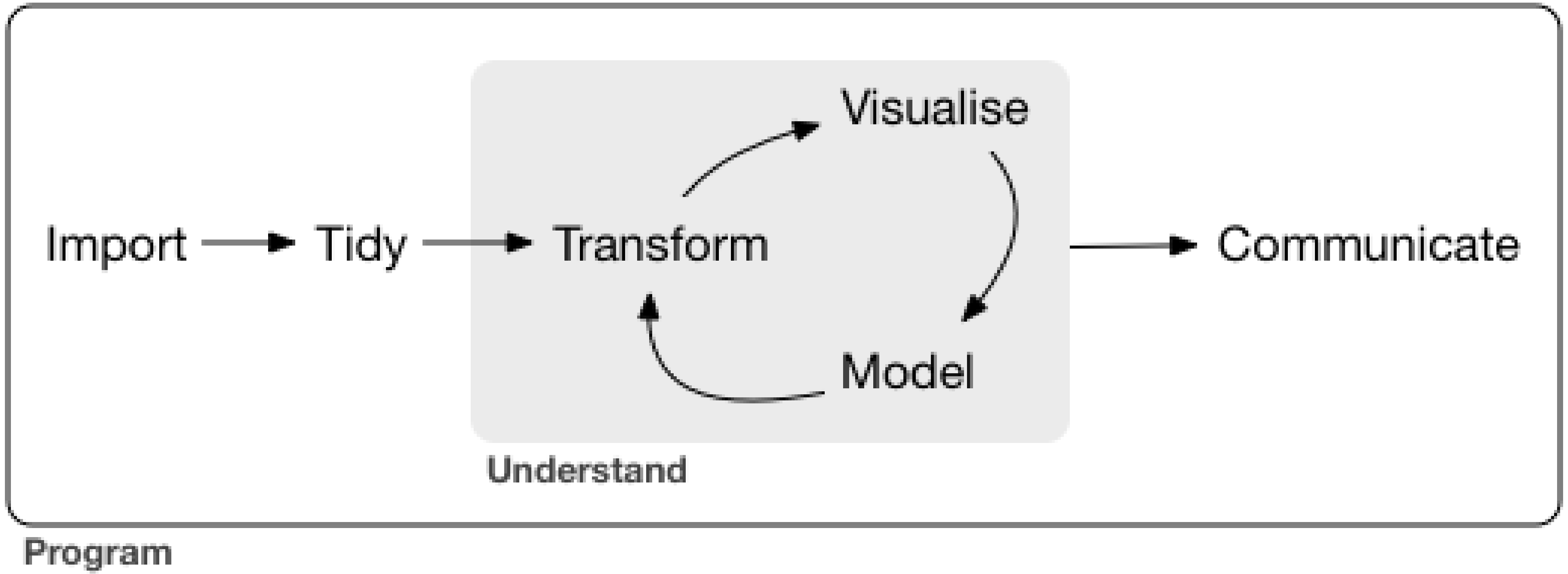
The summarize verb

INTRODUCTION TO THE TIDYVERSE

David Robinson

Chief Data Scientist, DataCamp

Data transformation and visualization



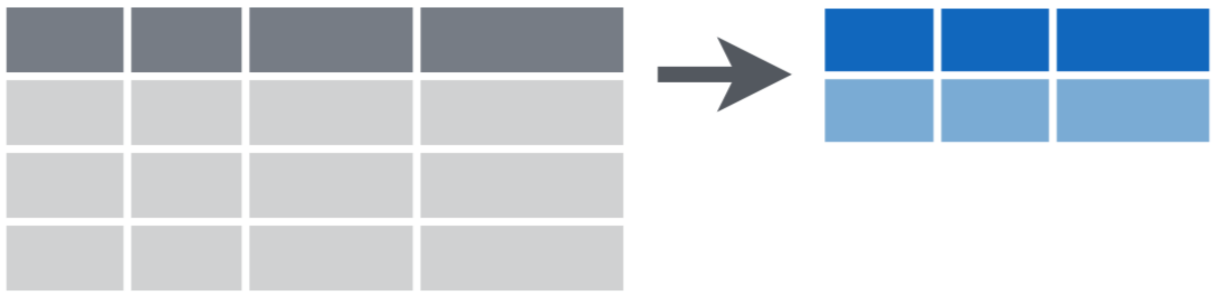
Extracting data

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

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

The summarize verb

`summarize()` turns many rows into one



```r
gapminder %>%
  summarize(meanLifeExp = mean(lifeExp))
```

```
# A tibble: 1 x 1
  meanLifeExp
        <dbl>
1    59.47444
```

