Joining datasets

CASE STUDY: EXPLORATORY DATA ANALYSIS IN R

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datacamp

Processed votes

```
votes_processed
```

```
# A tibble: 353,547 × 6
    rcid session  vote ccode  year            country
   <dbl>   <dbl> <dbl> <int> <dbl>              <chr>
1     46       2     1     2  1947      United States
2     46       2     1    20  1947             Canada
3     46       2     1    40  1947               Cuba
4     46       2     1    41  1947              Haiti
5     46       2     1    42  1947 Dominican Republic
6     46       2     1    70  1947             Mexico
7     46       2     1    90  1947          Guatemala
8     46       2     1    91  1947           Honduras
9     46       2     1    92  1947        El Salvador
10    46       2     1    93  1947          Nicaragua
# ... with 353,537 more rows
```

- Each row is one roll call/country pair

Descriptions dataset

```
descriptions
```

```
# A tibble: 2,589 × 10
    rcid session       date   unres    me    nu    di    hr    co    ec
   <dbl>   <dbl>     <dttm>   <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
1     46       2 1947-09-04 R/2/299     0     0     0     0     0     0
2     47       2 1947-10-05 R/2/355     0     0     0     1     0     0
3     48       2 1947-10-06 R/2/461     0     0     0     0     0     0
4     49       2 1947-10-06 R/2/463     0     0     0     0     0     0
5     50       2 1947-10-06 R/2/465     0     0     0     0     0     0
6     51       2 1947-10-02 R/2/561     0     0     0     0     1     0
7     52       2 1947-11-06 R/2/650     0     0     0     0     1     0
8     53       2 1947-11-06 R/2/651     0     0     0     0     1     0
9     54       2 1947-11-06 R/2/651     0     0     0     0     1     0
10    55       2 1947-11-06 R/2/667     0     0     0     0     1     0
# ... with 2,579 more rows
```

inner_join()

```
votes_processed %>%
  inner_join(descriptions, by = c("rcid", "session"))
```

```
# A tibble: 353,547 × 14
    rcid session  vote ccode  year            country       date   unres    me
   <dbl>   <dbl> <dbl> <int> <dbl>              <chr>     <dttm>   <chr> <dbl>
1     46       2     1     2  1947      United States 1947-09-04 R/2/299     0
2     46       2     1    20  1947             Canada 1947-09-04 R/2/299     0
3     46       2     1    40  1947               Cuba 1947-09-04 R/2/299     0
4     46       2     1    41  1947              Haiti 1947-09-04 R/2/299     0
5     46       2     1    42  1947 Dominican Republic 1947-09-04 R/2/299     0
6     46       2     1    70  1947             Mexico 1947-09-04 R/2/299     0
7     46       2     1    90  1947          Guatemala 1947-09-04 R/2/299     0
8     46       2     1    91  1947           Honduras 1947-09-04 R/2/299     0
9     46       2     1    92  1947        El Salvador 1947-09-04 R/2/299     0
10    46       2     1    93  1947          Nicaragua 1947-09-04 R/2/299     0
# ... with 353,537 more rows, and 5 more variables: nu <dbl>, di <dbl>,
#   hr <dbl>, co <dbl>, ec <dbl>
```

Let's practice!

