

The gapminder dataset

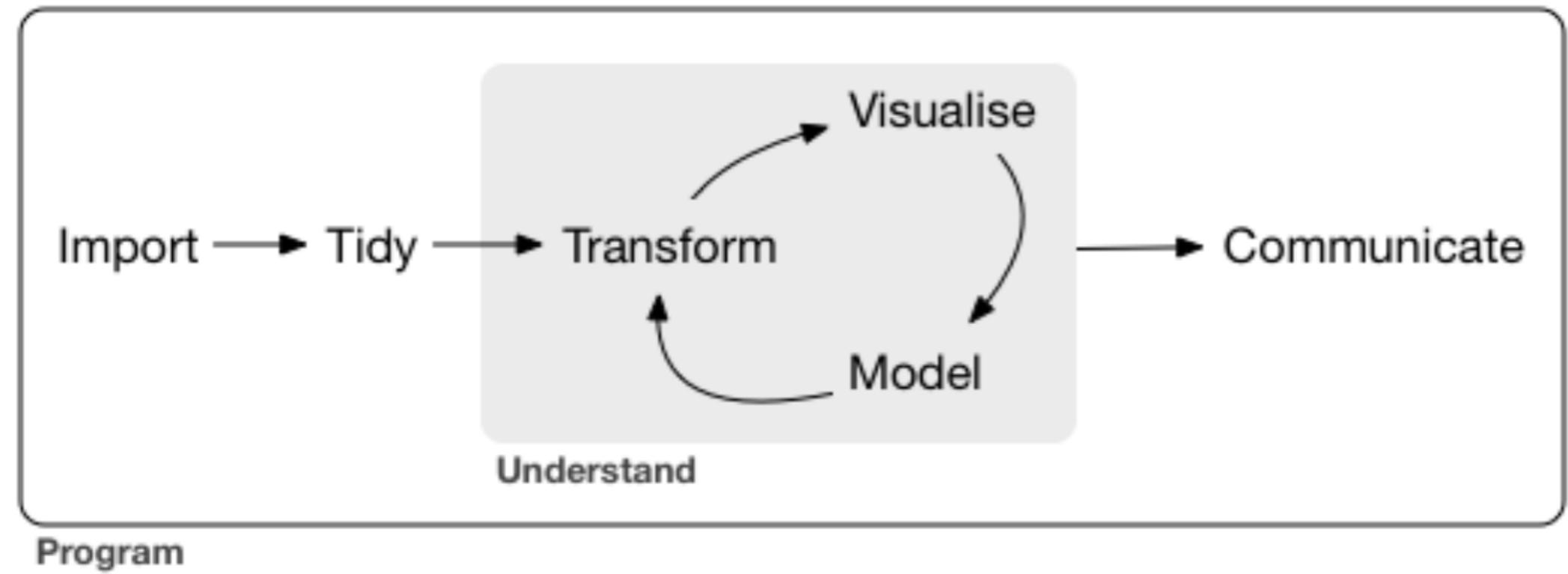
INTRODUCTION TO THE TIDYVERSE



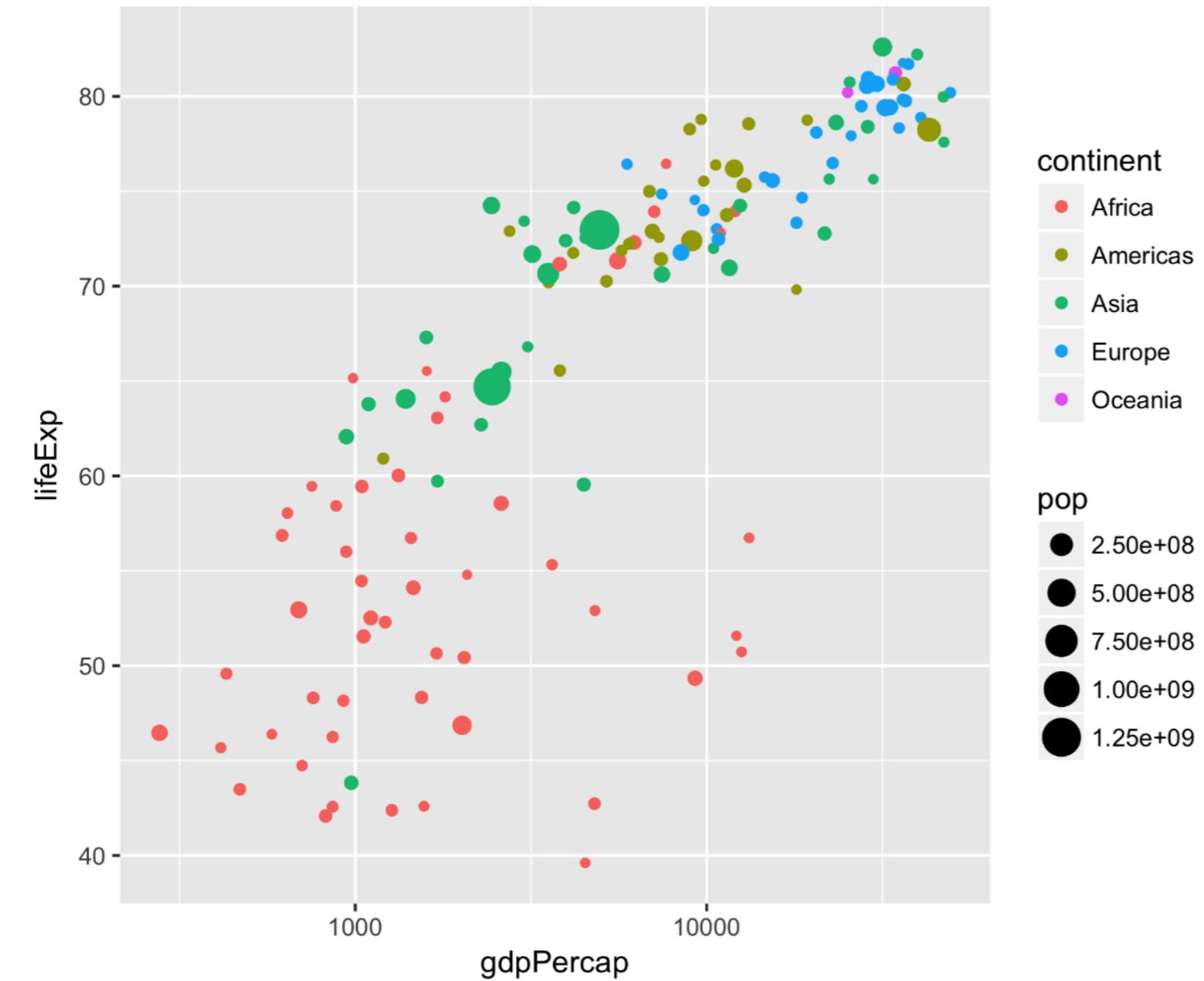
