POLI 30 D: Political Inquiry

TA Sessions

Lab 03 | R Basics II

Before we start

Announcements:

- Github page: **https://github.com/umbertomig/POLI30Dpublic**
- Piazza forum: https://piazza.com/ucsd/winter2023/17221

Before we start

Recap: In the Lab sessions, you learned:

- How to install R and R Studio on your computer.
- How to do basic math operations in R.

Great job!

- Do you have any questions about these contents?

Plan for Lab 03

- Learn R data types
- Learn how to create datasets
- Learn how to load a dataset
- Learn how to explore a dataset

R Data Types

R Numeric and R Character

You can create numeric and character variables in R easily:

```r
# Numeric
x <- 20
# Character (or string, same thing!)
y <- 'POLI 30 D'
print(x)
```

```
## [1] 20
```

```r
print(y)
```

```
## [1] "POLI 30 D"
```

R Numeric and R Character

We can easily check the types with the `class(.)`function:

```
class(x)
```

```
## [1] "numeric"
```

```
class(y)
```

```
## [1] "character"
```

R Numeric and R Character

The `str(.)`function also gives a neat description of what is going on.

- `str` is short for the structure of the data:

```
str(x)
```

```
##  num 20
```

```
str(y)
```

```
##  chr "POLI 30 D"
```

R Vectors

To create a vector, you use the function `c(.)`, and separate the values with a comma:

```r
voted   <- c(1, 0, 0, 1) # Binary vector (1=yes; 0=no)
age     <- c(48, 23, 18, 33) # Numeric vector with ages
message <- c('yes', 'yes', 'no', 'no') # Got message?
place   <- c('La Jolla', 'Del Mar',
             'Del Mar', 'Poway') # Character with places
```

Each of the variables has four positions (like four observations).

R Vectors

We can check the data for each of the four observations we have. We use square brackets (`[`and `]`) to index.

First person in the `voted` variable:

```
voted[1]
```

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

Ages of first three people. Note `1:3` (try it on the console!). It creates sequences.

```
age[1:3]
```

```
## [1] 48 23 18
```

R Vectors

Messages for all people but the second person:

```r
message[-2]
```

```
## [1] "yes" "no"  "no"
```

Checking all the places vector:

```r
place
```

```
## [1] "La Jolla" "Del Mar"  "Del Mar"  "Poway"
```

Changing the age of the second person:

```r
age[2] <- 24
age
```

```
## [1] 48 24 18 33
```

R Vectors

You can also create a numeric vector from a character vector. You should use the function `ifelse(.)`:

```r
message
```

```
## [1] "yes" "yes" "no"  "no"
```

```r
message_num <-
  ifelse(message == 'yes', # Check if message is yes
         1, # change to 1 if yes
         0) # change to 0 if no
message_num
```

```
## [1] 1 1 0 0
```

R Vectors

You can also check the length of the vector:

```r
length(message)
```

```
## [1] 4
```

And if you don’t need an object anymore, you can remove it:

```r
rm(message_num)
```

Now check the environment. `message_num` should have disappeared!

R `data.frame`

Creating a data.frame from scratch

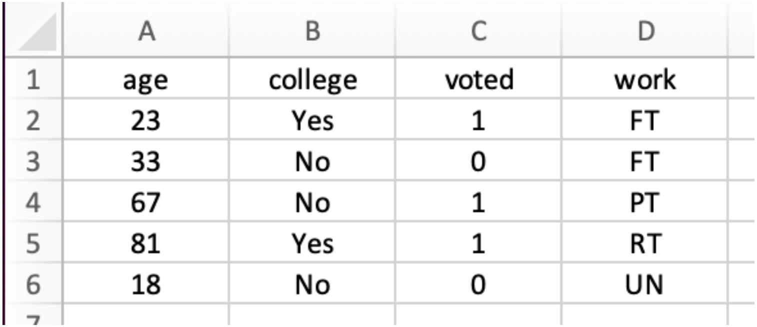
To create a `data.frame(.)`from scratch, you can just add variables inside it:

```
dat <- data.frame(
  v1 = c(1,2,3),
  v2 = c('a', 'b', 'c'),
  v3 = c('Treatment', 'Control', 'Control')
)
dat
```

```
##   v1 v2        v3
## 1  1  a Treatment
## 2  2  b   Control
## 3  3  c   Control
```

