Data Wrangling With dplyr

R basic reminder

Create object with assigment arrow `<-`

- keyboard shortcut `Alt + -`

Run code with `Crtl + Enter`

dataframe is the most important object

- columns of different types (e.g., characters, numerics, ...)

functions are saved in packages

- `install.packages("PackageName")`
- `library(PackageName)`

functions have arguments defined with =

```
FunctionName(arg1 = something, arg2 = somethingelse)
```

Read data with `read.csv("path/to/file.csv")`

Write data with `write.csv(DataframeObjectName, "path/to/file.csv", row.names = FALSE)`

The Tidyverse

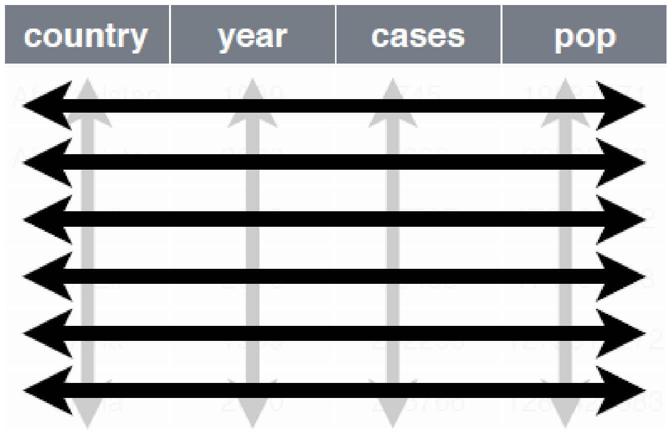
A collection of modern R packages that share common philosophies, embed best practices, and are designed to work together.

An R package that serves as a short cut for installing and loading the components of the tidyverse.

```r
install.packages("tidyverse")
# can take time to download and install beause many package are included

library(tidyverse)
```

The so called Tidy Data



A data set is **tidy** if:

1. Each **variable** is in its own **column**
2. Each **case** is in its own **row**
3. Each **value** is in its own **cell**

Data Wrangling with `dplyr` Package

Get the data

Can be found here: "https://raw.githubusercontent.com/damien-dupre/data/master/manager_satisfaction_performance_raw.csv"

Or here: "https://bit.ly/2HvAuAO"

```
data <- read.csv("https://bit.ly/2HvAuAO")
```

7 columns:

- managers = character "senior" or "junior",
- monthly.contract.negociated = numeric (average amount of contracts per month)
- job.satisfaction.Q1 = from 0 to 10
- job.satisfaction.Q2 = from 0 to 10
- job.satisfaction.Q3 = from 0 to 10
- job.satisfaction.Q4.reverse = from 0 to 10
- job.satisfaction.Q5 = from 0 to 10

How to use dplyr?

```
install.packages("dplyr")
library(dplyr)
```

dplyr has few very useful functions:

- `rename()` to rename a column
- `select()` to select certain columns of a dataframe
- `filter()` to filter certain rows of a dataframe
- `mutate()` to create new columns
- `group_by()` to analyse groups of data
- `summarise()` to create summary of data (mean, sd, ...)

rename()

Arguments

1. Name of the dataframe object
2. NewColName = OldColName

Example

```r
# Basic
data_with_new_names <- rename(data, MCN = monthly.contract.negociated)

# Works as well
data_with_new_names <- rename(
  data,
  MCN = monthly.contract.negociated
  )

# Works with many columns at once
data_with_new_names <- rename(
  data,
  MCN = monthly.contract.negociated,
  JS_Q1 = job.satisfaction.Q1,
  JS_Q2 = job.satisfaction.Q2,
  JS_Q3 = job.satisfaction.Q3,
  JS_Q4_Rev = job.satisfaction.Q4.reverse,
  JS_Q5 = job.satisfaction.Q5
  )
```

select()

Arguments

1. Name of the dataframe object
2. ColName1, ColName2, ...

Example

```
# Basic
data_with_few_col <- select(data_with_new_names, JS_Q1, JS_Q2, JS_Q3, JS_Q4_Rev, JS_

# Works as well
data_with_few_col <- select(
  data_with_new_names,
  JS_Q1,
  JS_Q2,
  JS_Q3,
  JS_Q4_Rev,
  JS_Q5)
```

filter()

Arguments

1. Name of the dataframe object
2. ColName to filter

filter can be character or numeric

```r
# Filter characters
data_filtered <- filter(data_with_new_names, managers == "senior")
data_filtered <- filter(data_with_new_names, managers != "senior")

# Filter numerics
data_filtered <- filter(data_with_new_names, JS_Q1 == 5)  # values equal 5
data_filtered <- filter(data_with_new_names, JS_Q1 != 5)  # values different than 5
data_filtered <- filter(data_with_new_names, JS_Q1 <  5)  # values lower than 5
data_filtered <- filter(data_with_new_names, JS_Q1 <= 5)  # values lower or egal 5
data_filtered <- filter(data_with_new_names, JS_Q1 >  5)  # values higher than 5
data_filtered <- filter(data_with_new_names, JS_Q1 >= 5)  # values higher or egal 5
```

mutate()

