Regular Expressions

Data Wrangling, Session 5

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Code Horizons

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A brief introduction to regular expressions

Load the packages, as always

```r
library(here)      # manage file paths
library(socviz)    # data and some useful functions
```

```r
library(tidyverse) # your friend and mine
library(gapminder) # gapminder data
library(stringr)
```

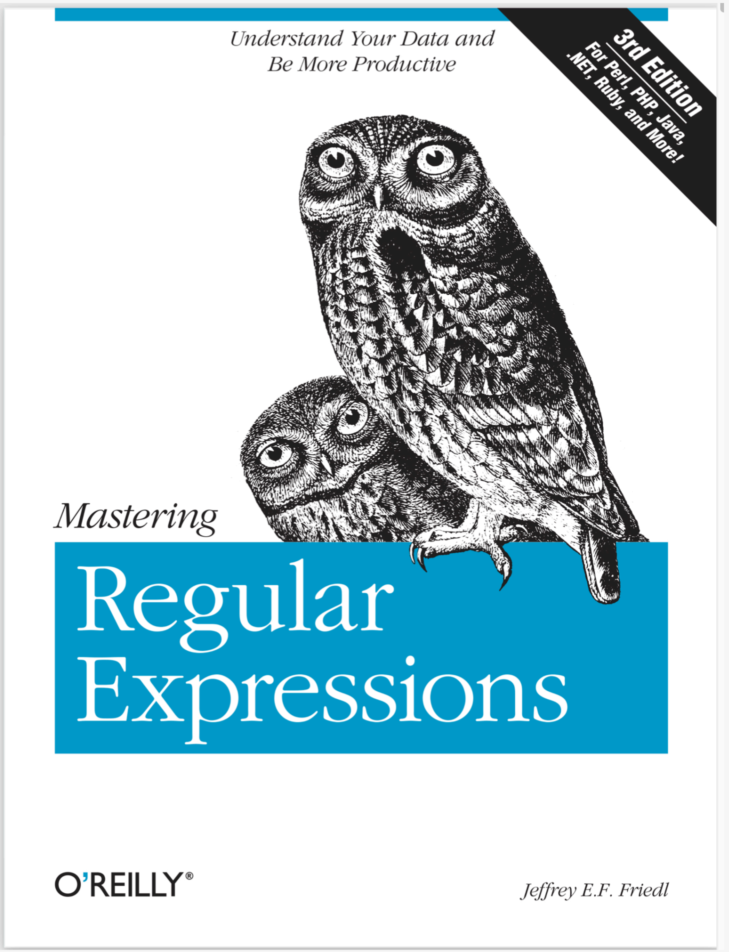
Regular Expressions

Or, waiter, there appears to be a language inside my language

stringr is your gateway to regexps

```r
library(stringr) # It's loaded by default with library(tidyverse)
```

regexps are their own whole world



This book is a thing of beauty.

Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

Searching for patterns

Here I’ll follow the exposition in Wickham & Grolemund (2017).

```
x ← c("apple", "banana", "pear")

str_view(x, "an", html=FALSE)
```

```
[2] │ b<an><an>a
```

Searching for patterns

Escaping

Hang on, I see a further problem

We use strings to represent regular expressions. \ is also used as an escape symbol in strings. So to create the regular expression \. we need the string \\.

```
# To create the regular expression, we need \\
dot <- "\\."

# But the expression itself only contains one:
writeLines(dot)
```

```
\.
```

```
# And this tells R to look for an explicit .
str_view(c("abc", "a.c", "bef"), "a\\.c")
```

```
[2] │ <a.c>
```

But … how do you match a literal \?

```
x <- "a\\b"
writeLines(x)
```

```
a\b
```

```
#> a\b

str_view(x, "\\\\") # you need four!
```

```
[1] │ a<\>b
```

But … how do you match a literal \?

This is the price we pay for having to express searches for patterns using a language containing these same characters, which we may also want to search for.

