Functions and advanced text mining

Fall 2022

October 12 2022

Functions

A function is a type of object in R that can perform a specific task.

- Functions take arguments as input and output some manipulated form of the input data.
- A function is specified first with the object name, then parentheses with arguments inside.

```
# a simple in-built function
sqrt
function (x)  .Primitive("sqrt")
```

```
# using the sqrt function
sqrt(4)
[1] 2
```

When to write functions?

- Using the same code more than once
- Complicated operation
- Vectorization

Function arguments

- `x`, `y`, `z`: vectors.
- `w`: a vector of weights.
- `df`: a data frame.
- `i`, `j`: numeric indices (typically rows and columns).
- `n`: length, or number of rows.
- `p`: number of columns.

Writing Functions

```
# Basic Set Up
my_awesome_function <- function(x,y) # Arguments broken up by commas
{ # Brackets that house the code
  # Some code to execute
  z = x*y
  return(z) # Return a data value
} # Close the Brackets
```

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```
my_awesome_function(x=5,y=6)
```

```
[1] 30
```

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```
my_awesome_function(x=5,y=6)
[1] 30
```

```
my_awesome_function(x=7,y=8)
[1] 56
```

More complicated function

```
Operate_This <- function(x, y, operation){
   first_operation <- switch(operation,
     plus = x + y,
     minus = x - y,
     times = x * y,
     divide = x / y,
     stop("Unknown operation!")
   )

   return(first_operation)
}
```

```
Operate_This(x=5, y=6, operation = "plus")
[1] 11
```

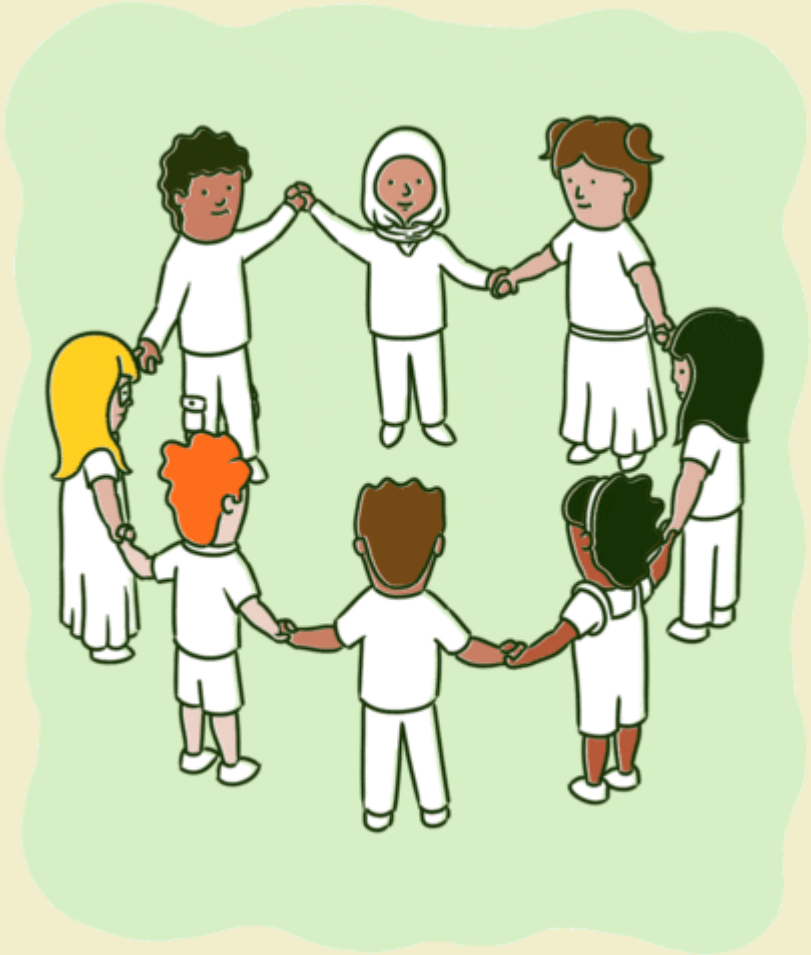
```
Operate_This(x=5, y=6, operation = "divide")
[1] 0.8333333
```

```
Operate_This(x=5, y=6, operation = "minus")
[1] -1
```

```
Operate_This(x=5, y=6, operation = "times")
[1] 30
```

