INSTITUTE
OF LAW,
POLITICS AND
DEVELOPMENT

Sant'Anna
School of Advanced Studies – Pisa

# Data Analysis for the Social Sciences with R

## Data Management

Prof. Kevin Koehler
kevin.koehler@santannapisa.it

# Why data management?

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# Data management

1. Most data sets we encounter in the real world are messy; they need to be cleaned and re-shaped before analysis
2. We frequently want to merge together information from various data sources
3. Exploratory (descriptive) statistics can be of great help for discovering patterns

# Today's class

1. Tidy data and the `tidyverse`

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# Today's class

1. Tidy data and the `tidyverse`
2. Data management functions

# Today's class

1. Tidy data and the `tidyverse`
2. Data management functions
3. Exercises

# What is tidy data

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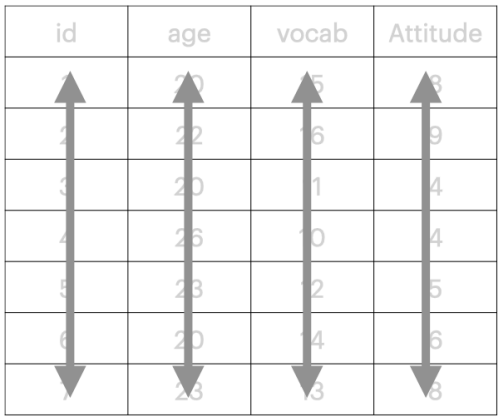
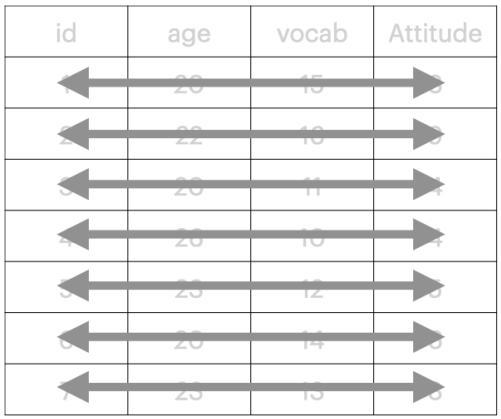
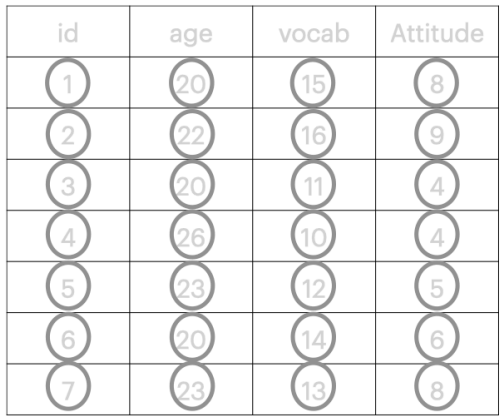
# Tidy data

Observations in rows




Variables in columns




Values in cells

# Messy data

| **Party** | **2014 Vote %** | **2019 Vote %** |
|---|---|---|
| Nidaa Tounes | 37.56% | 1.51% |
| Ennahda | 27.79% | 19.63% |

Table 1: Vote Percentages for Ennahda and Nidaa Tounes (2014 vs. 2019)

# Tidy data

| party | year | vote |
|---|---|---|
| Nidaa Tounes | 2014 | 37.56 |
| Nidaa Tounes | 2019 | 1.51 |
| Ennahda | 2014 | 27.79 |
| Ennahda | 2019 | 19.63 |

Table 2: Vote Percentages for Ennahda and Nidaa Tounes (2014 vs. 2019)

# The `tidyverse`

The `tidyverse` is a family of functions for data management. They follow a specific structure:

```
new_data <- data %>%
  function()  %>%
  function()
```

The `%>%` is called a *pipe*. It allows you to stack functions on top of each other.

# Data management

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# Data management functions

The most important data management functions are:

1. Adding or removing variables or observations

```
mutate() # to create new variables
select() # to select specific variables
filter() # to filter for values
```

2. Logical operations

```
ifelse() # ifelse(test,yes,no)
case_when() # series of ifelse statements
```

3. Grouping and summarizing

```
group_by() # to group a data set
summarize() # to summarize data
```

# Data management functions

For example, returning to the Tunisia survey, look at

```
tun22 <- read_csv("tunisia_survey.csv")
table(tun22$pres2019_2)
```

```
  1   2  97  98  99
434  32   8   9  25
```

From the codebook, we know that 1 stands for Kais Saied and 2 for Nabil Karoui, the two candidates in the run-off round. 97 stands for blank or invalid votes, 98 for DK/don't remember, and 99 for declined to answer.

