# 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")</pre>
```

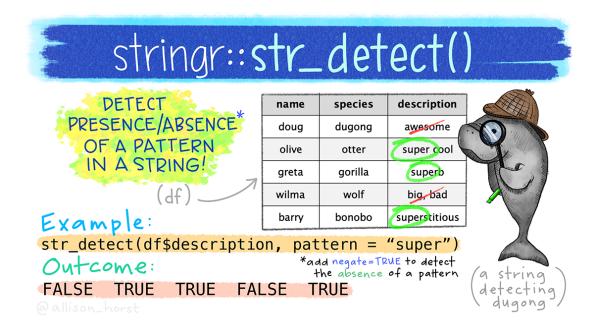


Figure 2: artwork by @allisonhorst

```
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>
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~ ECONO255~
                      Economics 2:15~ "Warner~ <NA>
                                                           "\nMicroec~ ECONO255~
9 Microecono~ <NA>
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.

```
1 Immigrant ~ AMR HIS Program i~ 11:1~ "Axinn ~ Rachael ~ "\nIn this~ AMST0175~
                                 2:15~ "Le Cha~ William ~ "\nIn this~ FREN0230~
2 Introducti~ EUR LN~ French
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~
                      Internati~ 12:4~ "Twilig~ Amit Pra~ "\nThis is~ IGST0101~
5 Introducti~ CMP
6 An Introdu~ EUR LN~ Italian
                                 9:45~ "Wright~ Thomas V~ "\nIntende~ ITAL0251~
                                 11:1~ "75 Sha~ Sandra C~ "\nIntende~ ITAL0251~
7 An Introdu~ EUR LN~ Italian
8 Globalizat~ SOC
                      Political~ 2:15~ "Librar~ Orion Le~ "\nHow doe~ PSCI0314~
                      Political~ 11:1~ "LaForc~ Bert Joh~ "\nCities ~ PSCI0465~
9 City Polit~ <NA>
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\_extract 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")
```

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

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

```
courses %>%
    mutate(CW = str_extract(distros, "CW")) %>%
    mutate(distros = str_remove(distros, "CW"))
# A tibble: 586 x 10
               distros department time location professor description courseNum
   titles
   <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
```

little example:

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

- starting character - ending character str\_sub output: - string with only the characters

#### [1] "data science"

between the start and the end

Bounds are inclusive!

Maybe I only want 200 level math classes.

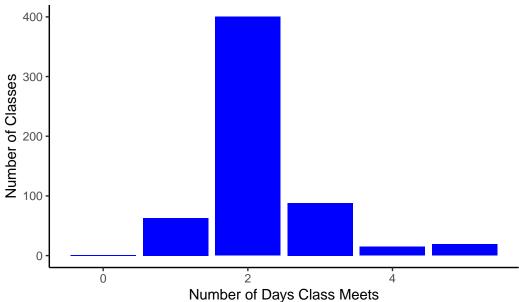
- First we filter for just math classes.
- Then we can create a new column called level that contains only the sixth character from the courses column.

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



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Figure 3: artwork by @allisonhorst