TALL SOM FORTELLER

Introduction course

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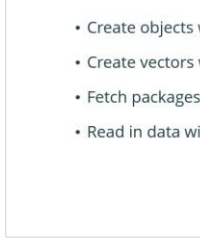
DAY 2: 15TH DECEMBER 2020

Statistisk sentralbyrå
Statistics Norway

Agenda: Part 1

	Monday **14th December**	**Tuesday** **15th December**	**Wednesday** **16th December**
12:00/13:00	• Introduction • Github • Basic calculations • Objects	• Review • Data manipulation	• Review • Sampling • Outlier detection
12:45/13:45	Exercise 1	Exercise 3	Exercise 5
13:30/14:30	• Logical statements • Read in data	• Merging datasets • Plotting	• Imputation
14:00/15:00	Exercise 2	Exercise 4	Exercise 6
14:50/15:50			Summary



Review (day 1)

- Write code in RStudio source files. Run using ctrl + enter
- Create objects with: `<-`
- Create vectors with : `c( )`
- Fetch packages with: `library()`
- Read in data with `read_csv()`

Exercise 2 review

Data manipulation with tidyverse

- Tidy and easy(er) way to write code
- Pipelines %>%

Base R:

```
leave_house(get_dressed(get_out_of_bed(wake_up(me))))
```

tidyverse:

```
me %>%
  wake_up() %>%
  get_out_of_bed() %>%
  get_dressed() %>%
  leave_house()
```

Create new variable: mutate()

- Can be used with a pipeline

```
dataset %>%
  mutate(newvariable = 1000)
```

Give variable a name

```
dataset %>%
  mutate(newvariable = oldvariable * 1000)
```

Give variable a name

Existing variable

What to do

Create new variable: mutate()

- Combine with `ifelse()`
- Allocate with **<-** to save variable
- Variables can be replaced/overridden
- Several variables can be created (use , to separate)
- Change variable type (`as.character()`,`as.numeric()`)

```
dataset %>%
  mutate(variable_name = as.character(variable_name))
```

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Change variable name: rename()

```
dataset %>%
  rename(new_name = old_name)
```

Select rows: filter()

- To select rows using a condition use: filter()
- Write a logical statement inside the brackets
- Several logical statements can be used (separate with ,)

```
dataset %>%
  filter(condition)
```

- Again: Nothing is saved without using <-

Select variables: select()

- Write variable name in brackets
- Several variables can be specified (separate with ,)
- Combine in pipeline with other functions (eg filter( ))

```
dataset %>%
  select(variable_name)
```

```
dataset %>%
  filter(condition) %>%
  select(variable_name)
```

Summary/count: summarise()

- Create summary and descriptive statistics
  - Total, average, minimum, maximum, count etc

```
dataset %>%
  summarise(summary_name = mean(variable_name))
```

Give summary a name

What to do:
- mean()
- median()
- sum()
- n()

Variable to action on

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Grouping: group_by()

- Choose a variable(s) to group by for further processes

```
dataset %>%
  group_by(grouping_variable) %>%
  summarise(summary_name = mean(variable_name))
```

Exercise 3

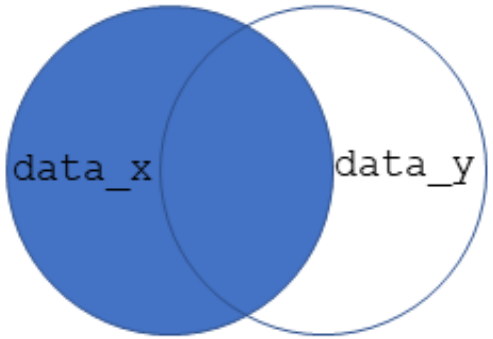
- Exercise 3 is in the file: **Exercises_day2.R**

Add a row : add_row()

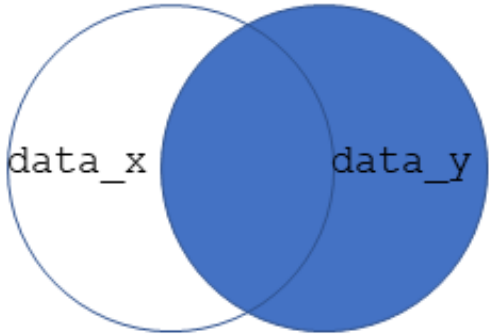
- Add a row to an existing dataset
- Rows must have the same length and type as the dataset

```
dataset %>%
  add_row(variable_name1 = "Kyiv", variable_name2 = 57733)
```