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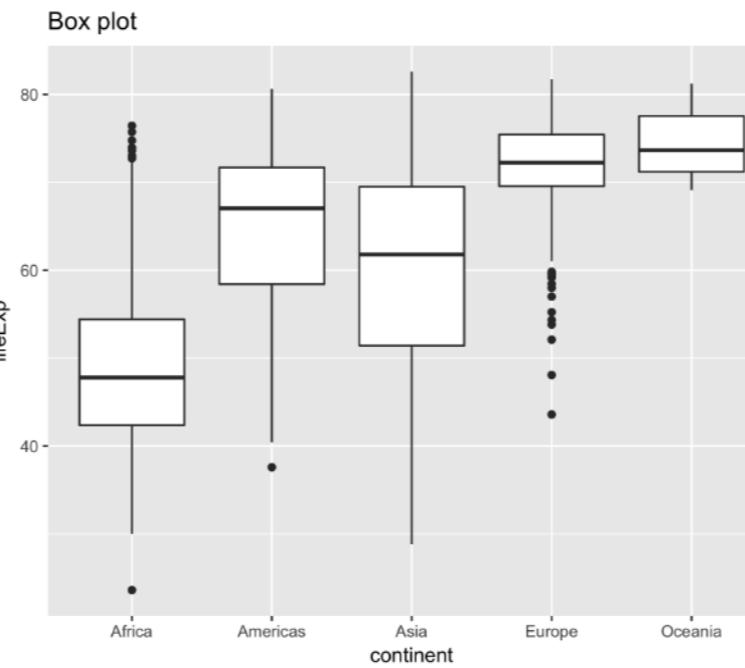
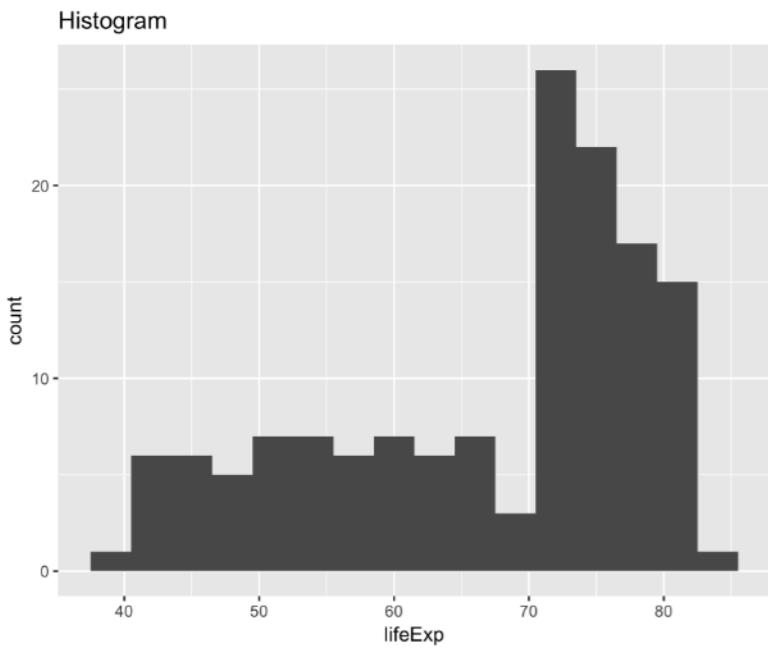