CASE STUDY: EXPLORATORY DATA ANALYSIS IN R

Tidy data

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United Kingdom

United Kingdom

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United Kingdom

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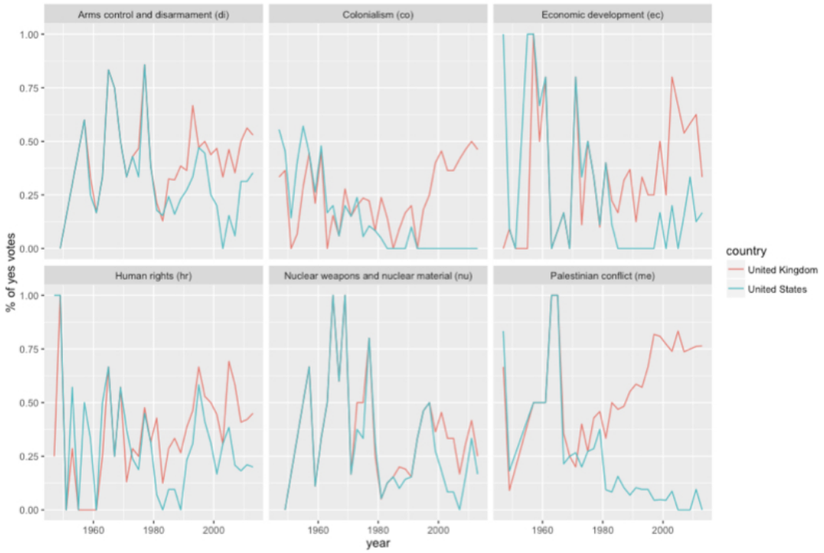
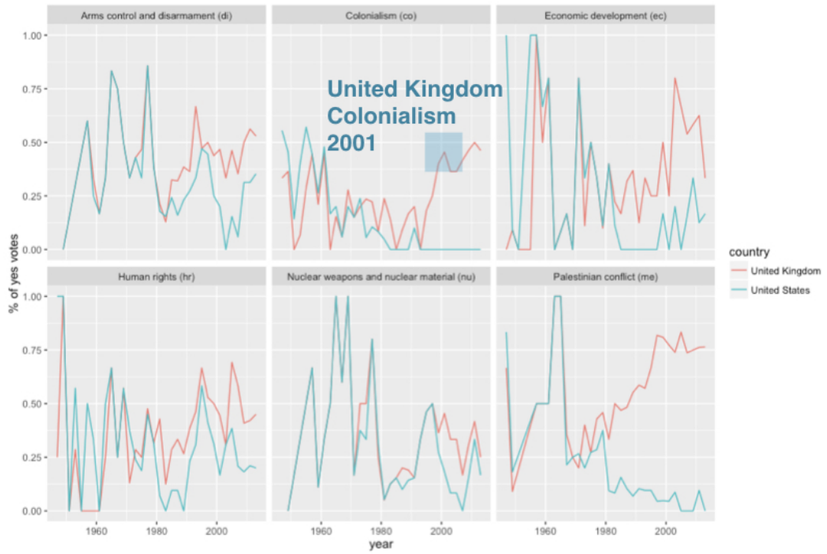
Tidy data: topic is a variable

Tidy data: topic is a variable



Country	Year	Topic
United States	1999	co
United States	2001	co
United States	1999	nu
United States	2001	nu
United Kingdom	1999	co
United Kingdom	2001	co
United Kingdom	1999	nu
United Kingdom	2001	nu

Tidy data: topic is a variable



Country	Year	Topic
United States	1999	co
United States	2001	co
United States	1999	nu
United States	2001	nu
United Kingdom	1999	co
United Kingdom	2001	co
United Kingdom	1999	nu
United Kingdom	2001	nu

Tidy data: topic is a variable

Country	Year	Topic
United States	1999	co
United States	2001	co
United States	1999	nu
United States	2001	nu
United Kingdom	1999	co
United Kingdom	2001	co
United Kingdom	1999	nu
United Kingdom	2001	nu

Topic is spread across six columns

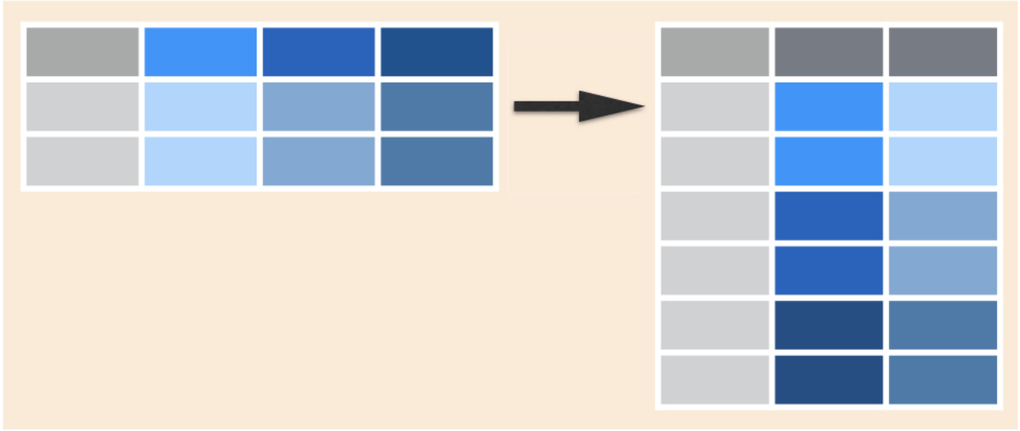
- Each topic has one column, so combine into a single variable: topic

```
votes_joined %>%
  select(rcid, session, vote, country, me:ec)
```

```
# A tibble: 353,547 × 10
    rcid session  vote            country    me    nu    di    hr    co    ec
   <dbl>   <dbl> <dbl>              <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
1     46       2     1      United States     0     0     0     0     0     0
2     46       2     1             Canada     0     0     0     0     0     0
3     46       2     1               Cuba     0     0     0     0     0     0
4     46       2     1              Haiti     0     0     0     0     0     0
5     46       2     1 Dominican Republic     0     0     0     0     0     0
6     46       2     1             Mexico     0     0     0     0     0     0
7     46       2     1          Guatemala     0     0     0     0     0     0
8     46       2     1           Honduras     0     0     0     0     0     0
9     46       2     1        El Salvador     0     0     0     0     0     0
10    46       2     1          Nicaragua     0     0     0     0     0     0
# ... with 353,537 more rows
```

