

The gapminder dataset

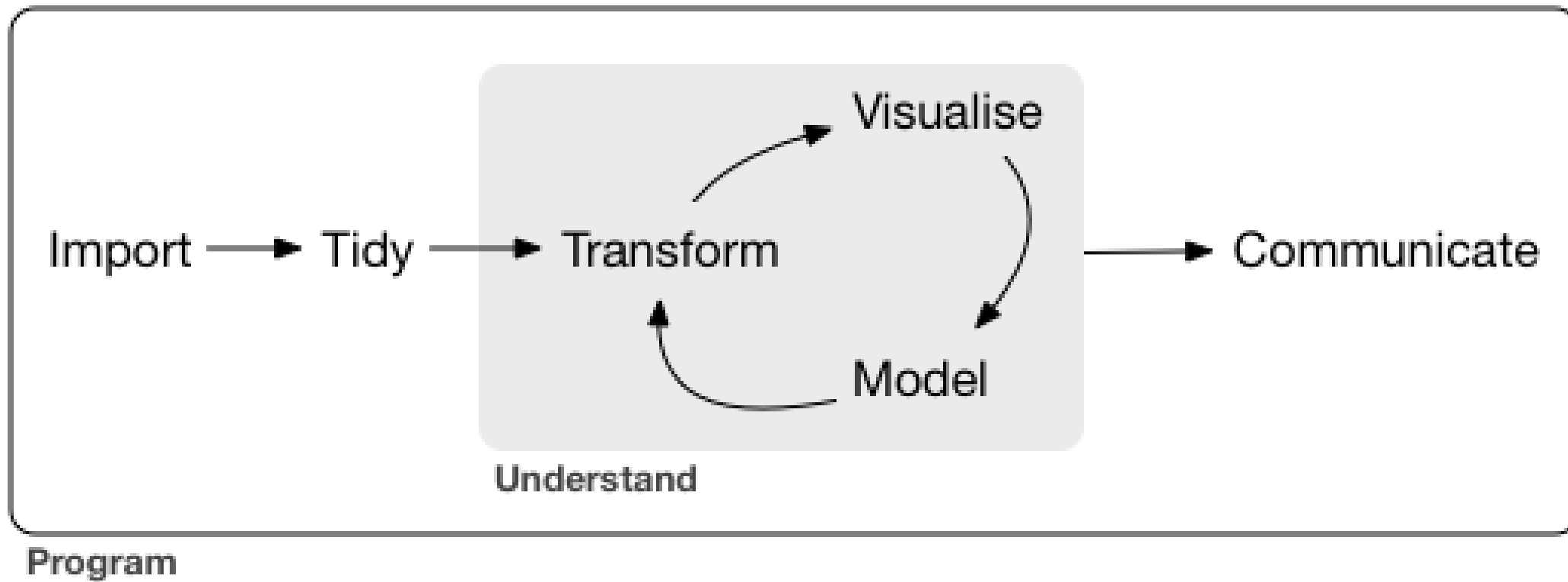
INTRODUCTION TO THE TIDYVERSE



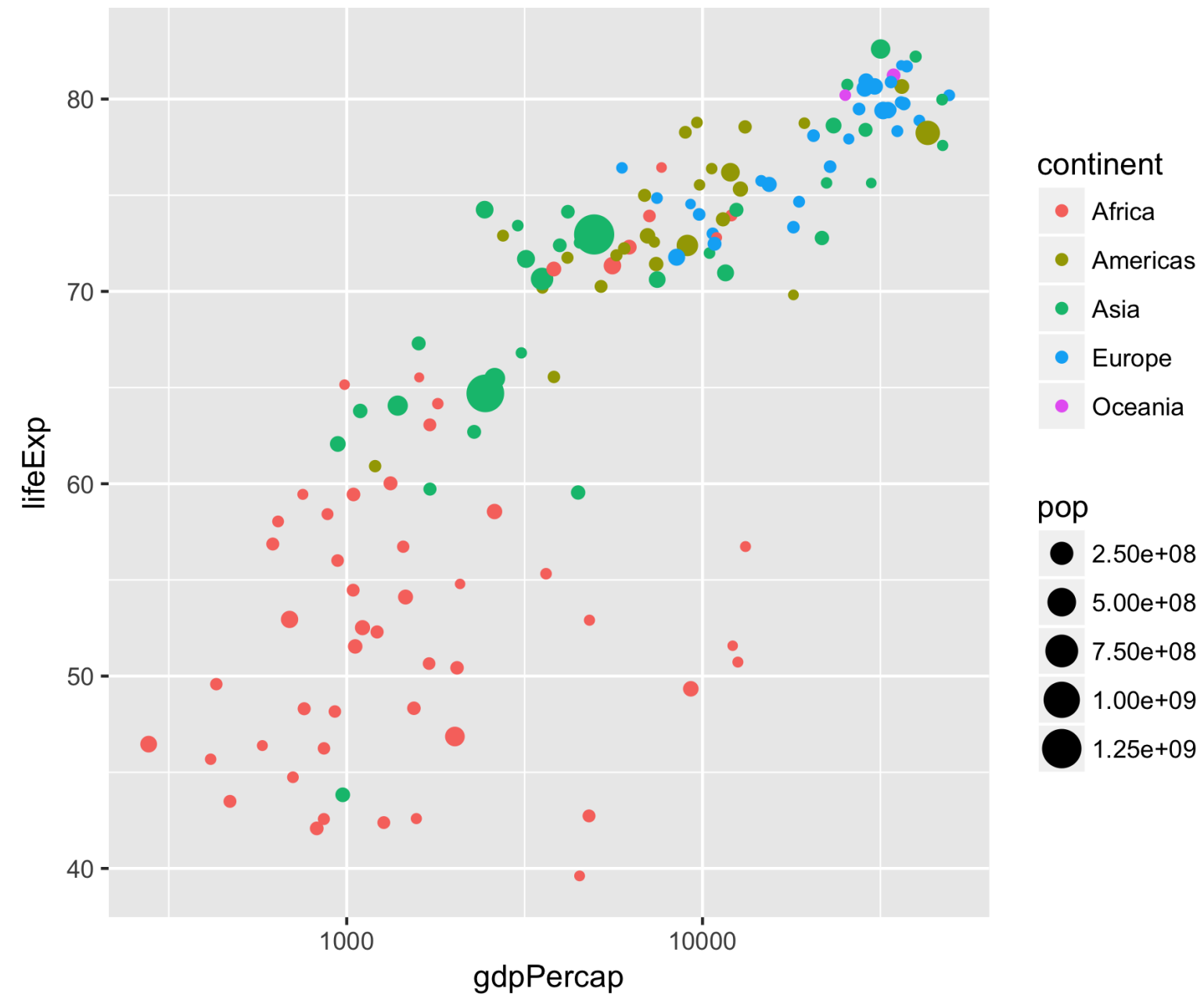