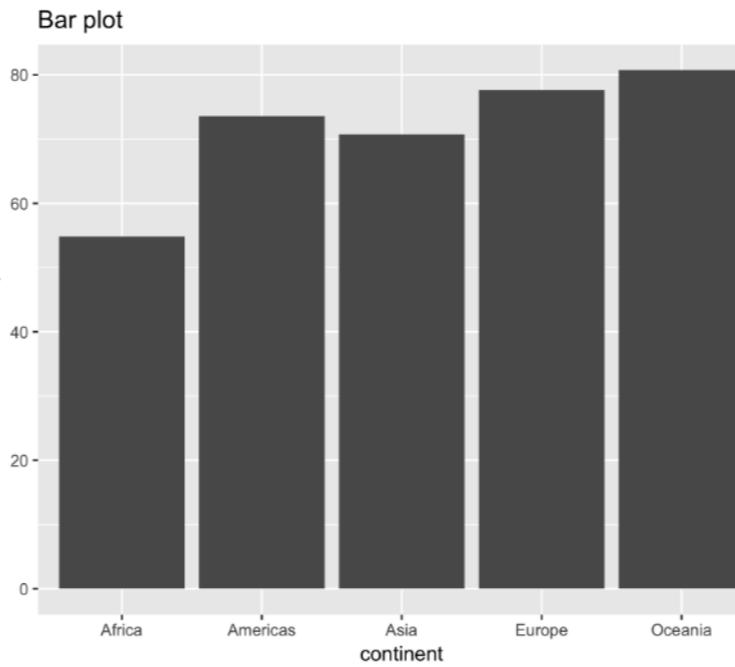
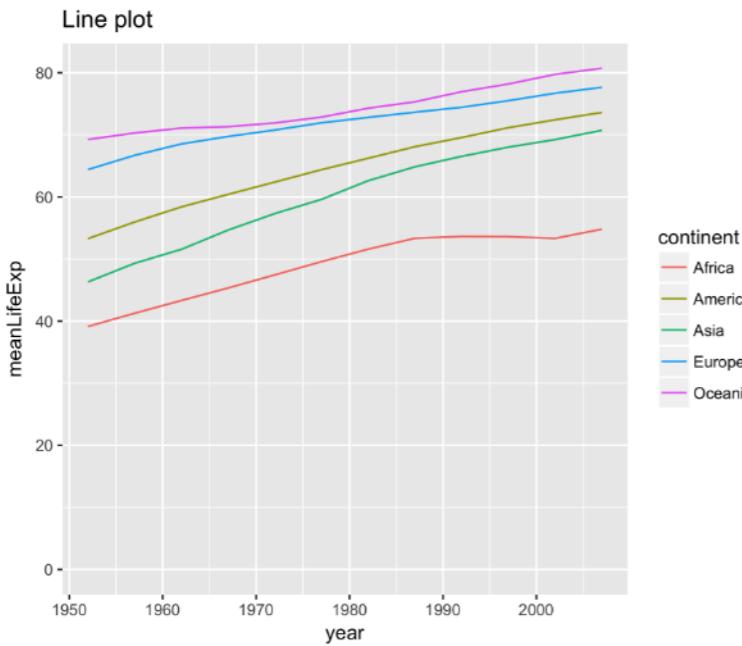
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Tidyverse