Summarizing one year

```
gapminder %>%
  filter(year == 2007) %>%
  summarize(meanLifeExp = mean(lifeExp))
```

```
# A tibble: 1 x 1
  meanLifeExp
        <dbl>
1    67.00742
```

Summarizing into multiple columns

```
gapminder %>%
  filter(year == 2007) %>%
  summarize(meanLifeExp = mean(lifeExp),
            totalPop = sum(pop))
```

```
# A tibble: 1 x 2
  meanLifeExp   totalPop
        <dbl>      <dbl>
1    67.00742 6251013179
```

Functions you can use for summarizing

- `mean`
- `sum`
- `median`
- `min`
- `max`

Let's practice!

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The group_by verb

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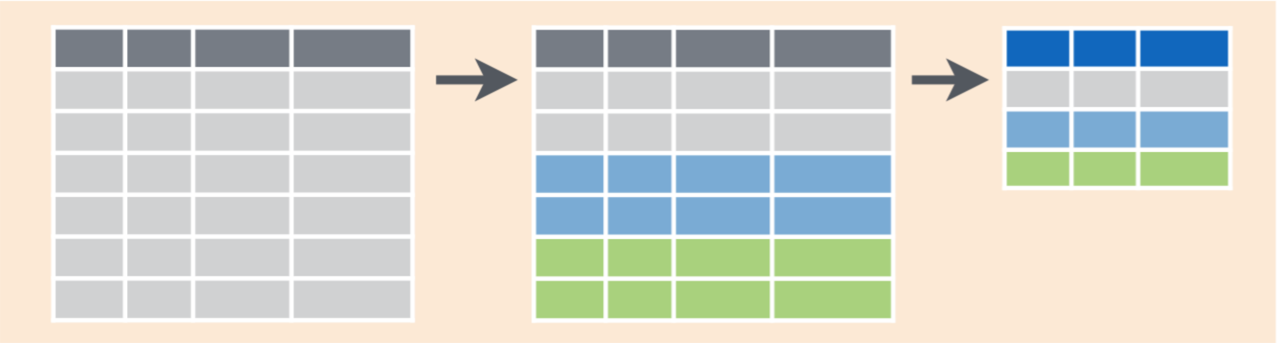
David Robinson
Chief Data Scientist, DataCamp

The summarize verb

```
gapminder %>%
  filter(year == 2007) %>%
  summarize(meanLifeExp = mean(lifeExp),
            totalPop = sum(pop))
```

```
# A tibble: 1 x 2
  meanLifeExp   totalPop
        <dbl>      <dbl>
1    67.00742 6251013179
```



`group_by()` before `summarize()` turns groups into one row each

Summarizing by year

```r
gapminder %>%
  group_by(year) %>%
  summarize(meanLifeExp = mean(lifeExp),
            totalPop = sum(pop))
```

```
# A tibble: 12 x 3
    year meanLifeExp   totalPop
   <int>       <dbl>      <dbl>
 1  1952    49.05762 2406957150
 2  1957    51.50740 2664404580
 3  1962    53.60925 2899782974
 4  1967    55.67829 3217478384
 5  1972    57.64739 3576977158
 6  1977    59.57016 3930045807
 7  1982    61.53320 4289436840
 8  1987    63.21261 4691477418
 9  1992    64.16034 5110710260
10  1997    65.01468 5515204472
11  2002    65.69492 5886977579
12  2007    67.00742 6251013179
```

Summarizing by continent

```
gapminder %>%
  filter(year == 2007) %>%
  group_by(continent) %>%
  summarize(meanLifeExp = mean(lifeExp),
            totalPop = sum(pop))
```

```
# A tibble: 5 x 3
  continent meanLifeExp    totalPop
      <fct>       <dbl>       <dbl>
1    Africa    48.86533  6187585961
2  Americas    64.65874  7351438499
3      Asia    60.06490 30507333901
4    Europe    71.90369  6181115304
5   Oceania    74.32621   212992136
```

