Before we begin…

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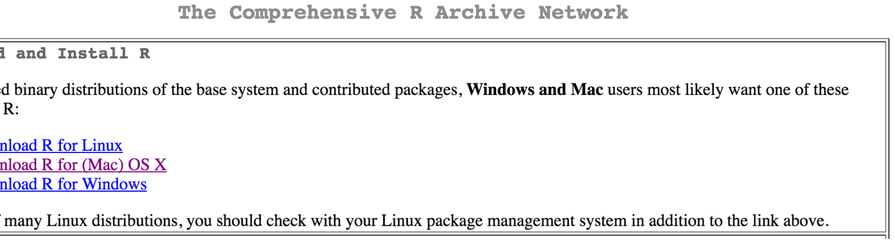
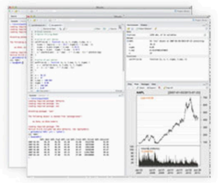
Download workshop materials

- goo.gl/J2sgyp





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Introduction to R Workshop

Session 3

Sean Nguyen

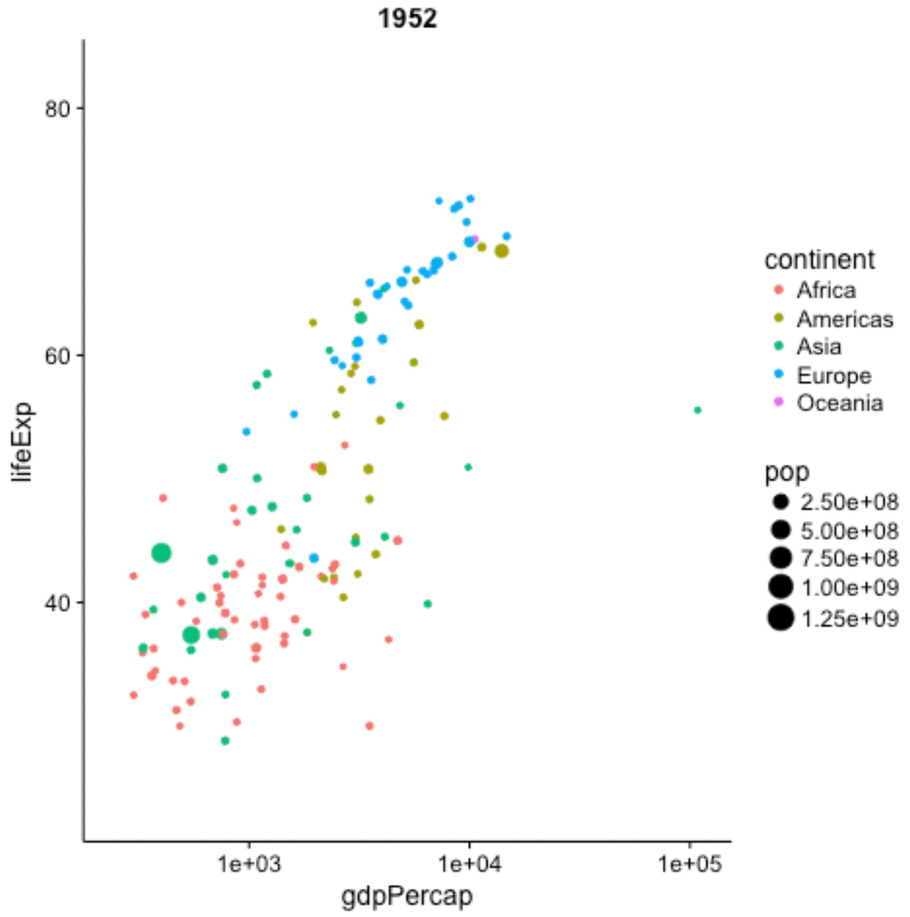
Session 3: Goals

Learn factors and levels

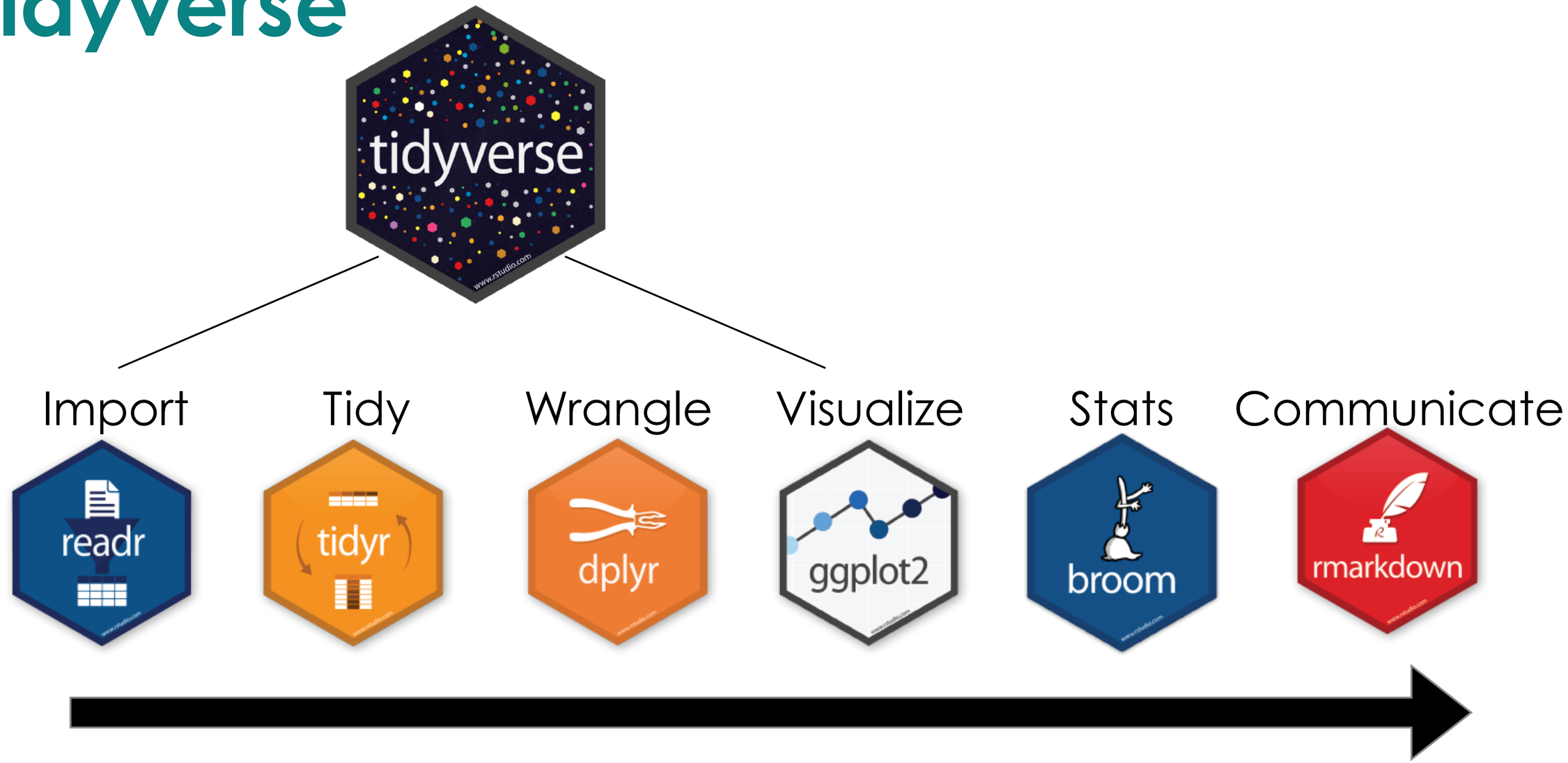
ggplot2

Saving plots

R markdown



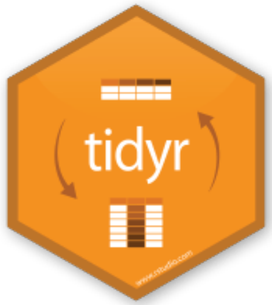
Data Analysis in the **Tidyverse**



Data Analysis in the **Tidyverse**

Import

Tidy



Wrangle

Visualize

ggplot()
geom_line()
geom_bar()
geom_point()
geom_boxplot()

Stats

Communicate

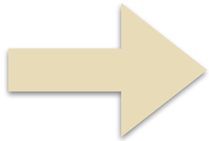
knitr
Rmd
Markdown

factor: categorical variable

Formula: data$column <- **as.factor**(data$column)

data$month <- **as.factor**(data$month)

month (chr)
January
February
March



month (fctr)
January
February
March

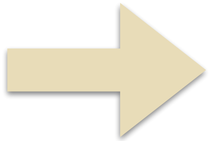
factor: categorical variable

Formula for multiple columns:

mutate_at(**vars**(columnA:columnD), **as.factor**)

mutate_at(**vars**(month:group), **as.factor**)

month (chr)	day (chr)	group (chr)
January	Mon	A
February	Mon	A
March	Tues	B



month (fctr)	day (fctr)	group (fctr)
January	Mon	A
February	Mon	A
March	Tues	B

numeric: numeric variable

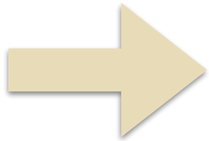
Integers - (~2 billion)