Gapminder





Loading packages

```
library(gapminder)
```

```
library(dplyr)
```

The gapminder dataset

gapminder

```
# A tibble: 1,704 x 6
  country continent year lifeExp      pop gdpPercap
  <fctr>    <fctr> <int>   <dbl>    <dbl>     <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
6 Afghanistan Asia     1977 38.438 14880372 786.1134
7 Afghanistan Asia     1982 39.854 12881816 978.0114
8 Afghanistan Asia     1987 40.822 13867957 852.3959
9 Afghanistan Asia     1992 41.674 16317921 649.3414
10 Afghanistan Asia    1997 41.763 22227415 635.3414
# ... with 1,694 more rows
```

Let's practice!

INTRODUCTION TO THE TIDYVERSE

The filter verb

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The filter verb

filter()



Filtering for one year

```
gapminder %>%  
  filter(year == 2007)
```

```
# A tibble: 142 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>   <fctr> <int>   <dbl>    <dbl>     <dbl>  
1 Afghanistan Asia    2007  43.828 31889923  974.5803  
2 Albania     Europe  2007  76.423  3600523  5937.0295  
3 Algeria     Africa  2007  72.301 33333216  6223.3675  
4 Angola      Africa  2007  42.731 12420476  4797.2313  
5 Argentina   Americas 2007  75.320 40301927 12779.3796  
6 Australia   Oceania  2007  81.235 20434176 34435.3674  
7 Austria     Europe  2007  79.829  8199783  36126.4927  
8 Bahrain     Asia    2007  75.635  708573  29796.0483  
9 Bangladesh   Asia    2007  64.062 150448339 1391.2538  
10 Belgium    Europe  2007  79.441 10392226 33692.6051  
# ... with 132 more rows
```