I *promise* this will pay off

Matching start and end

Use ^ to match the start of a string.

```r
x <- c("apple", "banana", "pear")
str_view(x, "^a")
```

```
[1] │ <a>pple
```

Matching start and end

Use ^ to match the start of a string.

```r
x ← c("apple", "banana", "pear")
str_view(x, "^a")
```

```
[1] │ <a>pple
```

Use $ to match the end of a string.

```r
str_view(x, "a$")
```

```
[2] │ banan<a>
```

Matching start and end

To force a regular expression to only match a complete string, anchor it with both ^ and $

```r
x ← c("apple pie", "apple", "apple cake")
str_view(x, "apple")
```

```
[1] │ <apple> pie
[2] │ <apple>
[3] │ <apple> cake
```

```r
str_view(x, "^apple$")
```

```
[2] │ <apple>
```

Matching character classes

\d matches any digit.

\s matches any whitespace (e.g. space, tab, newline).

abc matches a, b, or c.

^abc matches anything except a, b, or c.

Matching the *special* characters

Look for a literal character that normally has special meaning in a regex:

```
str_view(c("abc", "a.c", "a*c", "a c"), "a[.]c")
```

```
[2] │ <a.c>
```

```
str_view(c("abc", "a.c", "a*c", "a c"), ".[*]c")
```

```
[3] │ <a*c>
```

This works for most (but not all) regex metacharacters: `$ . | ? * + ( ) [ {`. Unfortunately, a few characters have special meaning even inside a character class and must be handled with backslash escapes. These are `] \ ^` and `-`

Alternation

Use parentheses to make the precedence of the ‘or’ operator | clear:

```r
str_view(c("groy", "grey", "griy", "gray"), "gr(e|a)y")
```

```
[2] │ <grey>
[4] │ <gray>
```

Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```r
x <- "1888 is the longest year in Roman numerals: MDCCCLXXXVIII"
str_view(x, "CC?")
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CC><C>LXXXVIII
```

Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```r
str_view(x, "CC+")
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```

Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```r
x <- "1888 is the longest year in Roman numerals: MDCCCLXXXVIII"
str_view(x, 'C[LX]+')
```

```
[1] │ 1888 is the longest year in Roman numerals: MDCC<CLXXX>VIII
```

Exact numbers of repetitions

{n} is exactly n

{n,} is n or more

{,m} is at most m

{n,m} is between n and m

```r
str_view(x, "C{2}")
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CC>CLXXXVIII
```

Exact numbers of repetitions

{n} is exactly n

{n,} is n or more

{,m} is at most m

{n,m} is between n and m

```r
str_view(x, "C{2,}")
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```

Exact numbers of repetitions

{n} is exactly n

{n,} is n or more

{,m} is at most m

{n,m} is between n and m

```r
str_view(x, "C{2,3}")
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```

Exact numbers of repetitions

- {n} is exactly n
- {n,} is n or more
- {,m} is at most m
- {n,m} is between n and m

By default regexps use *greedy* matches. You can make them match the *shortest* string possible by putting a ? after them. **This is often very useful!**

```
str_view(x, 'C{2,3}?')
```

```
[1] │ 1888 is the longest year in Roman numerals: MD<CC>CLXXXVIII
```

Exact numbers of repetitions

- {n} is exactly n
- {n,} is n or more
- {,m} is at most m
- {n,m} is between n and m

By default these are *greedy* matches. You can make them “lazy”, matching the shortest string possible by putting a ? after them. **This is often very useful!**

```
str_view(x, 'C[LX]+?')
```

```
[1] │ 1888 is the longest year in Roman numerals: MDCC<CL>XXXVIII
```