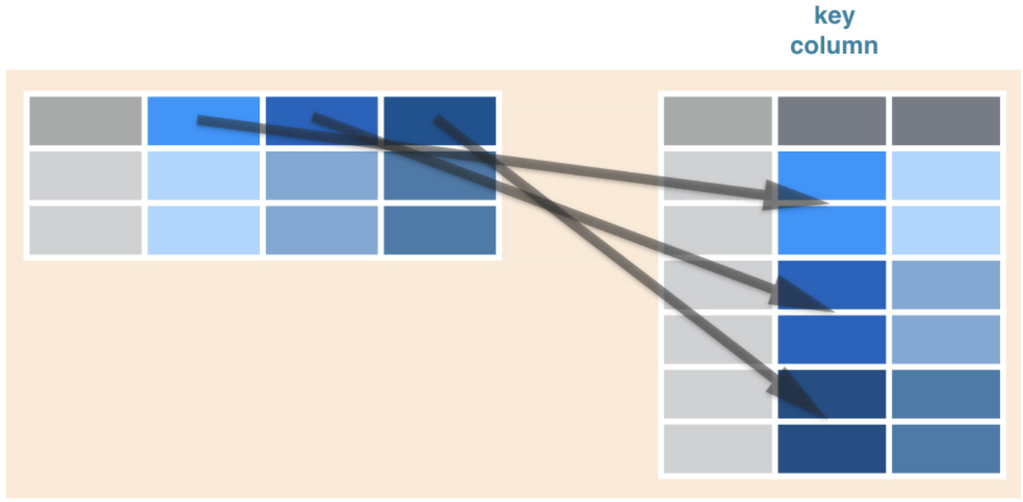
Use gather() to bring columns into two

gather() brings multiple columns into just key and value



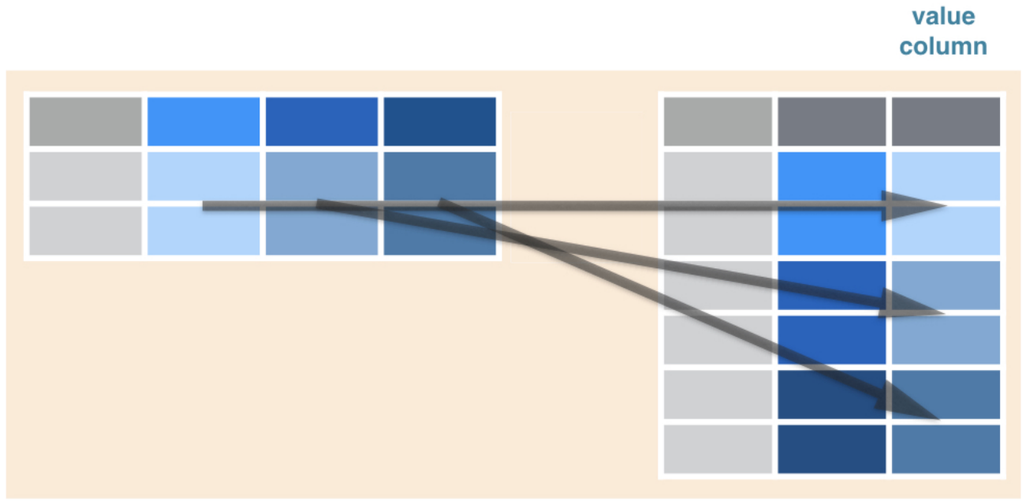
Use gather() to bring columns into two

gather() brings multiple columns into just key and value



Use gather() to bring columns into two

gather() brings multiple columns into just key and value



Use gather() to bring columns into two variables

```
library(tidyr)
votes_joined %>%
  gather(topic, has_topic, me:ec)
```

```
# A tibble: 2,121,282 × 10
    rcid session  vote ccode  year            country       date   unres topic has_topic
   <dbl>   <dbl> <dbl> <int> <dbl>              <chr>     <dttm>   <chr> <chr>     <dbl>
1     46       2     1     2  1947      United States 1947-09-04 R/2/299    me         0
2     46       2     1    20  1947             Canada 1947-09-04 R/2/299    me         0
3     46       2     1    40  1947               Cuba 1947-09-04 R/2/299    me         0
4     46       2     1    41  1947              Haiti 1947-09-04 R/2/299    me         0
5     46       2     1    42  1947 Dominican Republic 1947-09-04 R/2/299    me         0
6     46       2     1    70  1947             Mexico 1947-09-04 R/2/299    me         0
7     46       2     1    90  1947          Guatemala 1947-09-04 R/2/299    me         0
8     46       2     1    91  1947           Honduras 1947-09-04 R/2/299    me         0
9     46       2     1    92  1947        El Salvador 1947-09-04 R/2/299    me         0
10    46       2     1    93  1947          Nicaragua 1947-09-04 R/2/299    me         0
# ... with 2,121,272 more rows
```

- “topic” is now a variable

Use gather() to bring columns into one variable

```
library(tidyr)
votes_joined %>%
  gather(topic, is_topic, me:ec) %>%
  filter(has_topic == 1)
```

```
# A tibble: 350,032 × 10
    rcid session  vote ccode  year            country       date    unres topic has_topic
   <dbl>   <dbl> <dbl> <int> <dbl>              <chr>     <dttm>    <chr> <chr>     <dbl>