Filtering for one country

```
gapminder %>%  
  filter(country == "United States")
```

```
# A tibble: 12 x 6  
  country continent year lifeExp      pop gdpPerCap  
  <fctr>    <fctr> <int>   <dbl>    <dbl>     <dbl>  
1 United States Americas  1952  68.440 157553000 13990.48  
2 United States Americas  1957  69.490 171984000 14847.13  
3 United States Americas  1962  70.210 186538000 16173.15  
4 United States Americas  1967  70.760 198712000 19530.37  
5 United States Americas  1972  71.340 209896000 21806.04  
6 United States Americas  1977  73.380 220239000 24072.63  
7 United States Americas  1982  74.650 232187835 25009.56  
8 United States Americas  1987  75.020 242803533 29884.35  
9 United States Americas  1992  76.090 256894189 32003.93  
10 United States Americas 1997  76.810 272911760 35767.43  
11 United States Americas 2002  77.310 287675526 39097.10  
12 United States Americas 2007  78.242 301139947 42951.65
```

Filtering for two variables

```
gapminder %>%  
  filter(year == 2007, country == "United States")
```

```
# A tibble: 1 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>    <fctr> <int>   <dbl>    <dbl>      <dbl>  
1 United States Americas  2007  78.242 301139947  42951.65
```

Let's practice!

INTRODUCTION TO THE TIDYVERSE

The arrange verb

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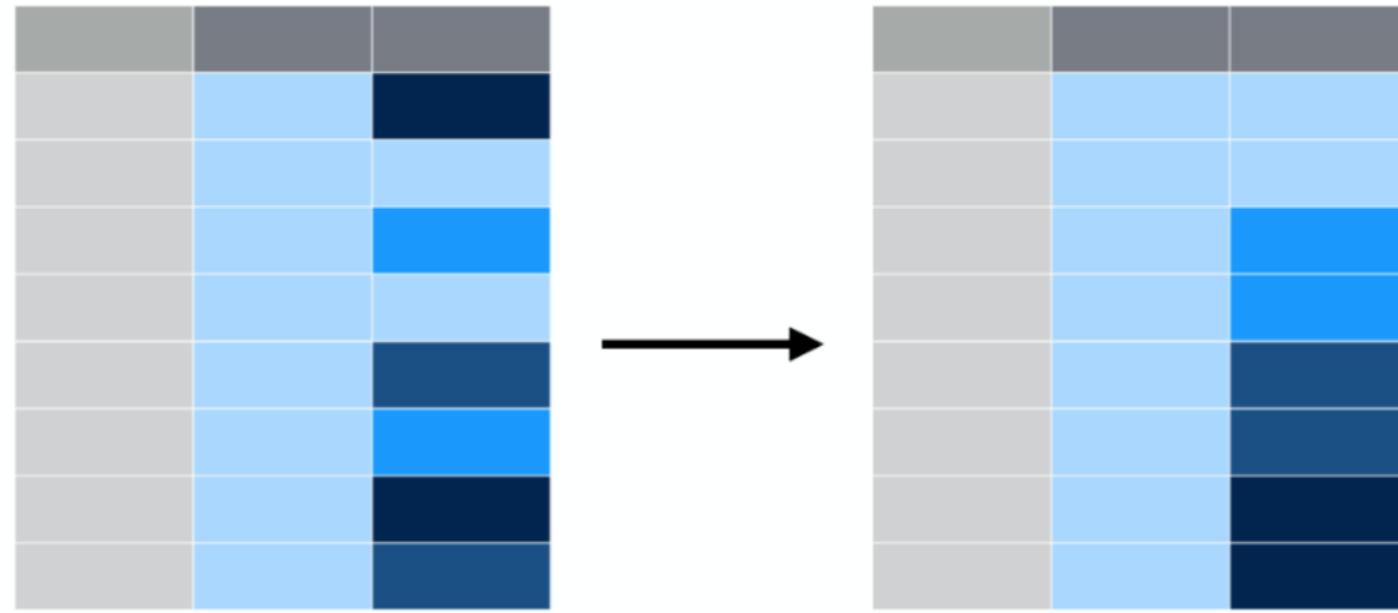