Double - (~1.79e308)

1.15, 4.40, 3.80

Formula: data$column <- **as.numeric**(data$column)

Column (chr)
3.124
5.934
5.600



Column (dbl)
3.124
5.934
5.600

character: strings of text

"MSU R Workshop"

Formula: data$column <- **as.character**(data$column)

Name (fctr)
Debbie
Dylan
Sarah

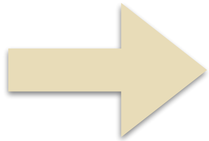
Name (chr)
Debbie
Dylan
Sarah

logical: True/False variable

Formula: data$column <- **as.logical**(data$column)

data$question <- **as.logical**(data$question)

question (chr)
TRUE
FALSE
TRUE



question (lgl)
TRUE
FALSE
TRUE

data types in R:

Factors - categorical variable Monday , Tuesday, Wednesday

Numeric - numbers

Integers (~2 billion)

Double (~1.79e308)

1.15, 4.40, 3.80

Character - strings of characters "Michigan State R Workshop"

Logical - TRUE/FALSE

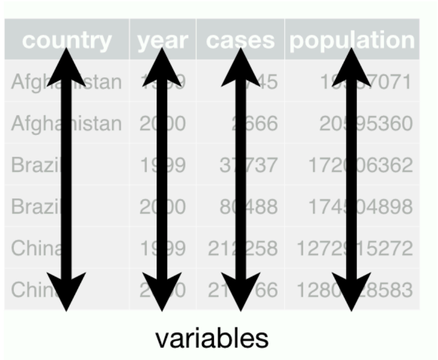
ggplot2 - considerations

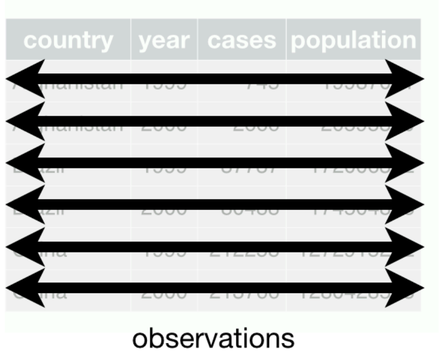
tidy data - variables in columns, observations in rows

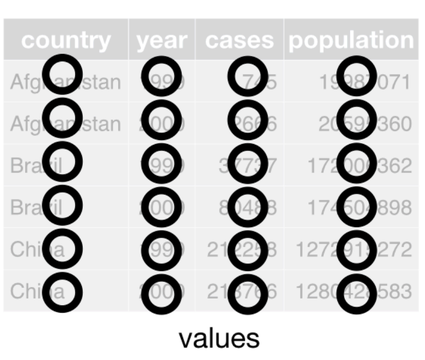
factors - categorical variables

integers/numeric - number variables

levels - order of categorical variables







levels - the **order** of **categorial** variables

Formula: data$column <- **factor**(data$column,
levels = c(“**order**”, “**that**”,”**you**”, “**want**”))

data$month <- **factor**(data$month, **levels** = c(“January”, “February”,
“March”, “April”))

‘April’, ’February’, ’January’, ’March’ → ’January’, ’February’, ’March’, ’April’