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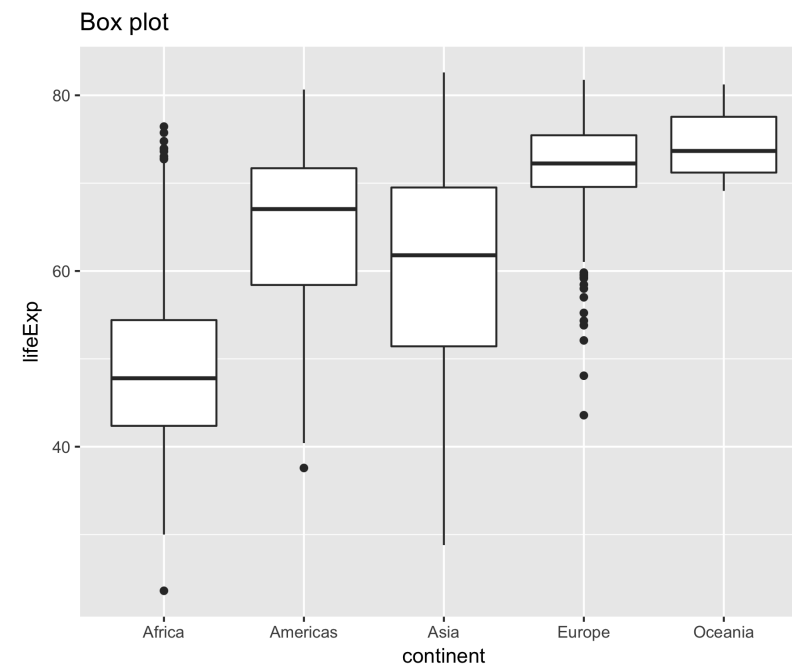
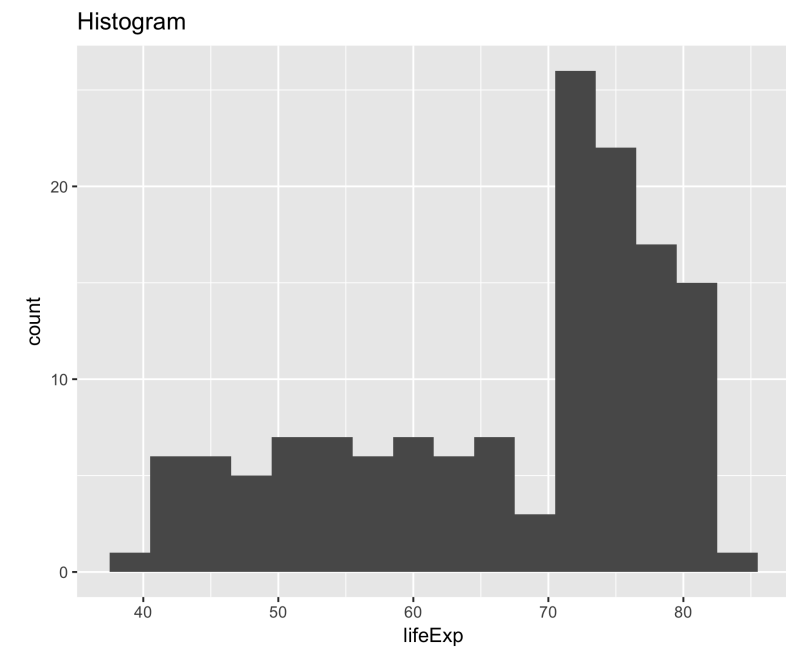