1     77       2     1     2  1947      United States 1947-11-06 R/2/1424    me         1
2     77       2     1    20  1947             Canada 1947-11-06 R/2/1424    me         1
3     77       2     3    40  1947               Cuba 1947-11-06 R/2/1424    me         1
4     77       2     1    41  1947              Haiti 1947-11-06 R/2/1424    me         1
5     77       2     1    42  1947 Dominican Republic 1947-11-06 R/2/1424    me         1
6     77       2     2    70  1947             Mexico 1947-11-06 R/2/1424    me         1
7     77       2     1    90  1947          Guatemala 1947-11-06 R/2/1424    me         1
8     77       2     2    91  1947           Honduras 1947-11-06 R/2/1424    me         1
9     77       2     2    92  1947        El Salvador 1947-11-06 R/2/1424    me         1
10    77       2     1    93  1947          Nicaragua 1947-11-06 R/2/1424    me         1
# ... with 350,022 more rows
```

Let's practice!

CASE STUDY: EXPLORATORY DATA ANALYSIS IN R

Tidy modeling by topic and country

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datacamp

Detecting a trend by topic

Tidy modeling by country

```
library(tidyr)
library(purrr)
library(broom)
country_coefficients <- by_year_country %>%
  nest(-country) %>%
  mutate(model = map(data, ~ lm(percent_yes ~ year, data = .)),
         tidied = map(model, tidy)) %>%
  unnest(tidied)
country_coefficients
```

```
# A tibble: 399 × 6
       country        term      estimate    std.error statistic      p.value
         <chr>       <chr>         <dbl>        <dbl>     <dbl>        <dbl>
1  Afghanistan (Intercept) -11.063084650 1.4705189228 -7.523252 1.444892e-08
2  Afghanistan        year   0.006009299 0.0007426499  8.091698 3.064797e-09
3    Argentina (Intercept)  -9.464512565 2.1008982371 -4.504984 8.322481e-05
4    Argentina        year   0.005148829 0.0010610076  4.852773 3.047078e-05
5    Australia (Intercept)  -4.545492536 2.1479916283 -2.116159 4.220387e-02
# ... with 394 more rows
```