Summarizing by continent and year

```
gapminder %>%
  group_by(year, continent) %>%
  summarize(totalPop = sum(pop),
            meanLifeExp = mean(lifeExp))
```

```
# A tibble: 60 x 4
# Groups:   year [?]
    year continent   totalPop meanLifeExp
   <int>     <fct>      <dbl>       <dbl>
 1  1952    Africa  237640501    39.13550
 2  1952  Americas  345152446    53.27984
 3  1952      Asia 1395357351    46.31439
 4  1952    Europe  418120846    64.40850
 5  1952   Oceania   10686006    69.25500
 6  1957    Africa  264837738    41.26635
 7  1957  Americas  386953916    55.96028
 8  1957      Asia 1562780599    49.31854
 9  1957    Europe  437890351    66.70307
10  1957   Oceania   11941976    70.29500
# ... with 50 more rows
```

Let's practice!

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Visualizing summarized data

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Summarizing by year

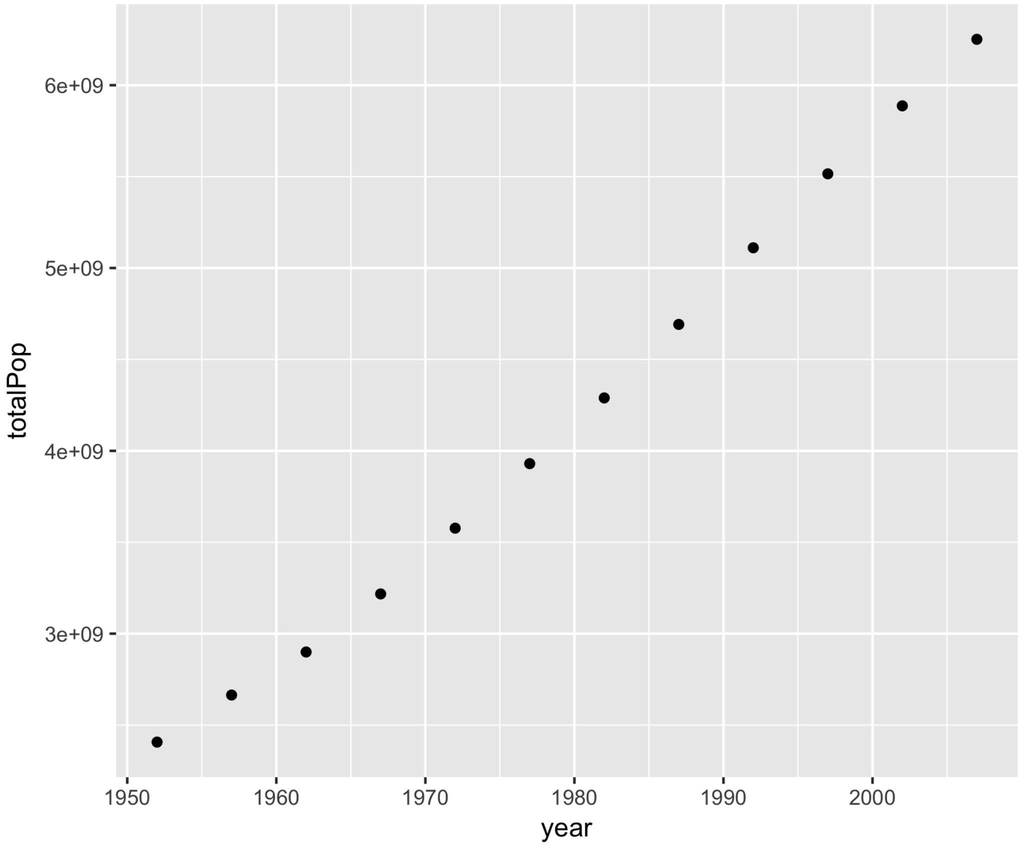
```
by_year <- gapminder %>%
  group_by(year) %>%
  summarize(totalPop = sum(pop),
            meanLifeExp = mean(lifeExp))

by_year
```

```
# A tibble: 12 x 3
    year   totalPop meanLifeExp
   <int>      <dbl>       <dbl>
 1  1952 2406957150    49.05762
 2  1957 2664404580    51.50740
 3  1962 2899782974    53.60925
 4  1967 3217478384    55.67829
 5  1972 3576977158    57.64739
 6  1977 3930045807    59.57016
 7  1982 4289436840    61.53320
 8  1987 4691477418    63.21261
 9  1992 5110710260    64.16034
10  1997 5515204472    65.01468
11  2002 5886977579    65.69492
12  2007 6251013179    67.00742
```