And finally … backreferences

```r
fruit # built into stringr
```

```
 [1] "apple"             "apricot"           "avocado"
 [4] "banana"            "bell pepper"       "bilberry"
 [7] "blackberry"        "blackcurrant"      "blood orange"
[10] "blueberry"         "boysenberry"       "breadfruit"
[13] "canary melon"      "cantaloupe"        "cherimoya"
[16] "cherry"            "chili pepper"      "clementine"
[19] "cloudberry"        "coconut"           "cranberry"
[22] "cucumber"          "currant"           "damson"
[25] "date"              "dragonfruit"       "durian"
[28] "eggplant"          "elderberry"        "feijoa"
[31] "fig"               "goji berry"        "gooseberry"
[34] "grape"             "grapefruit"        "guava"
[37] "honeydew"          "huckleberry"       "jackfruit"
[40] "jambul"            "jujube"            "kiwi fruit"
[43] "kumquat"           "lemon"             "lime"
[46] "loquat"            "lychee"            "mandarine"
[49] "mango"             "mulberry"          "nectarine"
[52] "nut"               "olive"             "orange"
[55] "pamelo"            "papaya"            "passionfruit"
```

Grouping and backreferences

Find all fruits that have a repeated pair of letters:

```
str_view(fruit, "(..)\\1", match = TRUE)
```

```
 [4] │ b<anan>a
[20] │ <coco>nut
[22] │ <cucu>mber
[41] │ <juju>be
[56] │ <papa>ya
[73] │ s<alal> berry
```

Grouping and backreferences

Backreferences and grouping will be very useful for string *replacements*.

OK that was a lot

Learning and testing regexps

Practice with a tester like https://regexr.com or https://regex101.com

Or an app like Patterns

The regex engine or “flavor” used by `stringr` is Perl- or PCRE2-like.