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The arrange verb

`arrange()` sorts a
table based on a
variable



Sorting with arrange

```
gapminder %>%  
  arrange(gdpPercap)
```

```
# A tibble: 1,704 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>   <fctr> <int>  <dbl>    <dbl>     <dbl>  
1 Congo, Dem. Rep. Africa  2002  44.966 55379852 241.1659  
2 Congo, Dem. Rep. Africa  2007  46.462 64606759 277.5519  
3 Lesotho       Africa  1952  42.138  748747 298.8462  
4 Guinea-Bissau Africa  1952  32.500  580653 299.8503  
5 Congo, Dem. Rep. Africa  1997  42.587 47798986 312.1884  
6 Eritrea       Africa  1952  35.928 1438760 328.9406  
7 Myanmar        Asia   1952  36.319 20092996 331.0000  
8 Lesotho       Africa  1957  45.047  813338 335.9971  
9 Burundi       Africa  1952  39.031 2445618 339.2965  
10 Eritrea      Africa  1957  38.047 1542611 344.1619  
# ... with 1,694 more rows
```

Sorting in descending order

```
gapminder %>%  
  arrange(desc(gdpPercap))
```

```
# A tibble: 1,704 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>   <fctr> <int>    <dbl>    <dbl>      <dbl>  
1 Kuwait     Asia    1957  58.033  212846 113523.13  
2 Kuwait     Asia    1972  67.712  841934 109347.87  
3 Kuwait     Asia    1952  55.565 1600000 108382.35  
4 Kuwait     Asia    1962  60.470  358266  95458.11  
5 Kuwait     Asia    1967  64.624  575003  80894.88  
6 Kuwait     Asia    1977  69.343 1140357  59265.48  
7 Norway    Europe   2007  80.196 4627926  49357.19  
8 Kuwait     Asia    2007  77.588 2505559  47306.99  
9 Singapore  Asia    2007  79.972 4553009  47143.18  
10 Norway   Europe   2002  79.050 4535591  44683.98  
# ... with 1,694 more rows
```

Filtering then arranging

```
gapminder %>%  
  filter(year == 2007) %>%  
  arrange(desc(gdpPercap))
```

```
# A tibble: 142 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>   <fctr> <int>  <dbl>    <dbl>     <dbl>  
1 Norway    Europe  2007  80.196  4627926  49357.19  
2 Kuwait    Asia    2007  77.588  2505559  47306.99  
3 Singapore Asia    2007  79.972  4553009  47143.18  
4 United States Americas 2007  78.242 301139947  42951.65  
5 Ireland   Europe  2007  78.885  4109086  40676.00  
6 Hong Kong, China Asia    2007  82.208  6980412  39724.98  
7 Switzerland Europe  2007  81.701  7554661  37506.42  
8 Netherlands Europe  2007  79.762  16570613  36797.93  
9 Canada    Americas 2007  80.653  33390141  36319.24  
10 Iceland   Europe  2007  81.757   301931  36180.79  
# ... with 132 more rows
```

Let's practice!

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The mutate verb

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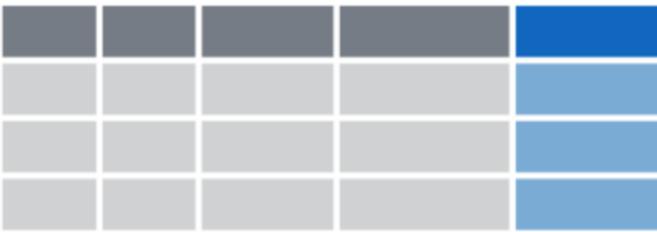
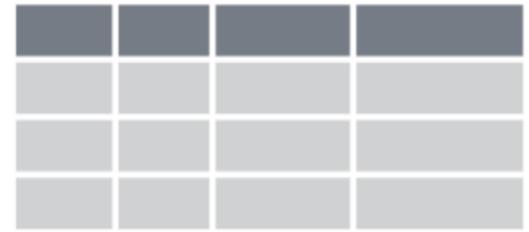