Creating a `data.frame` from scratch

Your turn: Create a data frame with the following info and call it `dat2`:



	A	B	C	D
1	age	college	voted	work
2	23	Yes	1	FT
3	33	No	0	FT
4	67	No	1	PT
5	81	Yes	1	RT
6	18	No	0	UN
7				

Creating a `data.frame` from scratch

If you are curious, these are the meanings:

Variable	**Meaning**
age	Age in years
college	Yes means college complete
voted	1 means voted
work	FT means full-time worker; PT means partial-time worker; UN means unemployed; RT means retired

Creating a data.frame from existing variables

If you recall, we created the following variables: voted, age, message, and place.

Here is how to create a data.frame with them:

```
dat3 <- data.frame(voted, age, message, place)
dat3
```

```
##   voted age message    place
## 1     1  48     yes La Jolla
## 2     0  24     yes  Del Mar
## 3     0  18      no  Del Mar
## 4     1  33      no    Poway
```

Loading CSV data in R

Loading a CSV dataset from the locale

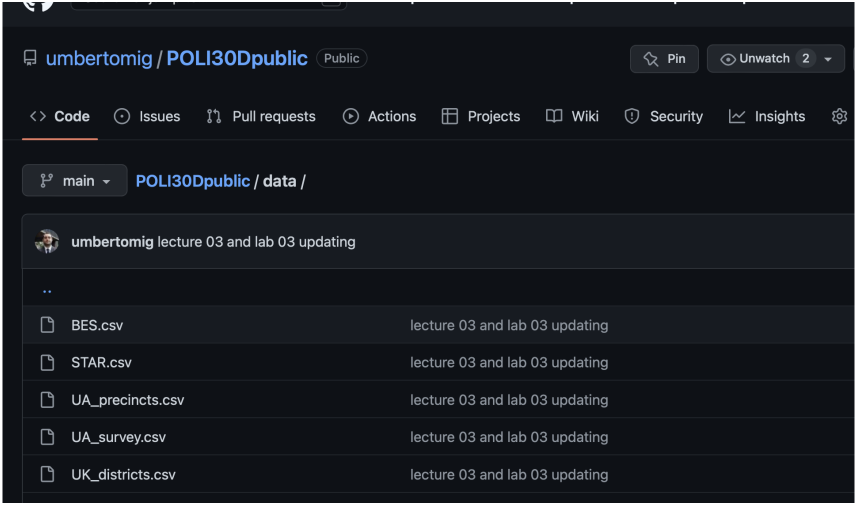
- CSV stands for Comma Separated Values. It is a particular way to organize data:
  - Each line corresponds to one observation
  - Within lines, information for each variable is separated by a comma.
- To load data from the locale (i.e., your computer), you must find and change your working directory.
- The book explains more about that. We are not going to deal with these cases here.
- We will frequently analyze data from **GitHub**.

Loading a CSV dataset from GitHub

To load a CSV dataset from GitHub:

1. Open the GitHub
2. Go to the GitHub data folder
3. Select the Dataset you want to open (in the case, `countries.csv`)
4. Find the *Raw* Version of it
5. Copy the URL (CMD + C / Ctrl + C). In the case of countries: https://raw.githubusercontent.com/umbertomig/POLI30Dpublic/main/data/countries.csv
6. Do `name_data_frame <- read.csv('paste_URL_in_here')`

