Statistics with R

Data Visualization

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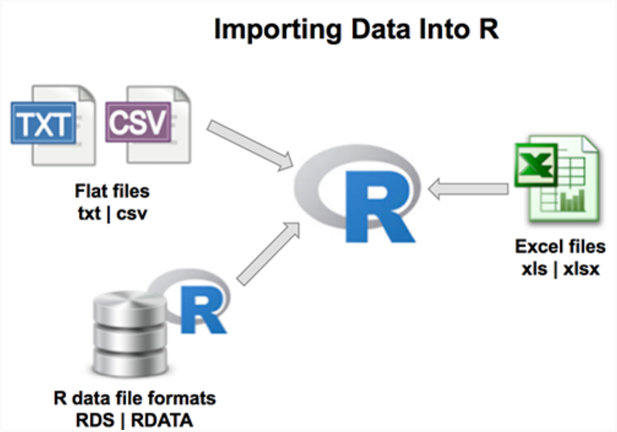
Last week: Import/Export Data

R can import and export many types of data. Most often format used are text, csv and excel files.



Import txt/csv files

- Read tabular data into R

```
read.table(file, header = FALSE, sep = "", dec = ".")
```

- Read "comma separated value" files (".csv")

```
read.csv(file, header = TRUE, sep = ",", dec = ".",
...)
```

- Or use read.csv2: variant used in countries that use a comma as decimal point and a semicolon as field separator.

```
read.csv2(file, header = TRUE, sep = ";", dec = ",",
...)
```

- Read TAB delimited files

```
read.delim(file, header = TRUE, sep = "\t", dec =
```

Import txt/csv files using readr

- tidyverse includes the package readr, a faster and friendly way to read table-like files.
  - read_csv(): comma separated (CSV) files
  - read_tsv(): tab separated files
  - read_delim(): general delimited files
  - read_fwf(): fixed width files
  - read_table(): tabular files where colums are separated by white-space.
  - read_log(): web log files
- readr provides consistence column specification (the most significant feature differs from the classical functions)

Import example

- read the data `exp1.csv` and show its head

```
data = read_csv('exp1.csv')
head(data, n = 3)
```

```
## # A tibble: 3 x 10
##   motion mIntv position   soa lenSeq    mi  resp    rt
##    <int> <int>    <int> <int>  <int> <int> <int> <dbl>
## 1      2     3        3    50      1    23     0 0.262
## 2      2     1        3   200      2     9     1 0.379
## 3      2     1        3   230      0     9     1 0.203
```

Export/save Data

- Exporting data is similar to importing data. You can simply change the above mentioned functions from `read*` to `write*`.

  write.csv(), *write.csv2()*, *write_csv()*

- Import and export excel files requires additional package `readxl`.
- Save data for R Data Format: RDS

  Save an object to a file

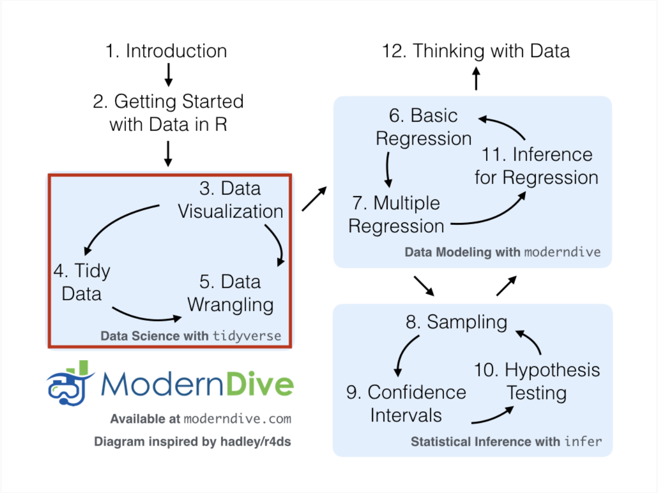
  saveRDS(object, file = "my_data.rds")

