Introduction to Map Functions

Vectorized Operations

The fundamental architecture of R is based on vectors.

Example: A function is defined, which squares a number if it's greater or equal to 0 and cubes it otherwise.

```
square_cube <- function(x){
  if (x>=0){
    y <- x^2
  } else {
    y<- x^3
  }
  return(y)
}


numbers<-c(1,-2,-3,4)

square_cube(numbers)
```

Output:

Why doesn't it work??

Here is a fix:

```
square_cube_loop <- function(x){
  for(i in 1:length(x))
    if (x[i]>= 0){
      y[i] <- x[i]^2
    } else {
      y[i]<- x[i]^3
    }
  return(y)
}

y<-NA


square_cube_loop(numbers)
```

Output:

```
map(numbers, square_cube)
```

Output:

```
[[1]]
[1] 1

[[2]]
[1] -8

[[3]]
[1] -27

[[4]]
[1] 16
```

```
unlist(map(numbers, square_cube))
```

Output:

Data

illustration_data

	HBP	SF	RA	ER	ERA	CG
1	*NA*	*NA*	303	109	3.55	22
2	*NA*	*NA*	241	77	2.76	25
3	*NA*	*NA*	341	116	4.11	23
4	*NA*	*NA*	243	97	5.17	19
5	*NA*	*NA*	313	121	3.72	32
6	*NA*	*NA*	266	137	4.95	27
7	*NA*	*NA*	287	108	4.30	23
8	*NA*	*NA*	362	153	5.51	28
9	*NA*	*NA*	303	137	4.37	32

`map()` Functions

What is the issue when I run this code?

```
median(illustration_data)
```

Map Functions: allow you to apply a function to each element of a list, vector, or dataframe. Map functions allow you to operate on entire vectors or data frames in a single step, without using explicit loops.

```
map(illustration_data, median)
unlist(map(illustration_data, median))
```

Output:

```
example_1 <- map_dbl(illustration_data, median)
example_1
```

Output:

```
example_2 <- map_chr(illustration_data, median)
example_2
```

Output:

```
example_3 <- map_dfr(illustration_data, median)
example_3
```

Output:

Map Functions when you have to use arguments

```
map_dbl(illustration_data, median, na.rm = TRUE)
```

Output:

Another notation:

```
map_dbl(illustration_data, \(x) median(x, na.rm = TRUE))
```

Output:

More Examples - Map Function - Iterating Over a Single Vector

This example demonstrates how to iterate over a single vector using mapping functions.

Data Example: Using the Teams dataset pull out the teams associated with the now Angels franchise ("ANA") and find the first and last year they played.

illustration_data_2

	teamID	name	began	ended
1	LAA	Los Angeles Angels	1961	1964
2	CAL	California Angels	1965	1996
3	ANA	Anaheim Angels	1997	2004
4	LAA	Los Angeles Angels of Anaheim	2005	2022

Example: We want to find out the number of characters in the team name.

```
map_dbl(illustration_data_2, str_length)
```

Output:

```
map_dbl(illustration_data_2$name, str_length)
```

Output:

```
map_dfr(illustration_data_2, str_length)
```

Output:

More Examples - Map Function - Iterating Over Our Own Function

Below is a function called `top5`. This function takes a team name and a dataset, filters the dataset for that team, selects specific columns, sorts by wins (W), and returns the top 5 records.

```
top5 <- function(team_name, data) {
  output <- data %>%
    filter(name == team_name) %>%
    select(teamID, yearID, W, L, name) %>%
    arrange(desc(W)) %>%
    head(n = 5)
  return(output)
}
```

Let's apply this function to the "New York Yankees":

```
top5(team_name = "New York Yankees", data = Teams)
```

Output:

```
  teamID yearID   W  L             name
1    NYA   1998 114 48 New York Yankees
2    NYA   1927 110 44 New York Yankees
3    NYA   1961 109 53 New York Yankees
4    NYA   1932 107 47 New York Yankees
5    NYA   1939 106 45 New York Yankees
```

```
map_dfr(illustration_data_2$name, top5, Teams)
```

Output:

	teamID	yearID	W	L	name
1	LAA	1962	86	76	Los Angeles Angels
2	LAA	1964	82	80	Los Angeles Angels
3	LAA	1961	70	91	Los Angeles Angels
4	LAA	1963	70	91	Los Angeles Angels
5	CAL	1982	93	69	California Angels
6	CAL	1986	92	70	California Angels
7	CAL	1989	91	71	California Angels
8	CAL	1985	90	72	California Angels
9	CAL	1979	88	74	California Angels
10	ANA	2002	99	63	Anaheim Angels
11	ANA	2004	92	70	Anaheim Angels
12	ANA	1998	85	77	Anaheim Angels
13	ANA	1997	84	78	Anaheim Angels
14	ANA	2000	82	80	Anaheim Angels
15	LAA	2008	100	62	Los Angeles Angels of Anaheim
16	LAA	2014	98	64	Los Angeles Angels of Anaheim
17	LAA	2009	97	65	Los Angeles Angels of Anaheim
18	LAA	2005	95	67	Los Angeles Angels of Anaheim
19	LAA	2007	94	68	Los Angeles Angels of Anaheim