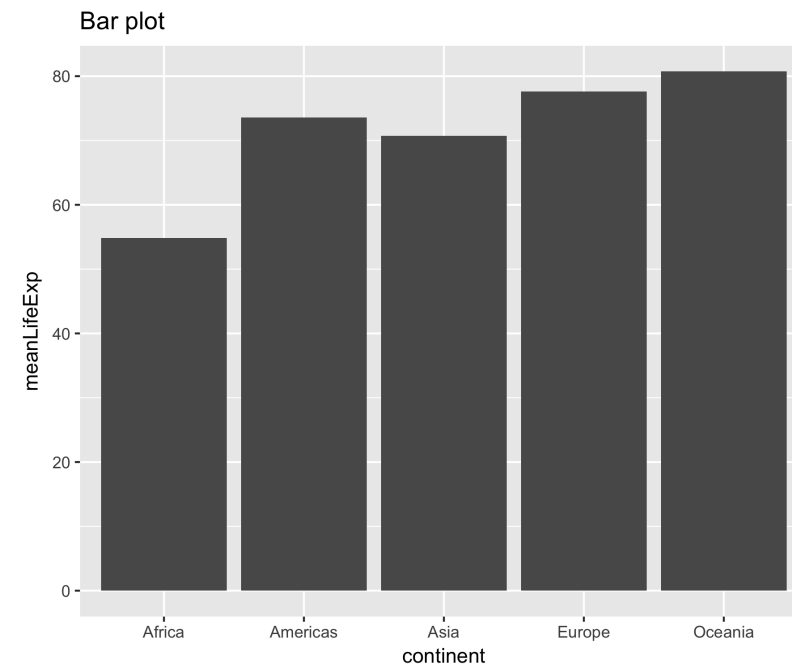
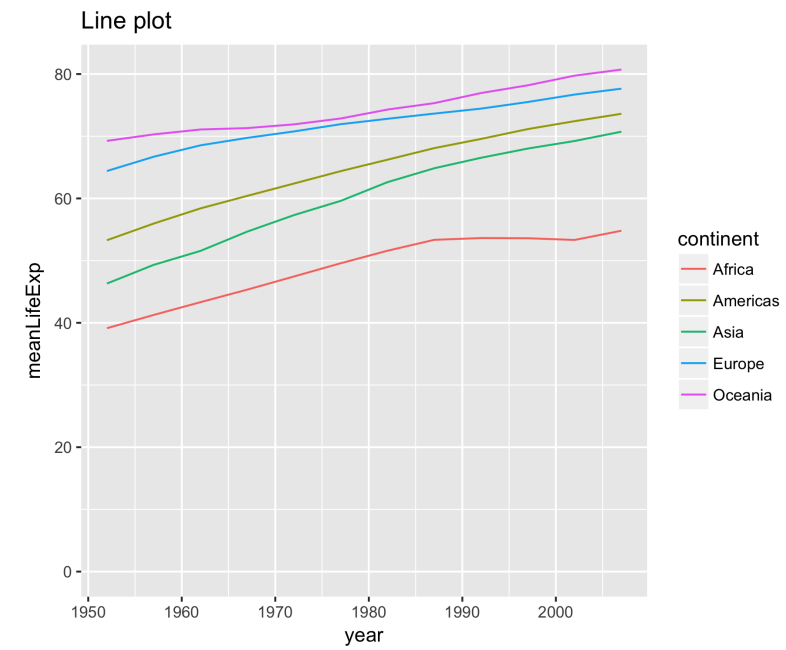
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Tidyverse