Example: `countries.csv`



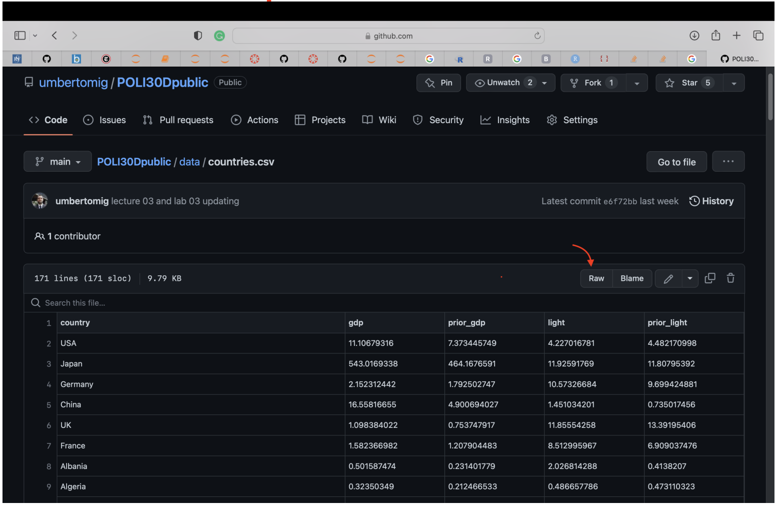
POLI30Dpublic / data /

umbertomig lecture 03 and lab 03 updating

..

BES.csv	lecture 03 and lab 03 updating
STAR.csv	lecture 03 and lab 03 updating
UA_precincts.csv	lecture 03 and lab 03 updating
UA_survey.csv	lecture 03 and lab 03 updating
UK_districts.csv	lecture 03 and lab 03 updating

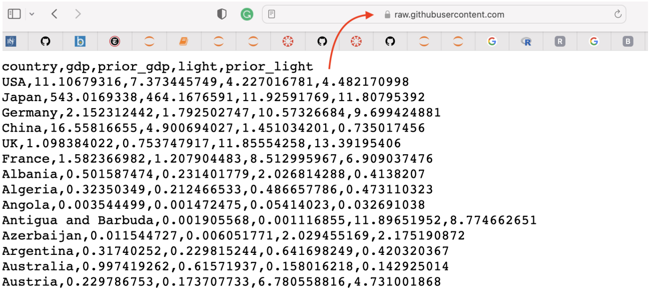
Example: `countries.csv`



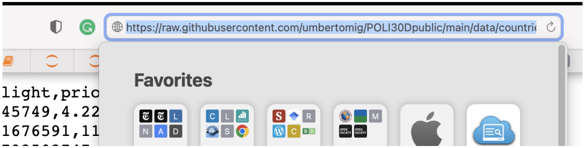
```
171 lines (171 sloc) | 9.79 KB
```

country	gdp	prior_gdp	light	prior_light
USA	11.10679316	7.373445749	4.227016781	4.482170998
Japan	543.0169338	464.1676591	11.92591769	11.80795392
Germany	2.152312442	1.792502747	10.57326684	9.699424881
China	16.55816655	4.900694027	1.451034201	0.735017456
UK	1.098384022	0.753747917	11.85554258	13.39195406
France	1.582366982	1.207904483	8.512995967	6.909037476
Albania	0.501587474	0.231401779	2.026814288	0.4138207
Algeria	0.32350349	0.212466533	0.486657786	0.473110323

Example: countries.csv



```
country,gdp,prior_gdp,light,prior_light
USA,11.10679316,7.373445749,4.227016781,4.482170998
Japan,543.0169338,464.1676591,11.92591769,11.80795392
Germany,2.152312442,1.792502747,10.57326684,9.699424881
China,16.55816655,4.900694027,1.451034201,0.735017456
UK,1.098384022,0.753747917,11.85554258,13.39195406
France,1.582366982,1.207904483,8.512995967,6.909037476
Albania,0.501587474,0.231401779,2.026814288,0.4138207
Algeria,0.32350349,0.212466533,0.486657786,0.473110323
Angola,0.003544499,0.001472475,0.05414023,0.032691038
Antigua and Barbuda,0.001905568,0.001116855,11.89651952,8.774662651
Azerbaijan,0.011544727,0.006051771,2.029455169,2.175190872
Argentina,0.31740252,0.229815244,0.641698249,0.420320367
Australia,0.997419262,0.61571937,0.158016218,0.142925014
Austria,0.229786753,0.173707733,6.780558816,4.731001868
```



https://raw.githubusercontent.com/umbertomig/POLI30Dpublic/main/data/countrie

```
light,prio
45749,4.22
1676591,11
```