Arguments

1. Name of the dataframe object
2. NewColName = Condition for new values

```r
# Recode column managers
data_new_col <- mutate(
  data_with_new_names,
  managers_C = ifelse(managers == "senior", 1,0)
  )

# Recode reverse question
data_new_col <- mutate(
  data_with_new_names,
  JS_Q4 = (10-0) - JS_Q4_Rev
  )

# Create composite score for job satisfaction
data_new_col <- mutate(
  data_new_col,
  JS_score = rowMeans(cbind(JS_Q1,JS_Q2,JS_Q3,JS_Q4,JS_Q5))
  )
```

summarise()

`summarise()` creates a summary of the data

```
# Average of Job Satisfaction Score
data_summary <- summarise(data_new_col, mean_JS = mean(JS_score))

# SD of Job Satisfaction Score
data_summary <- summarise(data_new_col, sd_JS = sd(JS_score))

# Average and SD of Job Satisfaction Score
data_summary <- summarise(data_new_col,
                          mean_JS = mean(JS_score),
                          sd_JS = sd(JS_score))

# Works as well
data_summary <- summarise(
  data_new_col,
  mean_JS = mean(JS_score),
  sd_JS = sd(JS_score)
  )
```

summarise() and group_by()

`group_by()` with `summarise()` create a summary of the data by groups

```r
# Group data in a new object
data_grouped <- group_by(data_new_col, managers)

# Then summarise by group
data_summary <- summarise(
  data_grouped,
  mean_JS = mean(JS_score),
  sd_JS = sd(JS_score))
```

Using pipes %>%

The symbole `%>%` can be translated by "then"

It takes an object and automatically associates it to the following code

```
# Instead of
data_with_new_names <- rename(
  data,
  MCN = monthly.contract.negociated,
  JS_Q1 = job.satisfaction.Q1,
  JS_Q2 = job.satisfaction.Q2,
  JS_Q3 = job.satisfaction.Q3,
  JS_Q4_Rev = job.satisfaction.Q4.reverse,
  JS_Q5 = job.satisfaction.Q5
  )

# Use
data_with_new_names <- data %>%
  rename(
    MCN = monthly.contract.negociated,
    JS_Q1 = job.satisfaction.Q1,
    JS_Q2 = job.satisfaction.Q2,
    JS_Q3 = job.satisfaction.Q3,
    JS_Q4_Rev = job.satisfaction.Q4.reverse,
    JS_Q5 = job.satisfaction.Q5
  )
```

Using pipes %>%

The symbole `%>%` can be translated by "then"

It takes an object and automatically associates it to the following code

```
# Instead of
data_with_few_col <- select(data_with_new_names, JS_Q1, JS_Q2, JS_Q3, JS_Q4_Rev, JS_

# Use
data_with_few_col <- data_with_new_names %>%
  select(JS_Q1, JS_Q2, JS_Q3, JS_Q4_Rev, JS_Q5)
```

Using pipes to chain operations

```
data_new <- data %>%
  rename(
    MCN = monthly.contract.negociated,
    JS_Q1 = job.satisfaction.Q1,
    JS_Q2 = job.satisfaction.Q2,
    JS_Q3 = job.satisfaction.Q3,
    JS_Q4_Rev = job.satisfaction.Q4.reverse,
    JS_Q5 = job.satisfaction.Q5
  ) %>%
  mutate(JS_Q4 = (10-0) - JS_Q4_Rev) %>%
  mutate(JS_score = rowMeans(cbind(JS_Q1,JS_Q2,JS_Q3,JS_Q4,JS_Q5))) %>%
  group_by(managers) %>%
  summarise(mean_JS = mean(JS_score), sd_JS = sd(JS_score))
```

can be translated as:

- Create a new object "data_new" from "data", then
- Rename the columns, then
- Create a new column called "JS_Q4" which is equal to ((10-0) - column "JS_Q4_Rev"), then
- Create a new column called "JS_score" which the mean of Questions 1 to 5, then
- Group by type of managers, then
- Calculate the mean and sd of their Iob Satisfaction Score

More possibilities with dplyr

Have a look at the Data Wrangling Cheat Sheet

https://www.rstudio.com/wp-content/uploads/2015/02/data-wrangling-cheatsheet.pdf

or google "dplyr cheat sheet"

Your are now a master of dplyr!