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Chief Data Scientist, DataCamp

The mutate verb

mutate()



mutate changes or adds variables

Using mutate to change a variable

```
gapminder %>%  
  mutate(pop = pop / 1000000)
```

```
# A tibble: 1,704 x 6  
  country continent year lifeExp      pop gdpPercap  
  <fctr>   <fctr> <int>   <dbl>     <dbl>     <dbl>  
1 Afghanistan Asia    1952 28.801 8.425333 779.4453  
2 Afghanistan Asia    1957 30.332 9.240934 820.8530  
3 Afghanistan Asia    1962 31.997 10.267083 853.1007  
4 Afghanistan Asia    1967 34.020 11.537966 836.1971  
5 Afghanistan Asia    1972 36.088 13.079460 739.9811  
6 Afghanistan Asia    1977 38.438 14.880372 786.1134  
7 Afghanistan Asia    1982 39.854 12.881816 978.0114  
8 Afghanistan Asia    1987 40.822 13.867957 852.3959  
9 Afghanistan Asia    1992 41.674 16.317921 649.3414  
10 Afghanistan Asia   1997 41.763 22.227415 635.3414  
# ... with 1,694 more rows
```

Using mutate to add a new variable

```
gapminder %>%  
  mutate(gdp = gdpPercap * pop)
```

```
# A tibble: 1,704 x 7  
  country continent year lifeExp      pop gdpPercap        gdp  
  <fctr>   <fctr> <int>  <dbl>    <dbl>    <dbl>    <dbl>  
1 Afghanistan Asia     1952 28.801 8425333 779.4453 6567086330  
2 Afghanistan Asia     1957 30.332 9240934 820.8530 7585448670  
3 Afghanistan Asia     1962 31.997 10267083 853.1007 8758855797  
4 Afghanistan Asia     1967 34.020 11537966 836.1971 9648014150  
5 Afghanistan Asia     1972 36.088 13079460 739.9811 9678553274  
6 Afghanistan Asia     1977 38.438 14880372 786.1134 11697659231  
7 Afghanistan Asia     1982 39.854 12881816 978.0114 12598563401  
8 Afghanistan Asia     1987 40.822 13867957 852.3959 11820990309  
9 Afghanistan Asia     1992 41.674 16317921 649.3414 10595901589  
10 Afghanistan Asia    1997 41.763 22227415 635.3414 14121995875  
# ... with 1,694 more rows
```

Combining verbs

```
gapminder %>%  
  mutate(gdp = gdpPercap * pop) %>%  
  filter(year == 2007) %>%  
  arrange(desc(gdp))
```

```
# A tibble: 142 x 7  
  country continent year LifeExp      pop gdpPercap     gdp  
  <fctr>    <fctr> <int>   <dbl>    <dbl>      <dbl>    <dbl>  
1 United States Americas  2007  78.242 301139947 42951.653 1.293446e+13  
2 China        Asia    2007  72.961 1318683096 4959.115 6.539501e+12  
3 Japan        Asia    2007  82.603 127467972 31656.068 4.035135e+12  
4 India         Asia    2007  64.698 1110396331 2452.210 2.722925e+12  
5 Germany       Europe   2007  79.406  82400996 32170.374 2.650871e+12  
6 United Kingdom Europe   2007  79.425  60776238 33203.261 2.017969e+12  
7 France        Europe   2007  80.657  61083916 30470.017 1.861228e+12  
8 Brazil        Americas 2007  72.390 190010647 9065.801 1.722599e+12  
9 Italy          Europe   2007  80.546  58147733 28569.720 1.661264e+12  
10 Mexico       Americas 2007  76.195 108700891 11977.575 1.301973e+12  
# ... with 132 more rows
```

Let's practice!

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