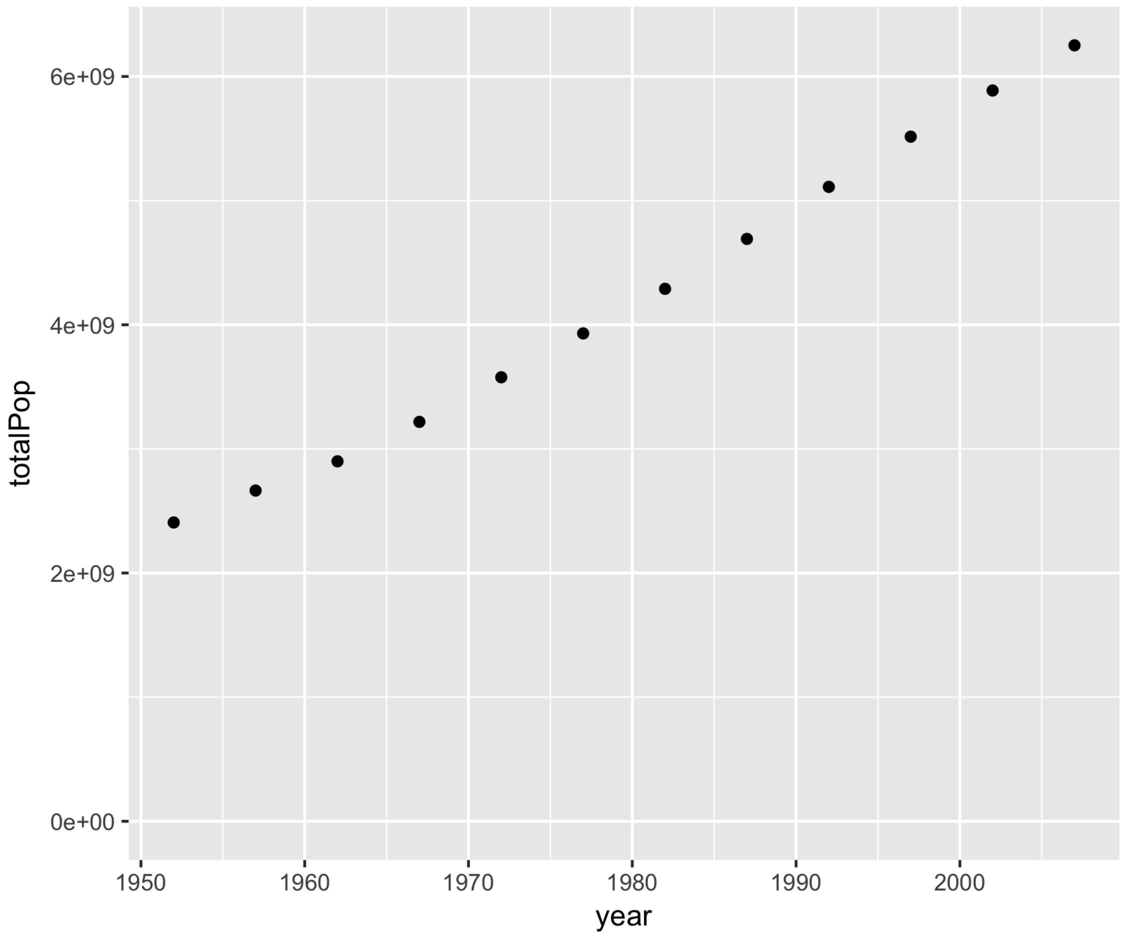
Visualizing population over time

```
ggplot(by_year, aes(x = year, y = totalPop)) +
  geom_point()
```



Starting y-axis at zero

```
ggplot(by_year, aes(x = year, y = totalPop)) +
  geom_point() +
  expand_limits(y = 0)
```