Regexps in practice

Example: Politics and Placenames

```r
library(ukelection2019)
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019
```

```
# A tibble: 3,320 × 13
   cid     constituency electorate party_name
candidate votes vote_share_percent
   <chr>   <chr>             <int> <chr>      <chr>
<int>              <dbl>
 1 W07000… Aberavon          50747 Labour     Stephen
… 17008               53.8
 2 W07000… Aberavon          50747 Conservat…
Charlott… 6518                20.6
 3 W07000… Aberavon          50747 The Brexi… Glenda
D…  3108                9.8
 4 W07000… Aberavon          50747 Plaid Cym… Nigel
Hu…  2711                8.6
 5 W07000… Aberavon          50747 Liberal D… Sheila
K…  1072                3.4
 6 W07000… Aberavon          50747 Independe… Captain
…   731                2.3
 7 W07000… Aberavon          50747 Green      Giorgia
…   450                1.4
 8 W07000… Aberconwy         44699 Conservat… Robin
Mi… 14687               46.1
 9 W07000… Aberconwy         44699 Labour     Emily
Ow… 12653               39.7
10 W07000… Aberconwy         44699 Plaid Cym… Lisa
Goo…  2704                8.5
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency)
```

```
# A tibble: 3,320 × 13
# Groups:   constituency [650]
   cid     constituency electorate party_name
candidate votes vote_share_percent
   <chr>   <chr>             <int> <chr>      <chr>
<int>              <dbl>
 1 W07000… Aberavon          50747 Labour     Stephen
… 17008               53.8
 2 W07000… Aberavon          50747 Conservat…
Charlott…  6518               20.6
 3 W07000… Aberavon          50747 The Brexi… Glenda
D…  3108                9.8
 4 W07000… Aberavon          50747 Plaid Cym… Nigel
Hu…  2711                8.6
 5 W07000… Aberavon          50747 Liberal D… Sheila
K…  1072                3.4
 6 W07000… Aberavon          50747 Independe… Captain
…   731                2.3
 7 W07000… Aberavon          50747 Green      Giorgia
…   450                1.4
 8 W07000… Aberconwy         44699 Conservat… Robin
Mi… 14687               46.1
 9 W07000… Aberconwy         44699 Labour     Emily
Ow… 12653               39.7
10 W07000… Aberconwy         44699 Plaid Cym… Lisa
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency) |>
  slice_max(votes)
```

```
# A tibble: 650 × 13
# Groups:   constituency [650]
   cid     constituency electorate party_name
candidate votes vote_share_percent
   <chr>   <chr>             <int> <chr>      <chr>
<int>              <dbl>
 1 W07000… Aberavon          50747 Labour     Stephen
… 17008               53.8
 2 W07000… Aberconwy         44699 Conservat… Robin
Mi… 14687               46.1
 3 S14000… Aberdeen No…      62489 Scottish … Kirsty
B… 20205               54
 4 S14000… Aberdeen So…      65719 Scottish … Stephen
… 20388               44.7
 5 S14000… Aberdeenshi…      72640 Conservat… Andrew
B… 22752               42.7
 6 S14000… Airdrie & S…      64008 Scottish … Neil
Gray 17929               45.1
 7 E14000… Aldershot         72617 Conservat… Leo
Doch… 27980               58.4
 8 E14000… Aldridge-Br…      60138 Conservat… Wendy
Mo… 27850               70.8
 9 E14000… Altrincham …      73096 Conservat… Graham
B… 26311               48
10 W07000… Alyn & Dees…      62783 Labour     Mark
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency) |>
  slice_max(votes) |>
  ungroup()
```

```
# A tibble: 650 × 13
   cid     constituency electorate party_name
candidate votes vote_share_percent
   <chr>   <chr>             <int> <chr>      <chr>
<int>              <dbl>
 1 W07000… Aberavon          50747 Labour     Stephen
… 17008               53.8
 2 W07000… Aberconwy         44699 Conservat… Robin
Mi… 14687               46.1
 3 S14000… Aberdeen No…      62489 Scottish … Kirsty
B… 20205               54
 4 S14000… Aberdeen So…      65719 Scottish … Stephen
… 20388               44.7
 5 S14000… Aberdeenshi…      72640 Conservat… Andrew
B… 22752                42.7
 6 S14000… Airdrie & S…      64008 Scottish … Neil
Gray 17929               45.1
 7 E14000… Aldershot         72617 Conservat… Leo
Doch… 27980               58.4
 8 E14000… Aldridge-Br…      60138 Conservat… Wendy
Mo… 27850               70.8
 9 E14000… Altrincham …      73096 Conservat… Graham
B… 26311               48
10 W07000… Alyn & Dees…      62783 Labour     Mark
Tami 18271               42.5
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency) |>
  slice_max(votes) |>
  ungroup() |>
  select(constituency, party_name)
```

```
# A tibble: 650 × 2
   constituency                     party_name
   <chr>                            <chr>
 1 Aberavon                         Labour
 2 Aberconwy                        Conservative
 3 Aberdeen North                   Scottish National
Party
 4 Aberdeen South                   Scottish National
Party
 5 Aberdeenshire West & Kincardine Conservative
 6 Airdrie & Shotts                 Scottish National
Party
 7 Aldershot                        Conservative
 8 Aldridge-Brownhills              Conservative
 9 Altrincham & Sale West           Conservative
10 Alyn & Deeside                   Labour
# ℹ 640 more rows
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency) |>
  slice_max(votes) |>
  ungroup() |>
  select(constituency, party_name) |>
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )"))
```

```
# A tibble: 650 × 14
   constituency party_name shire field dale  pool
ton   wood  saint port  ford
   <chr>        <chr>      <lgl> <lgl> <lgl> <lgl>
<lgl> <lgl> <lgl> <lgl> <lgl>
 1 Aberavon     Labour     FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 2 Aberconwy    Conservat… FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 3 Aberdeen No… Scottish … FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 4 Aberdeen So… Scottish … FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 5 Aberdeenshi… Conservat… TRUE  FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 6 Airdrie & S… Scottish … FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 7 Aldershot    Conservat… FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 8 Aldridge-Br… Conservat… FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
 9 Altrincham … Conservat… FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
10 Alyn & Dees… Labour     FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE FALSE
```