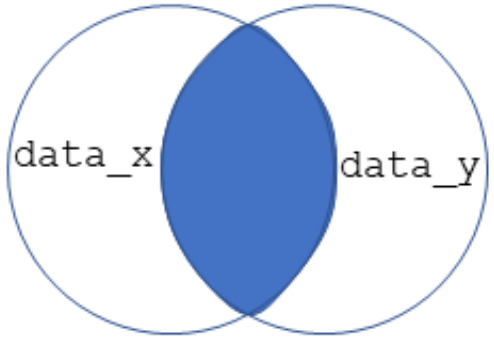
Join two datasets



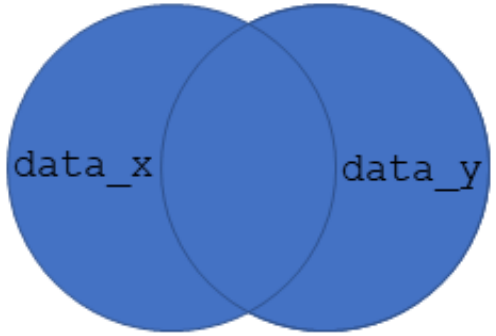
`left_join(data_x, data_y)`



`right_join(data_x, data_y)`



`inner_join(data_x, data_y)`



`full_join(data_x, data_y)`

Join two datasets

- Use **`by =`** to specify key variable to join on

by = c("Date" = "year")

```
merged_data <- left_join(dataset_1, dataset_2, by = variable_name)
```

- Several variables can be used for joining (as a vector)

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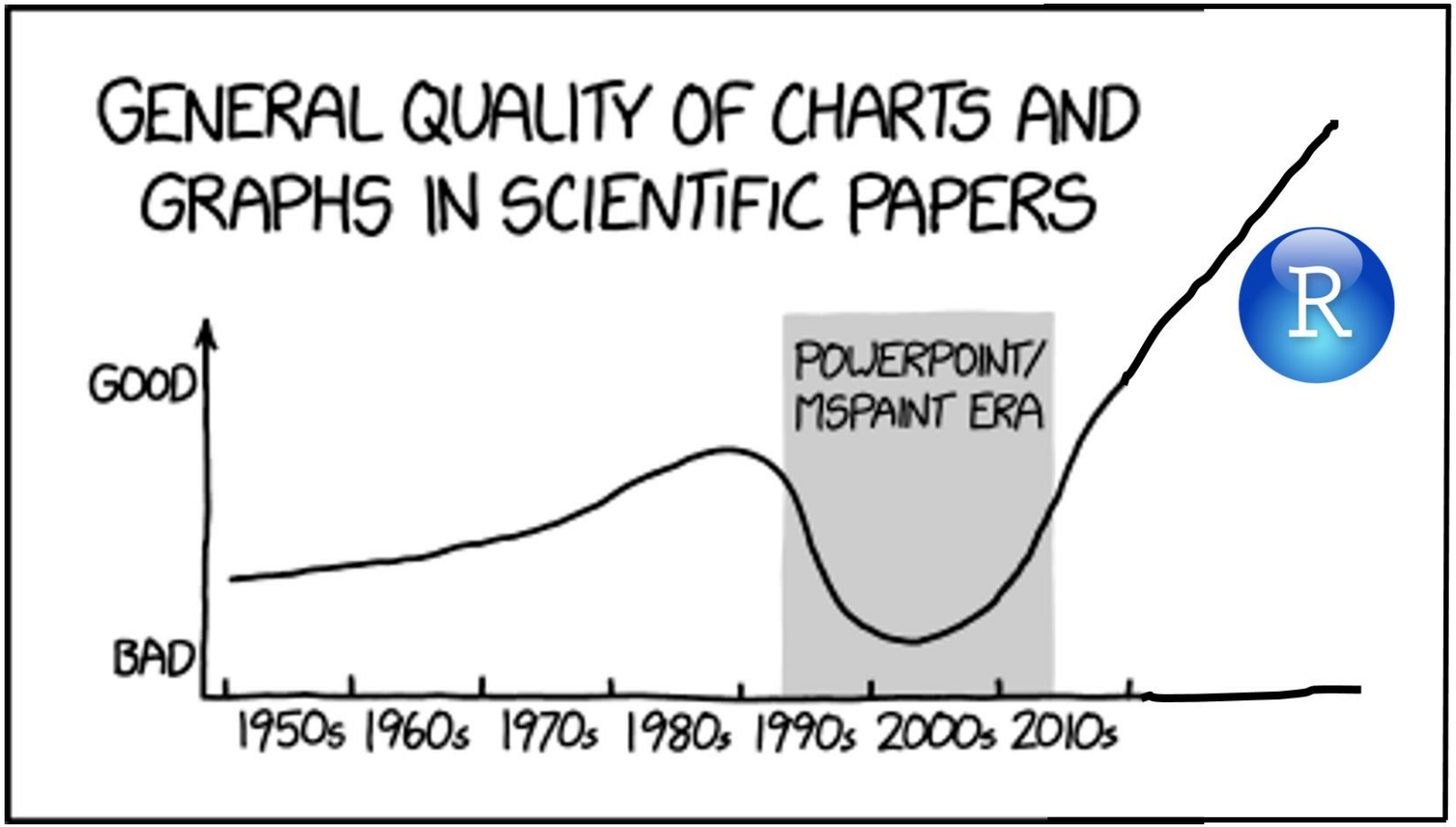
Graphs