Tidy modeling by country and topic

```
library(purrr)
library(broom)
country_topic_coefficients <- by_year_country_topic %>%
  nest(-country, -topic) %>%
  mutate(model = map(data, ~ lm(percent_yes ~ year, data = .)),
         tidied = map(model, tidy)) %>%
  unnest(tidied)
```

```
# A tibble: 2,383 × 7
       country                      topic        term      estimate    std.error
         <chr>                      <chr>       <chr>         <dbl>        <dbl>
1  Afghanistan                Colonialism (Intercept)  -9.196506325 1.9573746777
2  Afghanistan                Colonialism        year   0.005106200 0.0009885245
3  Afghanistan         Economic development (Intercept) -11.476390441 3.6191205187
4  Afghanistan         Economic development        year   0.006239157 0.0018265400
5  Afghanistan               Human rights (Intercept)  -7.265379964 4.3740212201
6  Afghanistan               Human rights        year   0.004075877 0.0022089932
7  Afghanistan         Palestinian conflict (Intercept) -13.313363338 3.5707983095
8  Afghanistan         Palestinian conflict        year   0.007167675 0.0018002649
9  Afghanistan Arms control and disarmament (Intercept) -13.759624843 4.1328667932
10 Afghanistan Arms control and disarmament        year   0.007369733 0.0020837753
# ... with 2,373 more rows, and 2 more variables: statistic <dbl>, p.value <dbl>
```

Tidy modeling by country and topic

```
library(purrr)
library(broom)
country_topic_coefficients <- by_year_country_topic %>%
  nest(-country, -topic) %>%
  mutate(model = map(data, ~ lm(percent_yes ~ year, data = .)),
         tidied = map(model, tidy)) %>%
  unnest(tidied)
```

```
# A tibble: 2,383 × 7
       country                      topic        term      estimate    std.error
         <chr>                      <chr>       <chr>         <dbl>        <dbl>
1  Afghanistan                Colonialism (Intercept)  -9.196506325 1.9573746777
2  Afghanistan                Colonialism        year   0.005106200 0.0009885245 <-
3  Afghanistan         Economic development (Intercept) -11.476390441 3.6191205187
4  Afghanistan         Economic development        year   0.006239157 0.0018265400 <-
5  Afghanistan               Human rights (Intercept)  -7.265379964 4.3740212201
6  Afghanistan               Human rights        year   0.004075877 0.0022089932 <-
7  Afghanistan         Palestinian conflict (Intercept) -13.313363338 3.5707983095
8  Afghanistan         Palestinian conflict        year   0.007167675 0.0018002649 <-
9  Afghanistan Arms control and disarmament (Intercept) -13.759624843 4.1328667932
10 Afghanistan Arms control and disarmament        year   0.007369733 0.0020837753 <-
# ... with 2,373 more rows, and 2 more variables: statistic <dbl>, p.value <dbl>
```

Let's practice!

