

Working with text using stringr

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Figure 1: artwork by @allisonhorst

A few basics

What is a string?

- datatype we use to represent text
- use " "

Examples of strings:

- "Hello world"
- "5678"
- "blah blah blah"

**** NOT a string:****

- 5678

Using stringr

`stringr` is a package containing a bunch of functions that help us work with strings. We'll discuss how to detect, remove, extract, and count words/characters/phrases from a string. We'll also talk about how to slice a string to get only the parts (aka the substrings) of it that you want.

[stringr cheat sheet](#)

`stringr` is contained within the `tidyverse` package.

```
library(tidyverse)
```

I'm registering for classes this Spring and am trying to decide what to take. Let's look at the course catalog!

Read in the courses data.

```
courses <- read_csv("data/Fall23courses.csv")
```



Figure 2: artwork by @allisonhorst

str_detect

inputs: - string - pattern

output: - TRUE/FALSE

little example:

```
str_detect("Welcome to data science, look at this cool data", "data")
```

```
[1] TRUE
```

```
str_detect("Welcome to data science, look at this cool data", "pineapple")
```

```
[1] FALSE
```

I only want to take classes in Warner!

```
courses %>%
  filter(str_detect(location, "WNS"))
```

```
# A tibble: 45 x 9
  titles      distros department time location professor description courseNum
  <chr>      <chr>    <chr>    <chr> <chr>    <chr>    <chr>    <chr>
1 Gothic and~ AMR HI~ Program i~ 2:15~ "Warner~ Michael ~ "\nThis co~ AMST0225~
2 Education ~ AMR SOC Program i~ 2:15~ "Warner~ Melissa ~ "\nWhat ar~ BLST0115~
3 Economic S~ DED      Economics 2:15~ "Warner~ Amanda G~ "\nAn intr~ ECON0111~
4 Introducto~ SOC      Economics 9:45~ "Warner~ Raphaell~ "\nAn intr~ ECON0150~
5 Introducto~ SOC      Economics 11:1~ "Warner~ Raphaell~ "\nAn intr~ ECON0150~
6 Introducto~ SOC      Economics 8:15~ "Warner~ Will Pyle "\nAn intr~ ECON0155~
7 Introducto~ SOC      Economics 9:45~ "Warner~ Will Pyle "\nAn intr~ ECON0155~
8 Microecono~ <NA>      Economics 12:4~ "Warner~ <NA>      "\nMicroec~ ECON0255~
9 Microecono~ <NA>      Economics 2:15~ "Warner~ <NA>      "\nMicroec~ ECON0255~
10 Federal Re~ AMR DED Economics 1:30~ "Warner~ Erin Wol~ "\nIn this~ ECON0360~
# i 35 more rows
# i 1 more variable: meet <chr>
```

Suppose I don't want any classes on Friday. Let's use `str_detect` to find our options.

```
notFriday <- courses %>%
  filter(!str_detect(meet, "Friday"))
```

Perhaps I'm interested in immigration.

The `regex` function is used to write regular expressions in R. Regular expressions are helpful if you want to search for a pattern rather than a specific word or phrase.

For now, we will only use `regex` to ignore capitalization.

If you're interested in using regular expressions at some point, this [regex cheat sheet](#) will be super helpful.

```
immigrationclasses <- courses %>%
  filter(str_detect(description, regex("immigration", ignore_case=TRUE)))

immigrationclasses
```

```
# A tibble: 10 x 9
  titles      distros department time location professor description courseNum
  <chr>      <chr>    <chr>    <chr> <chr>    <chr>    <chr>    <chr>
```

```

1 Immigrant ~ AMR HIS Program i~ 11:1~ "Axinn ~ Rachael ~ "\nIn this~ AMST0175~
2 Introducti~ EUR LN~ French      2:15~ "Le Cha~ William ~ "\nIn this~ FREN0230~
3 Introducti~ CW EUR~ French      2:15~ "Le Cha~ William ~ "\nIn this~ FREN0230~
4 The United~ AMR HIS History    9:45~ "Axinn ~ Joyce Mao "\nThis co~ HIST0206~
5 Introducti~ CMP      Internati~ 12:4~ "Twilig~ Amit Pra~ "\nThis is~ IGST0101~
6 An Introdu~ EUR LN~ Italian     9:45~ "Wright~ Thomas V~ "\nIntende~ ITAL0251~
7 An Introdu~ EUR LN~ Italian     11:1~ "75 Sha~ Sandra C~ "\nIntende~ ITAL0251~
8 Globalizat~ SOC      Political~ 2:15~ "Librar~ Orion Le~ "\nHow doe~ PSCI0314~
9 City Polit~ <NA>      Political~ 11:1~ "LaForc~ Bert Joh~ "\nCities ~ PSCI0465~
10 Christiani~ AMR HI~ Religion    7:30~ "Librar~ James Ca~ "\nReligio~ RELI0398~
# i 1 more variable: meet <chr>