Example: Politics and Placenames

```r
library(ukelection2019)

ukvote2019 |>
  group_by(constituency) |>
  slice_max(votes) |>
  ungroup() |>
  select(constituency, party_name) |>
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )")) |>
  pivot_longer(shire:ley, names_to = "toponym")
```

```
# A tibble: 7,800 × 4
   constituency party_name toponym value
   <chr>        <chr>      <chr>   <lgl>
 1 Aberavon     Labour     shire   FALSE
 2 Aberavon     Labour     field   FALSE
 3 Aberavon     Labour     dale    FALSE
 4 Aberavon     Labour     pool    FALSE
 5 Aberavon     Labour     ton     FALSE
 6 Aberavon     Labour     wood    FALSE
 7 Aberavon     Labour     saint   FALSE
 8 Aberavon     Labour     port    FALSE
 9 Aberavon     Labour     ford    FALSE
10 Aberavon     Labour     by      FALSE
# ℹ 7,790 more rows
```

Example: Politics and Placenames

```
place_tab ← ukvote2019 ▷
  group_by(constituency) ▷
  slice_max(votes) ▷
  ungroup() ▷
  select(constituency, party_name) ▷
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )")) ▷
  pivot_longer(shire:ley, names_to = "toponym")
```

Example: Politics and Placenames

```r
place_tab
```

```
# A tibble: 7,800 × 4
   constituency party_name toponym value
   <chr>        <chr>      <chr>   <lgl>
 1 Aberavon     Labour     shire   FALSE
 2 Aberavon     Labour     field   FALSE
 3 Aberavon     Labour     dale    FALSE
 4 Aberavon     Labour     pool    FALSE
 5 Aberavon     Labour     ton     FALSE
 6 Aberavon     Labour     wood    FALSE
 7 Aberavon     Labour     saint   FALSE
 8 Aberavon     Labour     port    FALSE
 9 Aberavon     Labour     ford    FALSE
10 Aberavon     Labour     by      FALSE
# ℹ 7,790 more rows
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym)
```

```
# A tibble: 7,800 × 4
# Groups:   party_name, toponym [120]
   constituency party_name toponym value
   <chr>        <chr>      <chr>   <lgl>
 1 Aberavon     Labour     shire   FALSE
 2 Aberavon     Labour     field   FALSE
 3 Aberavon     Labour     dale    FALSE
 4 Aberavon     Labour     pool    FALSE
 5 Aberavon     Labour     ton     FALSE
 6 Aberavon     Labour     wood    FALSE
 7 Aberavon     Labour     saint   FALSE
 8 Aberavon     Labour     port    FALSE
 9 Aberavon     Labour     ford    FALSE
10 Aberavon     Labour     by      FALSE
# ℹ 7,790 more rows
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym) |>
  filter(party_name %in% c("Conservative", "Labour"))
```

```
# A tibble: 6,816 × 4
# Groups:   party_name, toponym [24]
   constituency party_name toponym value
   <chr>        <chr>      <chr>   <lgl>
 1 Aberavon     Labour     shire   FALSE
 2 Aberavon     Labour     field   FALSE
 3 Aberavon     Labour     dale    FALSE
 4 Aberavon     Labour     pool    FALSE
 5 Aberavon     Labour     ton     FALSE
 6 Aberavon     Labour     wood    FALSE
 7 Aberavon     Labour     saint   FALSE
 8 Aberavon     Labour     port    FALSE
 9 Aberavon     Labour     ford    FALSE
10 Aberavon     Labour     by      FALSE
# ℹ 6,806 more rows
```