Wouldn't it be nice to see names instead of numbers?

# Data management functions

```
tun22 <- tun22 %>%
  mutate(pres2019_2_new = case_when(
    pres2019_2==1~"Kais Saied",
    pres2019_2==2~"Nabil Karoui",
    pres2019_2==97~"blank/invalid",
    pres2019_2==98~"don't know",
    pres2019_2==99~"declined to answer"
  ))

tun22 %>% tabyl(pres2019_2_new)
```

New variable with names instead of numbers

| pres2019_2_new | n | percent | valid_percent |
|---|---|---|---|
| Kais Saied | 434 | 0.434 | 0.85433071 |
| Nabil Karoui | 32 | 0.032 | 0.06299213 |
| blank/invalid | 8 | 0.008 | 0.01574803 |
| declined to answer | 25 | 0.025 | 0.04921260 |
| don't know | 9 | 0.009 | 0.01771654 |
| <NA> | 492 | 0.492 | NA |

Output with `janitor` package

# Data management functions

Next, assume we want to know the average value of Kais Saied voters on question:

To what extent do you agree with the following statement: "Members of Parliament very quickly lose touch with ordinary people after they assume office."

From the codebook, we know that this variable is called `mps`.

# Data management functions

## 1. Filtering

```
tun22 %>%
  select(pres2019_2_new, mps) %>%
  filter(pres2019_2_new=="Kais Saied") %>%
  summarize(mps=mean(mps, na.rm = T))
```

```
# A tibble: 1 x 1
    mps
  <dbl>
1  2.38
```

## 2. Grouping

```
tun22 %>%
  select(pres2019_2_new, mps) %>%
  group_by(pres2019_2_new) %>%
  summarize(mps=mean(mps, na.rm = T))
```

```
# A tibble: 6 x 2
  pres2019_2_new       mps
  <chr>              <dbl>
1 Kais Saied          2.38
2 Nabil Karoui        2.44
3 blank/invalid       1.62
4 declined to answer  2.04
5 don't know          1.89
6 <NA>                2.77
```

# Data management functions

4. Joining data sets

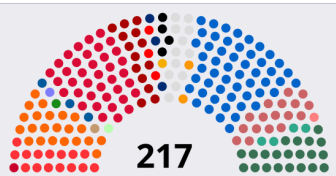
```
inner_join() # joining data sets keeping common obs
left_join() # joining data sets keeping all left-hand obs
right_join() # joining data sets keeping all right-hand obs
full_join() # joining data sets keeping all obs
```

5. Reshaping data sets

```
pivot_longer() # reshape data into long format
pivot_wider() # reshape data into wide format
```

# Data management functions

## Results [ edit ]




| Party | Votes | % | Seats | +/– |
|---|---|---|---|---|
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| Heart of Tunisia | 415,913 | 14.55 | 38 | New |
| Free Destourian Party | 189,356 | 6.63 | 17 | +17 |
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| Tahya Tounes | 116,582 | 4.08 | 14 | New |
| Republican People's Union | 59,924 | 2.10 | 3 | +3 |
| Aïch Tounsi | 46,401 | 1.62 | 1 | New |
| Tunisian Alternative | 46,046 | 1.61 | 3 | New |
| Afek Tounes | 43,892 | 1.54 | 2 | –6 |
| Nidaa Tounes | 43,213 | 1.51 | 3 | –83 |
| Machrouu Tounes | 40,869 | 1.43 | 4 | New |
| Popular Front | 32,365 | 1.13 | 1 | –14 |
| Democratic and Social Union (VDS-PR-MDS) | 29,828 | 1.04 | 1 | New |
| Errahma | 27,944 | 0.98 | 4 | +4 |
| Current of Love | 17,749 | 0.62 | 1 | –1 |
| Socialist Destourian Party | 16,235 | 0.57 | 1 | New |
| Farmers' Voice Party | 9,366 | 0.33 | 1 | 0 |
| Green League | 5,667 | 0.20 | 1 | +1 |
| Other parties/lists | 590,602 | 20.66 | 0 | –30 |
| Independent lists | 82,384 | 2.88 | 12 | +12 |
| **Total** | **2,858,187** | **100.00** | **217** | **0** |

| Leader | Rached Ghannouchi | Nabil Karoui | Mohamed Abbou |
|---|---|---|---|
| Party | Ennahda | Heart of Tunisia | Democratic Current |
| Last election | 69 seats, 27.79% | *New party* | 3 seats, 1.95% |
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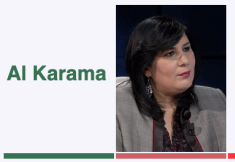