Summarizing by year and continent

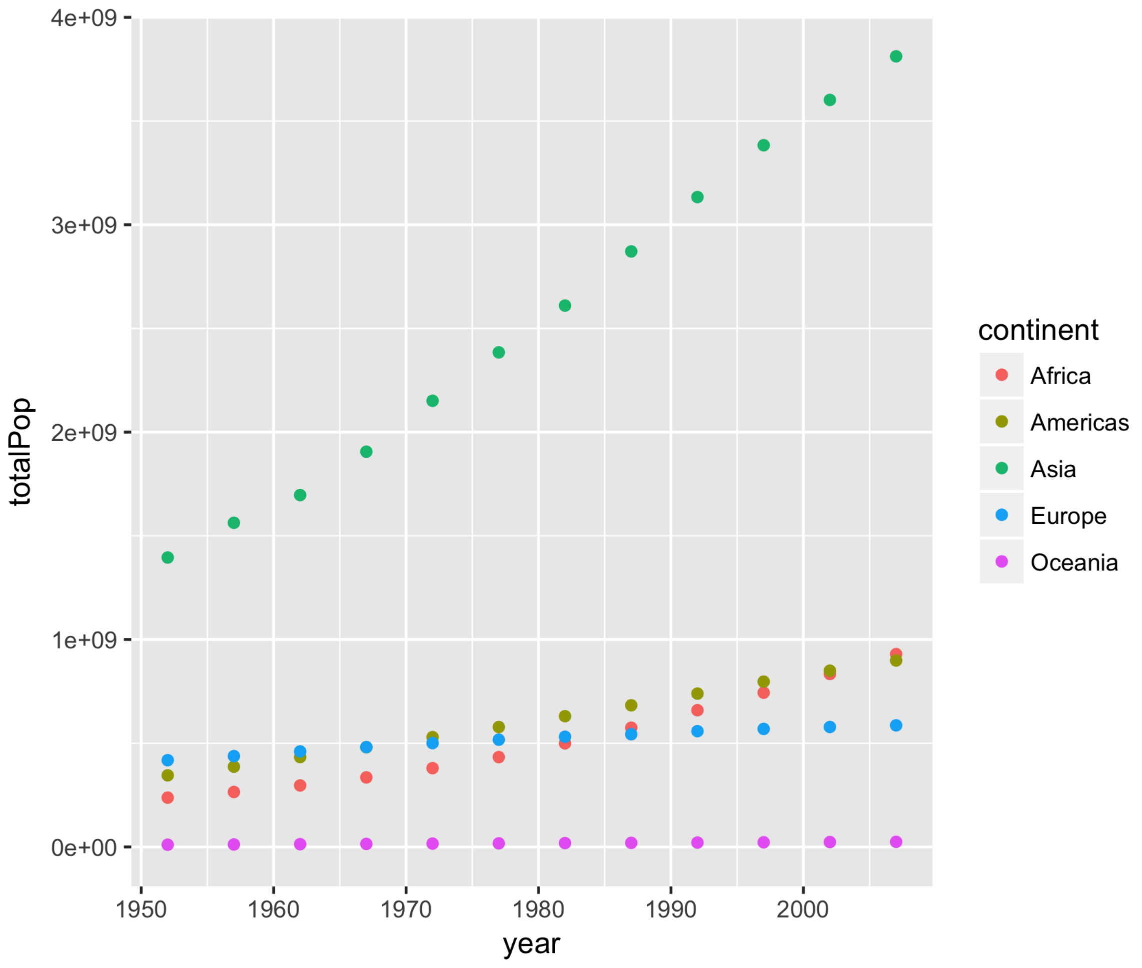
```r
by_year_continent <- gapminder %>%
  group_by(year, continent) %>%
  summarize(totalPop = sum(pop),
            meanLifeExp = mean(lifeExp))

by_year_continent
```

```
# A tibble: 60 x 4
# Groups:   year [?]
    year continent   totalPop meanLifeExp
   <int>     <fct>      <dbl>       <dbl>
 1  1952    Africa  237640501    39.13550
 2  1952  Americas  345152446    53.27984
 3  1952      Asia 1395357351    46.31439
 4  1952    Europe  418120846    64.40850
 5  1952   Oceania   10686006    69.25500
 6  1957    Africa  264837738    41.26635
 7  1957  Americas  386953916    55.96028
 8  1957      Asia 1562780599    49.31854
 9  1957    Europe  437890351    66.70307
10  1957   Oceania   11941976    70.29500
# ... with 50 more rows
```

Visualizing population by year and continent

```
ggplot(by_year_continent, aes(x = year, y = totalPop, color = continent)) +
  geom_point() +
  expand_limits(y = 0)
```



Let's practice!

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