Group Activity 1

08:00

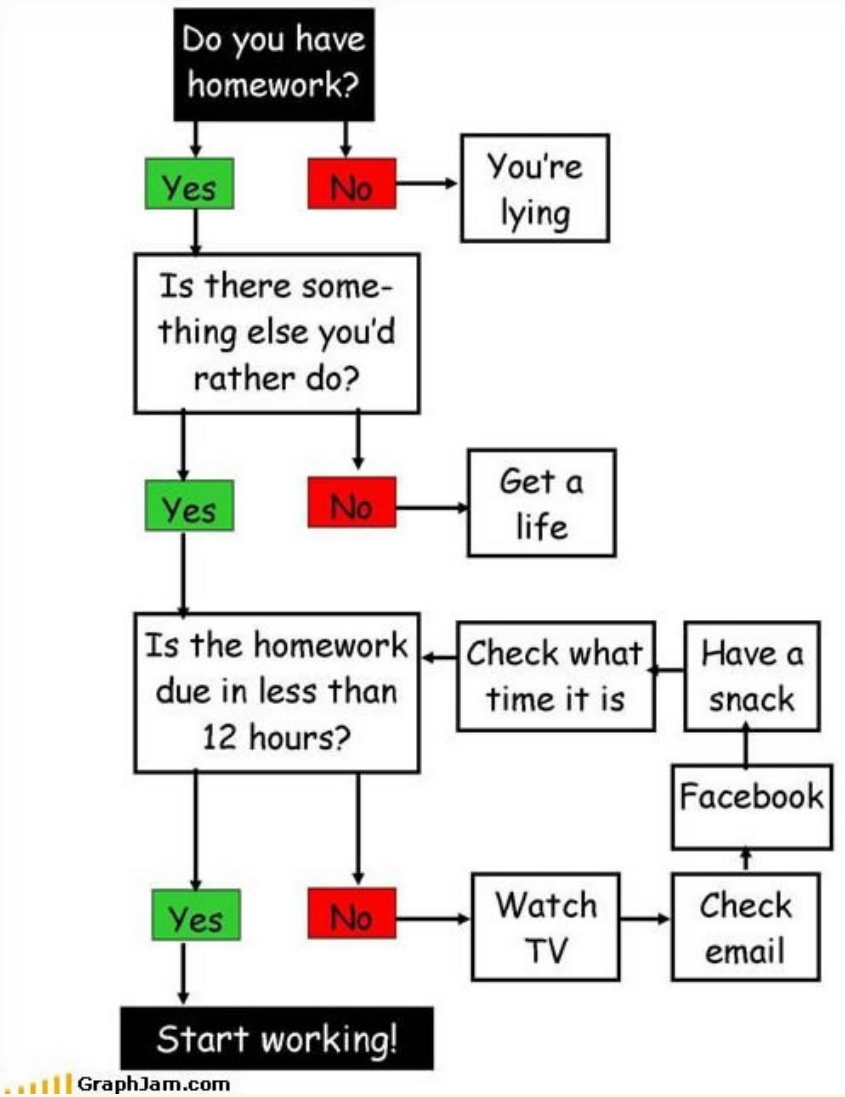


- Let's go over to maize server/ local Rstudio and our class moodle
- Get the class activity 14.Rmd file
- Work on activity 1
- Ask me questions

Conditional Execution

Allows code to:

- become more flexible
- adapt to the input arguments
- have certain “control flow” constructs



if - else

```
if(TRUE){
  print("Positive")
}else{
  print("Negative")
}
[1] "Positive"
```

```
if(FALSE){
  print("Positive")
}else{
  print("Negative")
}
[1] "Negative"
```

ifelse()

- Same idea just vectorized

```
ifelse(TRUE,"Positive","Negative")
[1] "Positive"
```

```
ifelse(FALSE,"Positive","Negative")
[1] "Negative"
```

```
x <- 1:5
ifelse(x<3, "Positive", "Negative")
[1] "Positive" "Positive" "Negative" "Negative" "Negative"
```

if and ifelse

```
x <- c(3, 4, 6, -1)
y <- c("5", "c", "9", 1)
```

```
# Use `if` for single condition tests
cutoff_make0 <- function(x, cutoff = 0){   # default cutoff is 0
  if(is.numeric(x)){
    ifelse(x < cutoff, 0, x)
  } else warning("The input provided is not a numeric vector")
}
```

```
# override the default cutoff of 0
cutoff_make0(x, cutoff = 4)
[1] 0 4 6 0
```

```
# no cutoff given, defaults to 0
cutoff_make0(x)
[1] 3 4 6 0
```

```
cutoff_make0(y, cutoff = 4)
Warning in cutoff_make0(y, cutoff = 4): The input provided is not a numeric
vector
```

Let's talk about word tokenization, word clouds, and sentiment analysis using *tidytext* principles !!