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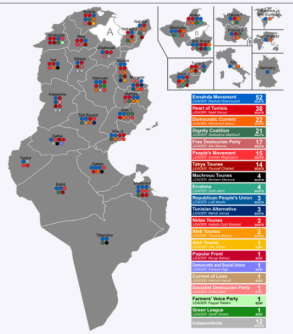


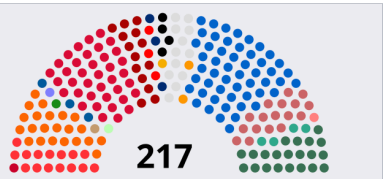
Map showing the seats won by each party in each constituency.

| Prime Minister before election | Prime Minister |
|---|---|
| Youssef Chahed | Elyes Fakhfakh |
| Tahya Tounes | Ettakatol |

How do we get the data from Wikipedia into R?

# Data management functions

Results [ edit ]

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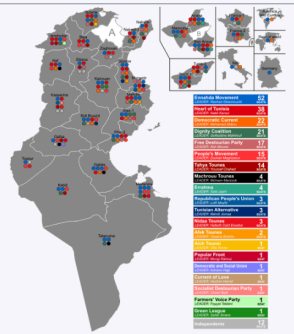

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# Data management functions

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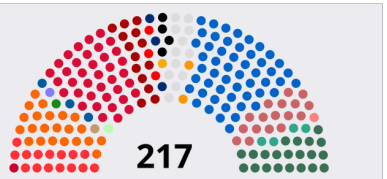


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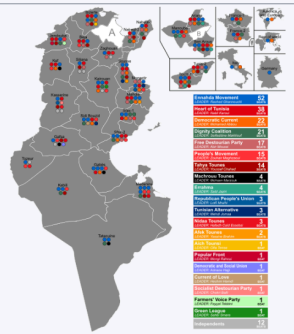

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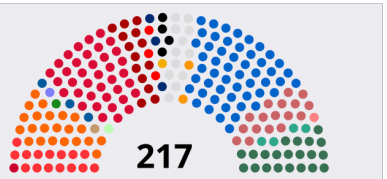


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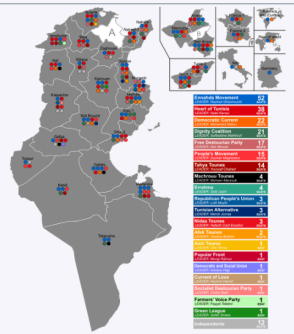

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We could:

1. manually copy the numbers
2. copy paste into Excel, save the file, read it into R
3. scrape the tables from Wikipedia using the `rvest` package in R (code is on the GitHub page)

# Data management functions

1. Load the result files, inspect them, and remove unnecessary parts

```
res2014 <- read_csv("res2014.csv")
res2014 <- res2014[1:42,]
res2019 <- read_csv("res2019.csv")
res2019 <- res2019[1:22,] %>%
  mutate(Party=ifelse(Party=="Other parties/lists",
                      "Other parties",
                      Party))
```

2. Merge the two result files and select only vote percentages

```
results <- full_join(res2014,res2019,by="Party")
results <- results %>%
  select(Party, Percentage2014, Percentage2019)
```

Is the `results` data set tidy?

# Data management functions

3. Reshape the data set to make it tidy

```
results <- results %>%
  pivot_longer(
    cols = starts_with("Percentage"),
    names_to = "Year",
    values_to = "Percentage",
    names_prefix = "Percentage"
  )
head(results, 4)
```

```
# A tibble: 4 x 3
  Party            Year  Percentage
  <chr>            <chr> <chr>
1 Nidaa Tounes     2014  37.56
2 Nidaa Tounes     2019  1.51
3 Ennahda Movement 2014  27.80
4 Ennahda Movement 2019  19.63
```

# Nice tables with stargazer

```
library(stargazer)

tab2014 <- results %>%
  filter(Year==2014 & !is.na(Percentage))

stargazer(tab2014,
          summary = F,
          type = "text") # or type="html" or type="latex"
```

# Exercices

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# Exercises

1. Create a new variable in the survey data which has names instead of numbers for the first-round results
2. Create a new data set which includes the average value of the `mps` variable for the voters of all first-round candidates
3. Create a single data set with the number of seats won by Tunisian political parties in 2014 and 2019
4. Produce a properly formatted table with seat shares in 2014 and 2019 which you could include in a table (using the text processor of your choice)