Example: Politics and Placenames

```
place_tab ▷
  group_by(party_name, toponym) ▷
  filter(party_name %in% c("Conservative", "Labour")) ▷
  group_by(toponym, party_name)
```

```
# A tibble: 6,816 × 4
# Groups:   toponym, party_name [24]
   constituency party_name toponym value
   <chr>        <chr>      <chr>   <lgl>
 1 Aberavon     Labour     shire   FALSE
 2 Aberavon     Labour     field   FALSE
 3 Aberavon     Labour     dale    FALSE
 4 Aberavon     Labour     pool    FALSE
 5 Aberavon     Labour     ton     FALSE
 6 Aberavon     Labour     wood    FALSE
 7 Aberavon     Labour     saint   FALSE
 8 Aberavon     Labour     port    FALSE
 9 Aberavon     Labour     ford    FALSE
10 Aberavon     Labour     by      FALSE
# ℹ 6,806 more rows
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym) |>
  filter(party_name %in% c("Conservative", "Labour")) |>
  group_by(toponym, party_name) |>
  summarize(freq = sum(value))
```

```
# A tibble: 24 × 3
# Groups:   toponym [12]
   toponym party_name    freq
   <chr>   <chr>        <int>
 1 boro    Conservative     7
 2 boro    Labour           1
 3 by      Conservative     6
 4 by      Labour           2
 5 dale    Conservative     3
 6 dale    Labour           1
 7 field   Conservative    10
 8 field   Labour          10
 9 ford    Conservative    17
10 ford    Labour          12
# ℹ 14 more rows
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym) |>
  filter(party_name %in% c("Conservative", "Labour")) |>
  group_by(toponym, party_name) |>
  summarize(freq = sum(value)) |>
  mutate(pct = freq/sum(freq))
```

```
# A tibble: 24 × 4
# Groups:   toponym [12]
   toponym party_name    freq   pct
   <chr>   <chr>        <int> <dbl>
 1 boro    Conservative     7 0.875
 2 boro    Labour           1 0.125
 3 by      Conservative     6 0.75
 4 by      Labour           2 0.25
 5 dale    Conservative     3 0.75
 6 dale    Labour           1 0.25
 7 field   Conservative    10 0.5
 8 field   Labour          10 0.5
 9 ford    Conservative    17 0.586
10 ford    Labour          12 0.414
# ℹ 14 more rows
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym) |>
  filter(party_name %in% c("Conservative", "Labour")) |>
  group_by(toponym, party_name) |>
  summarize(freq = sum(value)) |>
  mutate(pct = freq/sum(freq)) |>
  filter(party_name == "Conservative")
```

```
# A tibble: 12 × 4
# Groups:   toponym [12]
   toponym party_name    freq   pct
   <chr>   <chr>        <int> <dbl>
 1 boro    Conservative     7 0.875
 2 by      Conservative     6 0.75
 3 dale    Conservative     3 0.75
 4 field   Conservative    10 0.5
 5 ford    Conservative    17 0.586
 6 ley     Conservative    26 0.722
 7 pool    Conservative     2 0.286
 8 port    Conservative     3 0.333
 9 saint   Conservative     3 0.5
10 shire   Conservative    37 0.974
11 ton     Conservative    37 0.507
12 wood    Conservative     7 0.636
```

Example: Politics and Placenames

```r
place_tab |>
  group_by(party_name, toponym) |>
  filter(party_name %in% c("Conservative", "Labour")) |>
  group_by(toponym, party_name) |>
  summarize(freq = sum(value)) |>
  mutate(pct = freq/sum(freq)) |>
  filter(party_name == "Conservative") |>
  arrange(desc(pct))
```

```
# A tibble: 12 × 4
# Groups:   toponym [12]
   toponym party_name    freq   pct
   <chr>   <chr>        <int> <dbl>
 1 shire   Conservative    37 0.974
 2 boro    Conservative     7 0.875
 3 by      Conservative     6 0.75
 4 dale    Conservative     3 0.75
 5 ley     Conservative    26 0.722
 6 wood    Conservative     7 0.636
 7 ford    Conservative    17 0.586
 8 ton     Conservative    37 0.507
 9 field   Conservative    10 0.5
10 saint   Conservative     3 0.5
11 port    Conservative     3 0.333
12 pool    Conservative     2 0.286
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