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Conclusion

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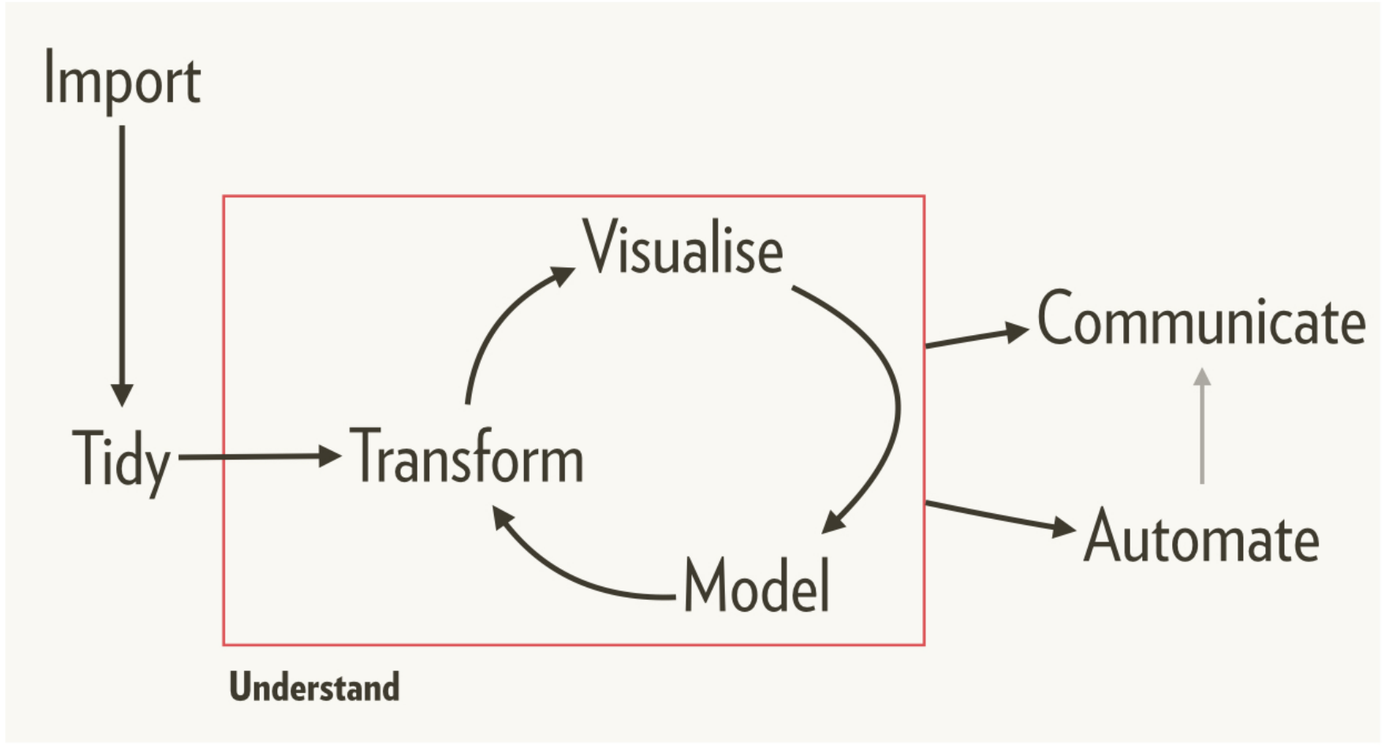
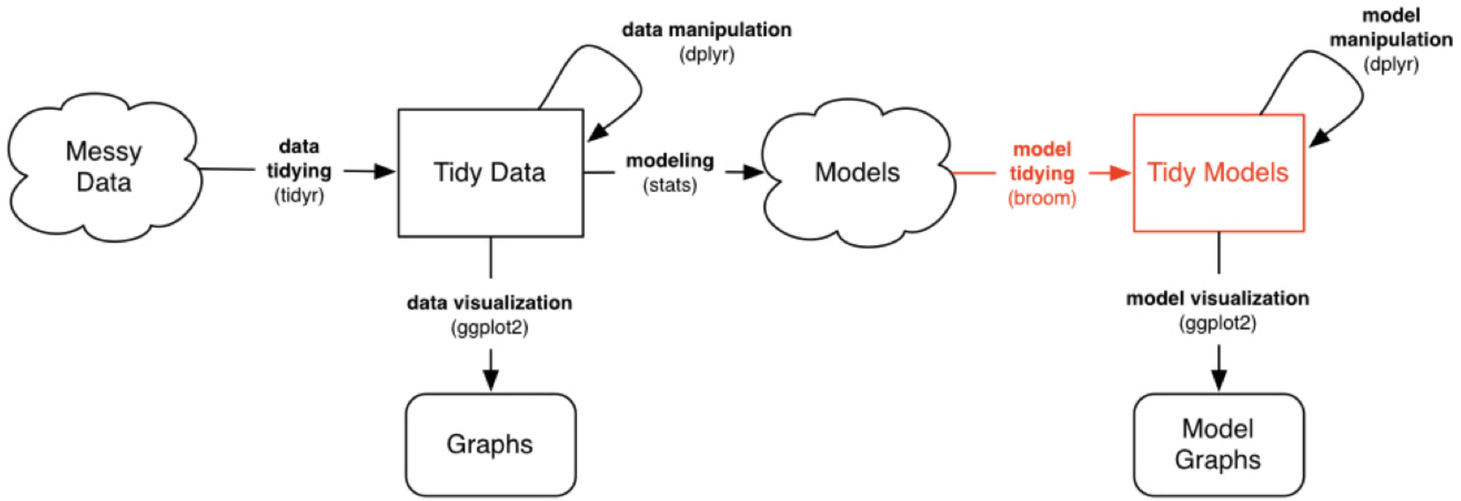

Import
Tidy
Transform
Visualise
Model
Understand
Communicate
Automate


Messy Data
data tidying (tidyr)
Tidy Data
data manipulation (dplyr)
modeling (stats)
Models
model tidying (broom)
Tidy Models
model manipulation (dplyr)
data visualization (ggplot2)
Graphs
model visualization (ggplot2)
Model Graphs

Let's practice!

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