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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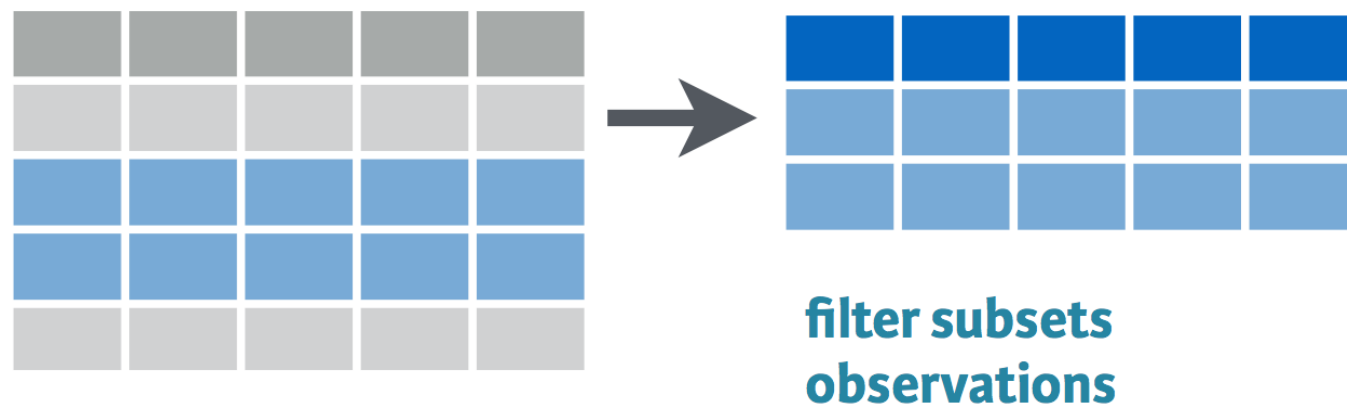