ggplot2 - powerful plotting library

General Formula: `ggplot(aes(x = ___, y = ____) ) +`

`geom_point()`

`geom_line()`

`geom_boxplot()`

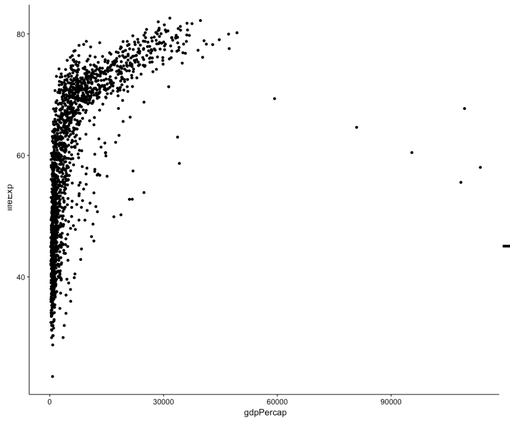
`geom_violin()`

`geom_col()/geom_bar(stat = "identity")`

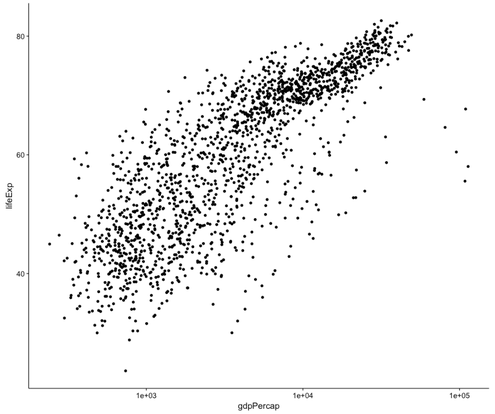
Grammar of Graphics

- Layered
- Iterative
- Customizable

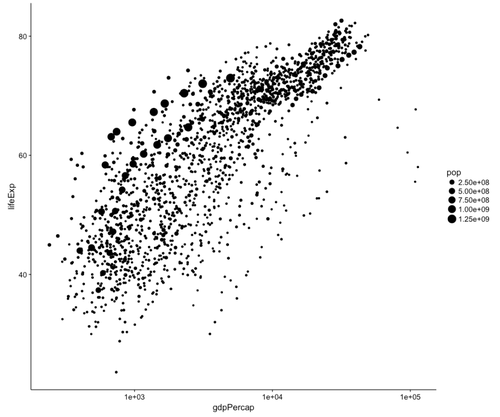
```
# A tibble: 1,704 x 6
       country continent  year lifeExp      pop gdpPercap
        <fctr>    <fctr> <int>   <dbl>    <int>     <dbl>
1  Afghanistan      Asia  1952  28.801  8425333  779.4453
2  Afghanistan      Asia  1957  30.332  9240934  820.8530
3  Afghanistan      Asia  1962  31.997 10267083  853.1007
4  Afghanistan      Asia  1967  34.020 11537966  836.1971
5  Afghanistan      Asia  1972  36.088 13079460  739.9811
```



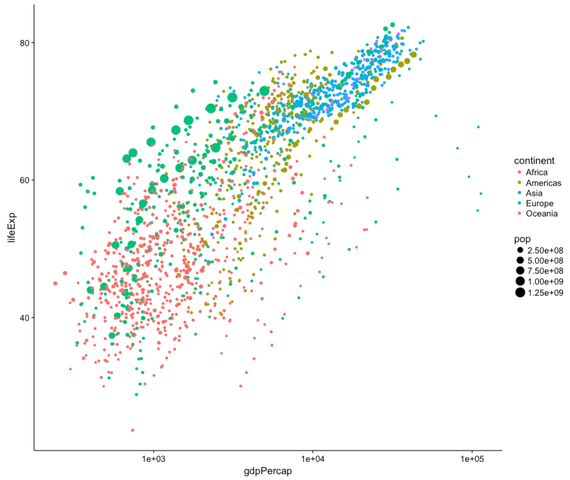

```
data %>%
  ggplot(aes(x = gdpPercap, y = lifeExp))+
  geom_point()
```




```
data %>%
  ggplot(aes(x = gdpPercap, y = lifeExp))+
  geom_point()+
  scale_x_log10()
```




```
data %>%
  ggplot(aes(x = gdpPercap, y = lifeExp, size = pop))+
  geom_point()+
  scale_x_log10()
```




```
data %>%
  ggplot(aes(x = gdpPercap, y = lifeExp,
             size = pop, color = continent))+
  geom_point()+
  scale_x_log10()
```

Demo!

ggplot2 - tweaking your plot

reorder - ggplot(aes (x = **reorder(_____ , ordered_variable)**, y = ____)

color - **+ scale_fill_brewer(palette= “YlOrRd”)**

legends - remove legend **+ guides(color = FALSE)/guides(fill = FALSE)**

annotations - **+ annotate(“text”,x= 2, y=2, label = “your text”)**

Try to plot:

Life expectancy of Asian countries in 1992

Life expectancy of of Africa and Europe in 2007

GDP of Americas and Europe in 2002

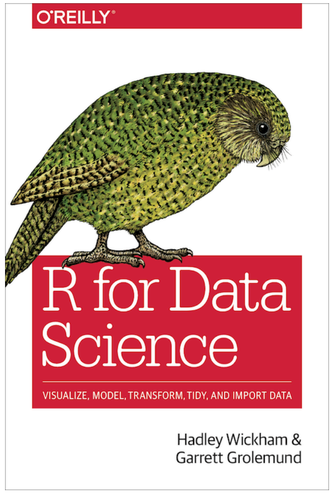
BONUS:

Determine the GDP if each continent in 2007

Additional Resources

R Graphics Cookbook

R for Data Science



Stack Overflow

stackoverflow

R markdown: reproducible documents

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Reproduce.