  Restore the object

  readRDS(file = "my_data.rds")

Visualization with ggplot2

- Visualization is a critical step for explorative data analysis (EDA)



1. Introduction
2. Getting Started with Data in R
3. Data Visualization
4. Tidy Data
5. Data Wrangling
Data Science with tidyverse
ModernDive
Available at moderndive.com
Diagram inspired by hadley/r4ds
12. Thinking with Data
6. Basic Regression
11. Inference for Regression
7. Multiple Regression
Data Modeling with moderndive
8. Sampling
9. Confidence Intervals
10. Hypothesis Testing
Statistical Inference with infer

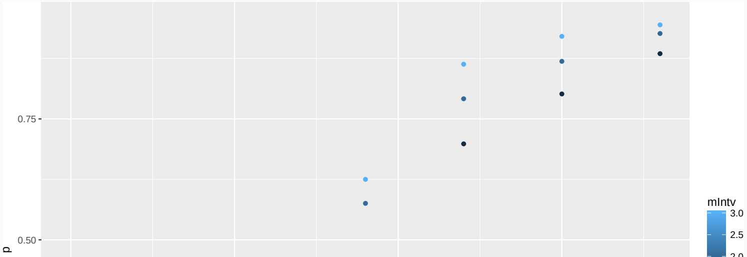
ggplot grammar

- Please refer to the cheatsheet.

  'ggplot(data =) + (mapping = aes(<MAPPINGs))

- Example

```
data %>% group_by(soa, mIntv) %>%
  summarise(p = mean(resp)) %>%
ggplot(data = .) + geom_point(mapping = aes(x = soa, y = p,
```



common problem in plotting

- ggplot using + for layering.

  If you miss the last part, R doesn't think you've typed a complete expression and it's waiting for you to finishe it. ***ESCAPE to abort****.*

- + in a wrong place.

  It has to come at the end of the line, ***not*** *the start.*

  If mappings are the same, you can move it to `ggplot()`*.*

Five Named Graphs - The 5NG

- Scatterplots `geom_point()`
- linegraphs `geom_line()`
- histogram `geom_histogram()`
- Boxplot `geom_boxplot()`
- Barplots `geom_bar()`

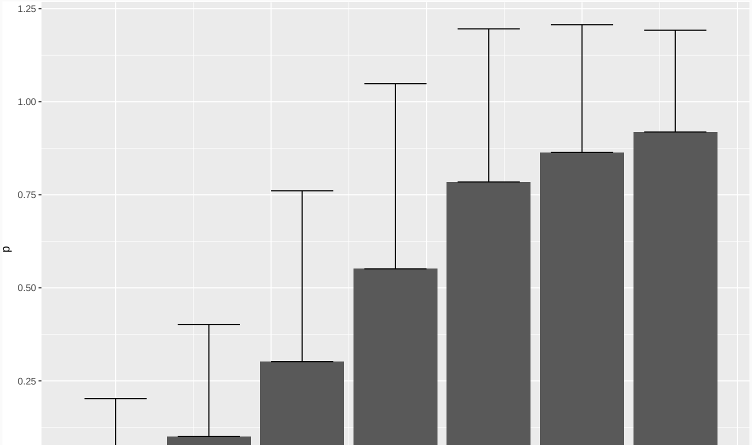
Some tipps

- Barplot by default only plots the counts. If you want to plot mean etc, you need to specify `stat = 'identity'`
- Multiple conditions in Barplot `position = 'dodge'`.
- Be aware of your type of data (category vs. continuous)
  - the data format will affect your graph. Using `factor()` or `as.numeric()` to convert your data type.
- `facet_*()` can be very helpful to examin individual participants

Error bars - an example

- Error bars are common in APA figures.

```
data %>% group_by( soa) %>% summarise(p = mean(resp), sd =
  ggplot(., aes(x = soa, y = p )) + geom_bar(stat = 'identi
```



Practice

- Let's practise together
- Next week Artyom will provide more practical examples.