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The filter verb

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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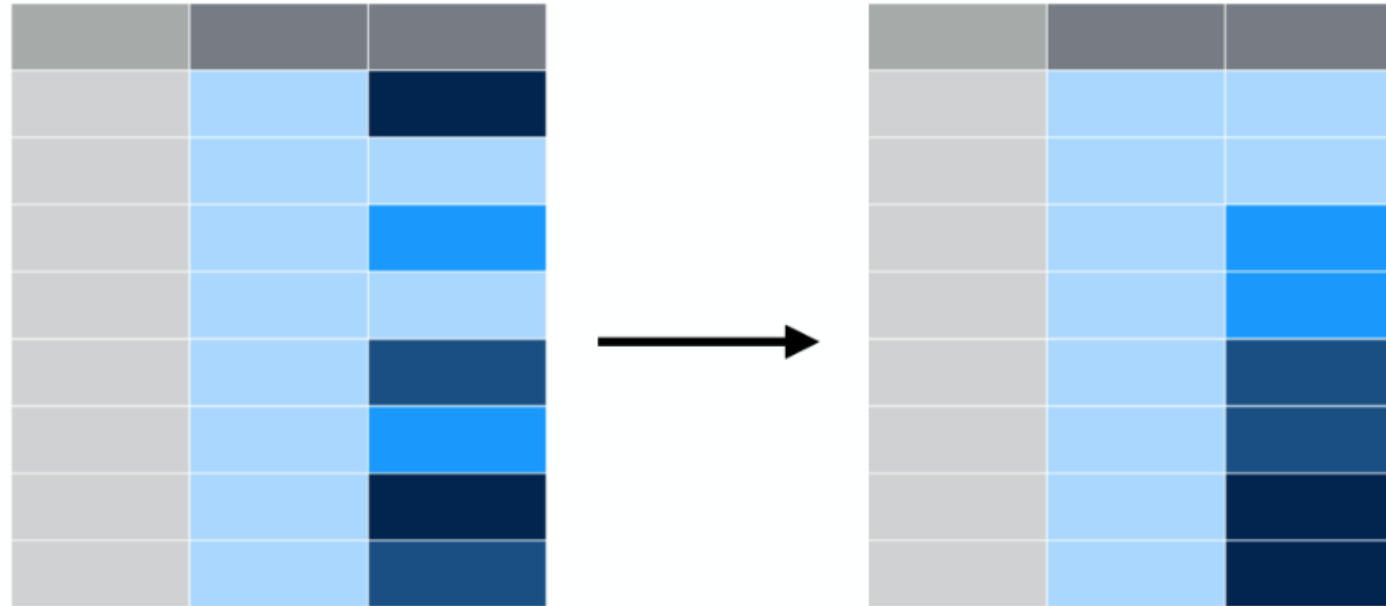


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The arrange verb

`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  160000 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

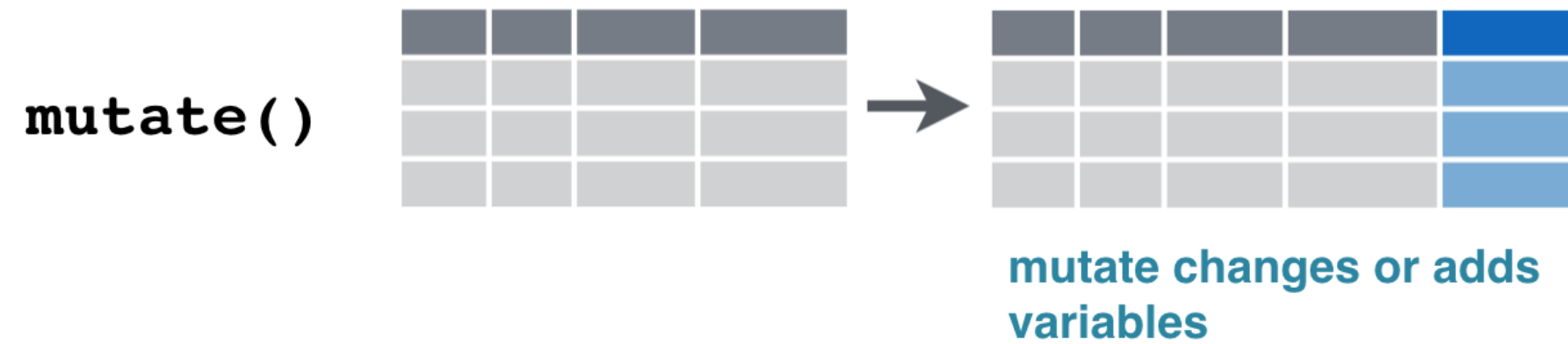
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The mutate verb



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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