```

str_extract and str_remove

str_extract inputs: - string - pattern **str_extract** output: - the extracted pattern, if it appears in the the string

str_remove inputs: - string - pattern **str_remove** output: - the string without the pattern, if it appears in the string

little example:

```
str_extract("Welcome to data science, look at this cool data", "data")
```

```
[1] "data"
```

```
str_extract_all("Welcome to data science, look at this cool data", "data")
```

```
[[1]]
```

```
[1] "data" "data"
```

```
str_remove("Welcome to data science, look at this cool data", "data")
```

```
[1] "Welcome to science, look at this cool data"
```

```
str_remove_all("Welcome to data science, look at this cool data", "data")
```

```
[1] "Welcome to science, look at this cool "
```

CW is part of the distribution requirement column. I want CW to be its own column.

```
courses %>%
  mutate(CW = str_extract(distros, "CW")) %>%
  mutate(distros = str_remove(distros, "CW"))
```

```
# A tibble: 586 x 10
  titles      distros department time location professor description courseNum
  <chr>      <chr>    <chr>    <chr> <chr>    <chr>    <chr>    <chr>
1 Introducti~ AMR CMP Program i~ 12:4~ "Axinn ~ Roberto ~ "\nIn this~ AMST0101~
2 Immigrant ~ AMR HIS Program i~ 11:1~ "Axinn ~ Rachael ~ "\nIn this~ AMST0175~
3 American L~ AMR LIT Program i~ 11:1~ "Axinn ~ Ellery F~ "\nA study~ AMST0209~
4 Introducti~ AMR HI~ Program i~ 1:30~ "Twilig~ Roberto ~ "\nIn this~ AMST0213~
5 Gothic and~ AMR HI~ Program i~ 2:15~ "Warner~ Michael ~ "\nThis co~ AMST0225~
6 American C~ AMR HIS Program i~ 9:45~ "Axinn ~ Holly Al~ "\nFor man~ AMST0234~
7 Constructi~ AMR ART Program i~ 1:30~ "Ross C~ Deb Evans "\n"Democr~ AMST0251~
8 African Am~ AMR LIT Program i~ 9:45~ "Axinn ~ William ~ "\nThis co~ AMST0252~
9 American D~ AMR HI~ Program i~ 11:1~ "Axinn ~ Susan Bu~ "\nIn this~ AMST0260~
10 Chicagoland AMR HIS Program i~ 11:1~ "Giffor~ Jim Ralp~ "\nIn this~ AMST0264~
# i 576 more rows
# i 2 more variables: meet <chr>, CW <chr>
```

str_sub

str_sub inputs: - string

- starting character - ending character **str_sub output:** - string with only the characters between the start and the end

little example:

```
str_sub("Welcome to data science, look at this cool data", start=12, end=23)
```

```
[1] "data science"
```

Bounds are inclusive!

Maybe I only want 200 level math classes.

- First we filter for just math classes.
- Then we can create a new column called `level` that contains only the sixth character from the `courses` column.

We call this a **substring**, hence the function `str_sub`.

```
MathClasses <- courses %>%
  filter(department == "Mathematics") %>%
  mutate(level=str_sub(courseNum, start=6, end=6))

Math2Classes <- MathClasses %>%
  filter(level== "2")
```

str_count

str_count inputs: - string

- pattern **str_count output:** - a count of the number of times the pattern appears in the string

little example:

```
str_count("Welcome to data science, look at this cool data", "data")
```

```
[1] 2
```

Maybe I only want my classes to meet twice a week.

```
courses <- courses %>%
  mutate(dayCount = str_count(meet, "day"))

#what's the maximum number of days a week a class meets?
max(courses$dayCount)
```

```
[1] 5
```

```
#what's the mean number of days?
mean(courses$dayCount)
```

```
[1] 2.187713
```

Let's visualize this data.

```
courses %>%
  ggplot() +
```

```
geom_bar(aes(x=dayCount), fill="blue") +  
xlab("Number of Days Class Meets") +  
ylab("Number of Classes") +  
labs(title="How many Days a Week do Classes at Middlebury Meet?")+  
theme_classic()
```



Another useful function `str_squish`

`str_squish` is used to remove leading, trailing, and repeated interior whitespaces from strings



Figure 3: artwork by @allisonhorst