Tidy Text

- tidy data principles
- works with existing data manipulation tools
- streamlined integration with other text mining libraries

General Youtube Comment

```
text <- c("This is SERIOUSLY well put together. Honestly I don't even know how
          Television services are still in business when there is QUALITY like
          this available at our damn fingertips.. it's actually mind boggling
          and I really think we take these things for granted. Big big BIG ups
          to the Sidemen and all involved in this.")
```

```
text_data <- tibble(text = text)
text_data
# A tibble: 1 × 1
  text
  <chr>
1 "This is SERIOUSLY well put together. Honestly I don't even know how \n      …
```

Tokenization

```
text_data %>%
  unnest_tokens(output = word,
                input = text,
                token = "words") %>%
  kable()
```

word
this
is
seriously
well
put
together
honestly
i
don’t
even
know
how
television
services
are

Counting words

```
text_data %>%
  unnest_tokens(word,text) %>%
  count(word, sort = TRUE) %>% kable()
```

word	n
big	3
this	3
and	2
i	2
in	2
is	2
actually	1

Stopwords

- `tidytext` comes with a database of common stop words
- carry little to no unique information, and need to be removed

```
stop_words %>% sample_n(10)
# A tibble: 10 × 2
   word    lexicon
   <chr>   <chr>
 1 which   snowball
 2 making  onix
 3 pointed onix
 4 than    SMART
 5 novel   SMART
 6 nothing onix
 7 try     SMART
 8 various SMART
 9 over    snowball
10 cannot  snowball
```

What is the average sentiment of Amazon shoppers purchasing musical instruments?

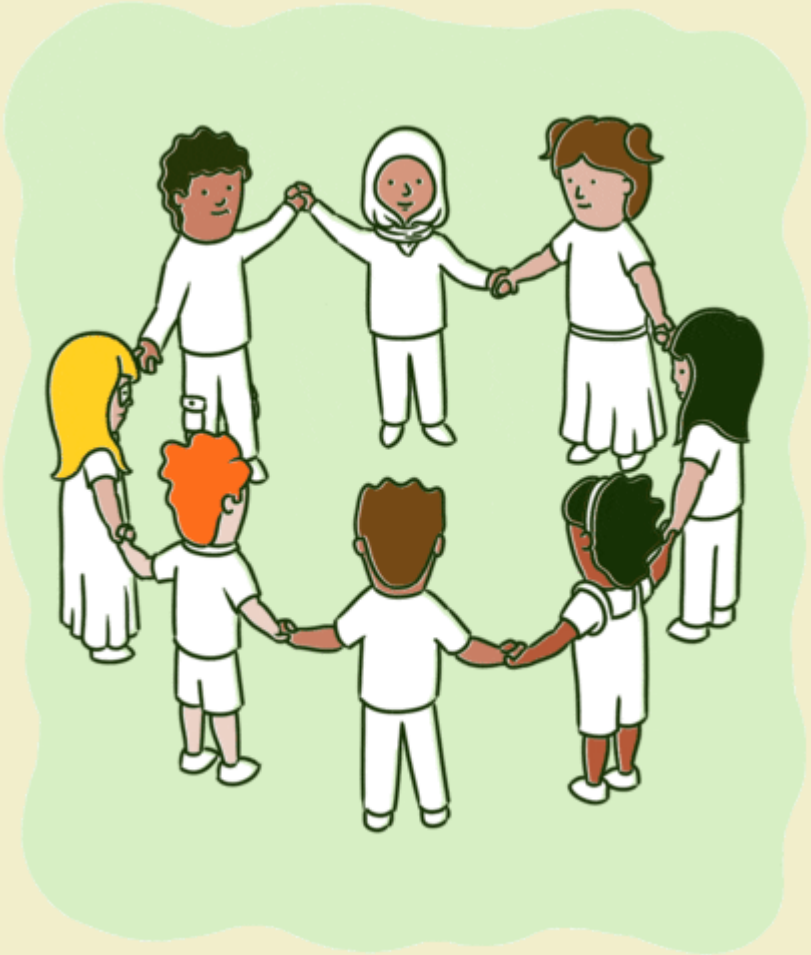
Sentiments in Amazon Musical Instruments Reviews

```
library(wordcloud)
library(reshape2)  # for acast function
set.seed(123)  # for reproducibility

musical_instr_reviews %>%
  select(reviewText) %>%
  unnest_tokens(output=word,
                input=reviewText) %>%
  anti_join(stop_words) %>%
  inner_join(get_sentiments("bing")) %>%
  count(word, sentiment, sort = TRUE) %>%
  acast(word ~ sentiment, value.var = "n",
  comparison.cloud(colors = c("blue","purp
                   scale = c(2,0.5),
                   max.words = 100,
                   title.size = 2)
```

Group Activity 2

08:00



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