Example: `countries.csv`

And since the link is:
`https://raw.githubusercontent.com/umbertomig/POLI30Dpub`

```r
countries <- read.csv('https://raw.githubusercontent.com/um
head(countries)
```

```
##   country        gdp   prior_gdp     light prior_light
## 1     USA  11.106793   7.3734457  4.227017   4.4821710
## 2   Japan 543.016934 464.1676591 11.925918  11.8079539
## 3 Germany   2.152312   1.7925027 10.573267   9.6994249
## 4   China  16.558167   4.9006940  1.451034   0.7350175
## 5      UK   1.098384   0.7537479 11.855543  13.3919541
## 6  France   1.582367   1.2079045  8.512996   6.9090375
```

Exploring a dataset

head and tail

`head(.)` shows the first six observations:

```
head(countries)
```

```
##   country        gdp   prior_gdp     light prior_light
## 1     USA  11.106793   7.3734457  4.227017   4.4821710
## 2   Japan 543.016934 464.1676591 11.925918  11.8079539
## 3 Germany   2.152312   1.7925027 10.573267   9.6994249
## 4   China  16.558167   4.9006940  1.451034   0.7350175
## 5      UK   1.098384   0.7537479 11.855543  13.3919541
## 6  France   1.582367   1.2079045  8.512996   6.9090375
```

head and tail

`tail(.)` shows the last six observations:

```
tail(countries)
```

```
##         country         gdp   prior_gdp     light prior_light
## 165     Uruguay 0.434783819 0.341299579 0.5807991  0.48451899
## 166 Uzbekistan 1.486802454 0.983226379 1.6353821  1.83231197
## 167  Venezuela 0.048871355 0.038868261 1.4243972  1.21489199
## 168       Samoa 0.001036411 0.000620675 0.5527025  0.38445127
## 169       Yemen 0.270938873 0.142525797 0.6498414  0.34853987
## 170      Zambia 3.252155015 2.372258356 0.0968198  0.08652917
```

str

That is a nice and neat description of the data.frame. You can try it with other objects too!

```
str(countries)
```

```
## 'data.frame':    170 obs. of  5 variables:
##  $ country    : chr  "USA" "Japan" "Germany" "China" ...
##  $ gdp        : num  11.11 543.02 2.15 16.56 1.1 ...
##  $ prior_gdp  : num  7.373 464.168 1.793 4.901 0.754 ...
##  $ light      : num  4.23 11.93 10.57 1.45 11.86 ...
##  $ prior_light: num  4.482 11.808 9.699 0.735 13.392 ...
```

`summary`, `View`, and `dim`

- `dim(.)` gives you the dimension of the data.frame.
  - The first number is the number of rows (observations).
  - The second number is the number of columns (variables).

```
dim(countries)
```

```
## [1] 170   5
```

- The `View(.)` function is also useful. In your console, type the following:

```
View(countries)
```

- Very cool, right?!

summary, View, and dim

And for a quick summary of the variables in your dataset, you can use the function **summary(.)**:

```
summary(countries)
```

```
##    country               gdp              prior_gdp             light
##  Length:170         Min.   :   0.0000   Min.   :   0.0000   Min.   : 0.00494
##  Class :character   1st Qu.:   0.0117   1st Qu.:   0.0086   1st Qu.: 0.19885
##  Mode  :character   Median :   0.2588   Median :   0.1419   Median : 1.24459
##                     Mean   :  27.5893   Mean   :  16.6594   Mean   : 3.56543
##                     3rd Qu.:   1.5106   3rd Qu.:   0.9746   3rd Qu.: 3.64854
##                     Max.   :1798.3271   Max.   :1111.8674   Max.   :45.69160
##   prior_light
##  Min.   : 0.00299
##  1st Qu.: 0.16311
##  Median : 0.89487
##  Mean   : 2.95033
##  3rd Qu.: 3.37282
##  Max.   :44.18754
```

Today's Lab

- Learn R data types
- Learn how to create datasets
- Learn how to load a dataset
- Learn how to explore a dataset

Next Lab

- How to operate with data.frames
- Learn how to use R Markdown

Questions?

See you in the next lab!