GENERAL QUALITY OF CHARTS AND GRAPHS IN SCIENTIFIC PAPERS
GOOD
BAD
POWERPOINT/ MSPAINT ERA
R
1950s 1960s 1970s 1980s 1990s 2000s 2010s

Plots med ggplot()

- **aes** : aesthetics, which variables
- **geom_** : what type of plot
- **stat** : what type of summary to present

Table 18-1 A Selection of Geoms and Associated Default Stats

Geom	*Description*	*Default Stat*
`geom_bar()`	Bar chart	`stat_bin()`
`geom_point()`	Scatterplot	`stat_identity()`
`geom_line()`	Line diagram, connecting observations in order by *x*-value	`stat_identity()`
`geom_boxplot`	Box-and-whisker plot	`stat_boxplot()`
`geom_path`	Line diagram, connecting observations in original order	`stat_identity()`
`geom_smooth`	Add a smoothed conditioned mean	`stat_smooth()`
`geom_histogram`	An alias for `geom_bar()` and `stat_bin()`	`stat_bin()`

Bar plot

```
ggplot(aes(variable_name)) +
  geom_bar()
```

Use + to add plot type

Specify variable

Specify bar plot

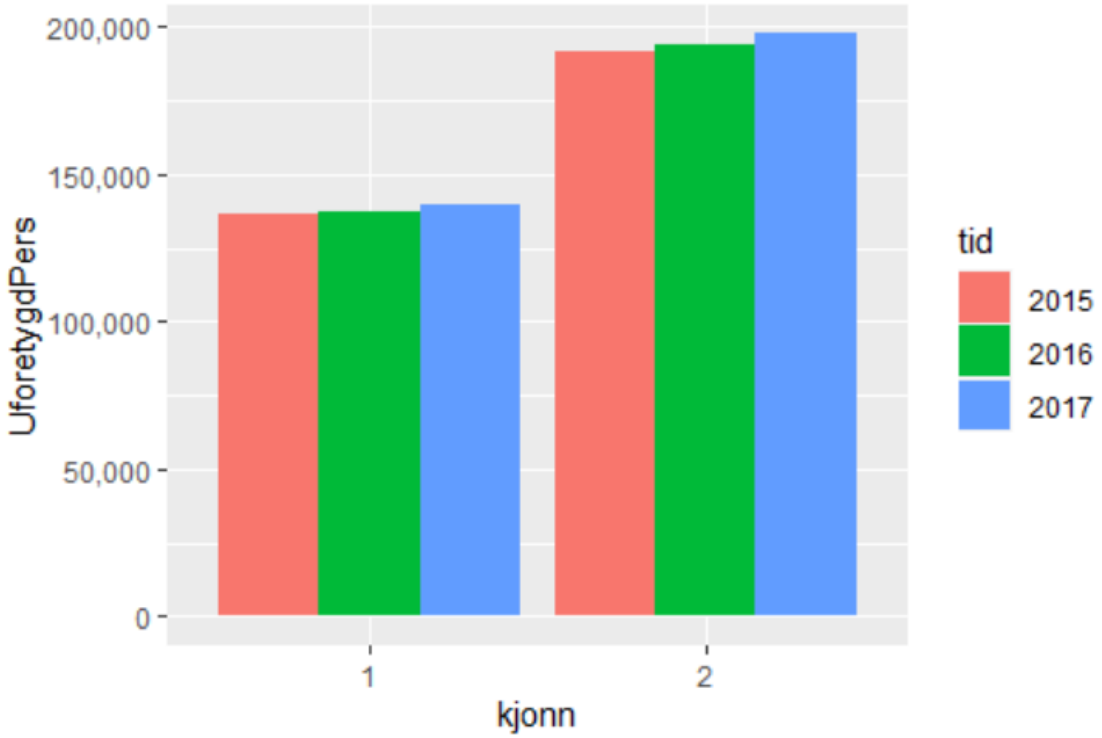
```
ggplot(aes(x = variabelnavn1, y = variabelnavn2)) +
  geom_bar(stat = "identity")
```

Specify x and y variables

Specify to use variable value

Bar plot

- Use fill() in aes to specify a varible to colour by
- Combine with other functions first (eg filter)



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Scatter plot

- Compare two numeric variables

```
ggplot(aes(x = variable_name1, y = variable_name2)) +
  geom_point()
```

- Add a regression line with:

```
geom_smooth(method = "lm")
```

- Colour point by group with:

```
geom_point(aes(color = variable_name))
```

Save plots

- Click 

- Or save to working directory (`getwd()`)

```
png(file = "plot_name.png")
ggplot(aes(variable_name)) +
                geom_bar()
dev.off()
```

Specify file name

Create plot

Specify we are finished

Exercise 4

- Exercise 4 is in the file: **Exercises_day2.R**