_step() is useful when you want to highlight exactly when
# the y value changes
recent <- economics[economics$date > as.Date("2013-01-01"), ]
ggplot(recent, aes(date, unemploy)) + geom_line()
ggplot(recent, aes(date, unemploy)) + geom_step()
```

HOW CAN WE FIND HELP WITH R?

ChatGPT:

how can I crop a raster file with a sf object in R?

To crop a raster file with a sf object in R, you can use the **`raster::crop()`** function along with the **`sf::st_bbox()`** function to create a bounding box from the sf object. Here is an example:

r Copy code

```r
library(raster)
library(sf)

# Load raster and sf object
raster_file <- raster("path/to/raster.tif")
sf_object <- st_read("path/to/sf_object.shp")

# Create bounding box from sf object
bbox <- st_bbox(sf_object)

# Crop raster using the bounding box
cropped_raster
```

Regenerate response

Send a message.

Free Research Preview. ChatGPT may produce inaccurate information about people, places, or facts. ChatGPT May 3 Version

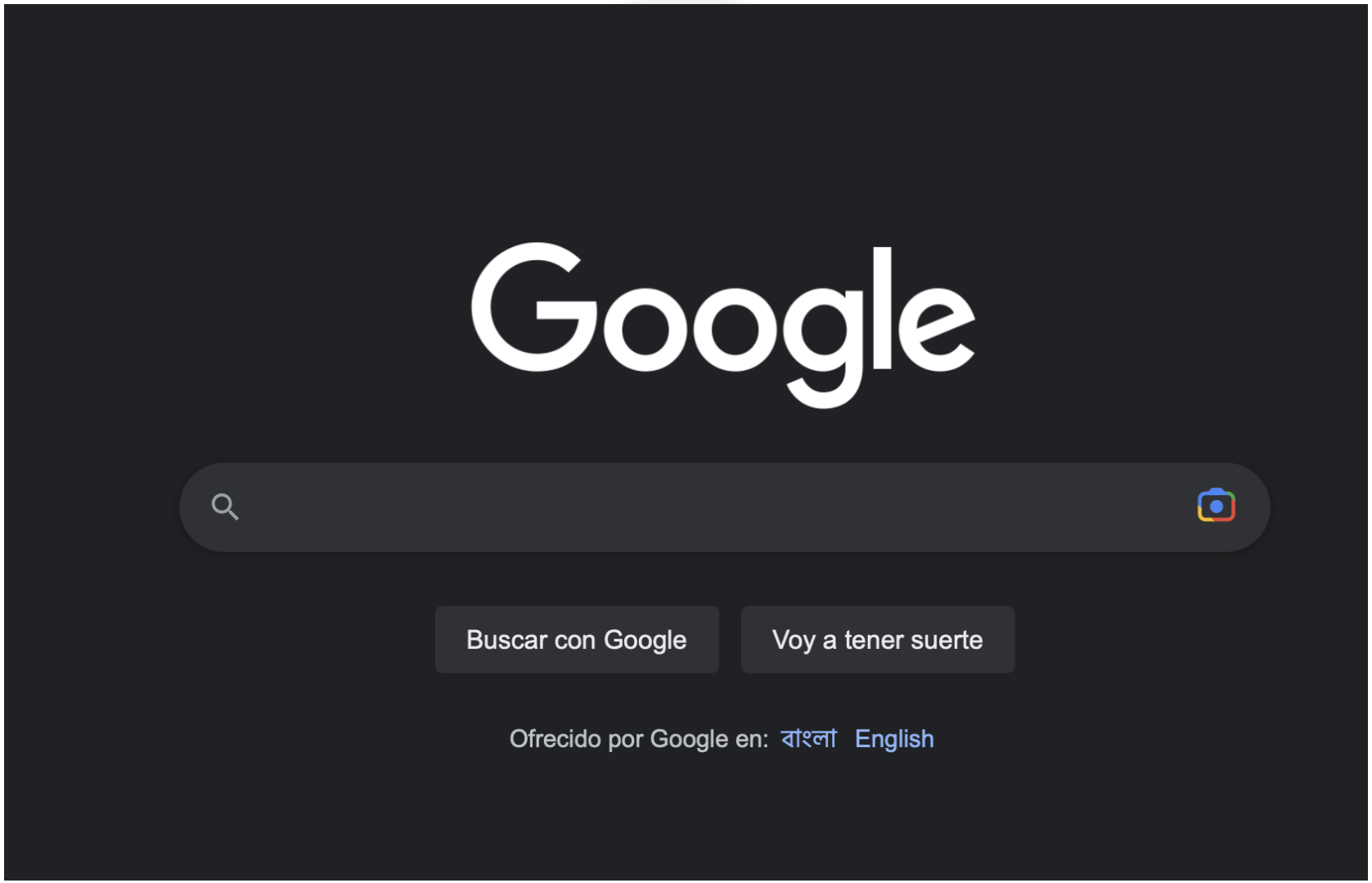
HOW CAN WE FIND HELP WITH R?

ChatGPT:

! WARNING: CHAT GPT CAN GIVE INCORRECT INFORMATION !

- If chat GPT does not knows something, sometimes will make up information (i.e. made up references, name of packages, libraries etc...)
- Make sure to verify the information provided by Chat GPT

HOW CAN WE FIND HELP WITH R?



LAB TIME!

https://cadms.github.io/mpm207/lab3.html