

Workouts

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Description

This dataset was made based on my active weekly workouts. The workouts occurred four - five times a week focusing on different body parts of the body. Every workout had four sets containing ten reps. Each rep may have contained different weights (lbs) due to the fact that I like to increase the weight with each rep. So the weight (lbs) that were recorded in the dataset is the average weights used overall in each workout. The variables of the dataset are as followed;

```
Day - "The actual date that the workout was performed"
Week - "The week # in the year"
Workout Day - "What body category was focused on"
# of Workouts - "The amount of different exercises that were done"
Cardio - "Total number of calories that are burned in a cardio session" (calories)
Weight - "The amount of pounds I weighed for that day" (lbs)
```

The other variables are the types of exercises that were done at each workout day.

The main focus of this research is calculating my body fat percentage. As the semester continues, my weight should be changing whether its increasing or decreasing. In reality my weight will be increasing due to the increase of the amount of weight that will be used over time. The reason why my weight should be increasing is because muscle weighs more than fat, so as I gained more muscle I will weigh more. This can sometimes be stressful because seeing the number on the scale is intimidating and discouraging. That's why with this research I'm not worried about tracking the change in my weight, but in my body fat percentage. Since I already know my weight will be increasing, the outcome of this research is to see the possible decrease in body fat percentage.

Reading in the Data

The packages that are required to run the code and functions are;

```
"googlesheets"
"devtools"
"plyr"
"reshape2"
"ggplot2"
```

This grouping of r code will run the data into R from the google drive and make it a data frame.

```
gs_url(
  "https://docs.google.com/spreadsheets/d/1L-x70T_CIQXSrGIB8GN-MsVTpljni_xu0Sj470HuSHE/edit?usp=sharing",
  lookup = NULL, visibility = NULL, verbose = TRUE
)
```

```
##           Spreadsheet title: Workouts
##           Spreadsheet author: k.m.catalfamo001
##   Date of googlesheets registration: 2017-12-13 20:39:00 GMT
##   Date of last spreadsheet update: 2017-12-13 05:19:13 GMT
##           visibility: private
##           permissions: rw
##           version: new
##
## Contains 1 worksheets:
## (Title): (Nominal worksheet extent as rows x columns)
## Sheet1: 999 x 55
##
## Key: 1L-x70T_CIQXSrGIB8GN-MsVTPljni_xuOSj470HuSHE
## Browser URL: https://docs.google.com/spreadsheets/d/1L-x70T_CIQXSrGIB8GN-MsVTPljni_xuOSj470HuSHE/
```

```
workout <- gs_title("Workouts")
workouts <- gs_read(ss=workout, wo = "Workouts for Each Day", header = T)
workouts <- as.data.frame(workouts)
```

Extra Coding

This section sets up coding to revise the dataframe in the meantime while more data is being collected throughout the weeks. Descriptions of what is being done is stated underneath the coding in comment form.

```
colnames(workouts) <- gsub(' ', '_', colnames(workouts))
# puts _ where spaces are within the variable names

avg_cal <- ddply(workouts, .(Workout_Day), summarize,
                  Avg_Calories_Burned = mean(Calories_Burned, na.rm = TRUE))
# subset of the data just looking at the workout day and the average calories burned
# for each of those workout days
```

```
workouts2 <- workouts[,-c(4:6, length(workouts)-2)]
```

“workouts2” is a subset of the original data frame “workouts.” The coding is removing columns four through six and the column third from last. Columns four through six are being eliminated because they show the number of exercises performed, how many reps and sets were done, respectively. The column third from last is the the column that stores the amount of calories burned when cardio is done. This data frame will be used to depict the progress of average weights (in pounds) used for each exercise in a specific workout day over the weeks. Columns four through six and the calories burned in cardio are not needed for this because the plot will only look at the week, workout day, and each exercise that was performed within the workout day.

```
workouts.melt <- melt(workouts2,
                      id.vars = c('Day', 'Workout_Day', 'Calories_Burned', 'Weight',
                                   'Week'))
head(workouts.melt, n = 20)
```

##	Day	Workout_Day	Calories_Burned	Weight	Week
## 1	9/12/2017	Leg	654	144.0	37
## 2	9/13/2017	Shoulders	366	145.2	37
## 3	9/14/2017	Arms	489	145.0	37
## 4	9/18/2017	Back	464	145.0	38
## 5	9/19/2017	Leg	448	145.0	38
## 6	9/21/2017	Shoulders/Arms	594	144.0	38
## 7	9/25/2017	Back	564	145.0	39
## 8	9/26/2017	Leg	510	145.0	39
## 9	9/27/2017	Shoulders	321	145.0	39
## 10	10/2/2017	Back	507	145.0	40
## 11	10/3/2017	Leg	561	145.0	40
## 12	10/5/2017	Shoulders/Arms	438	145.0	40
## 13	10/9/2017	Back	578	146.0	41
## 14	10/10/2017	Leg	641	148.0	41
## 15	10/12/2017	Shoulders	521	146.0	41
## 16	10/16/2017	Back	547	148.0	42
## 17	10/17/2017	Leg	437	148.0	42
## 18	10/21/2017	Shoulders	748	147.0	42
## 19	10/22/2017	Arms	455	147.0	43
## 20	10/23/2017	Back	538	148.0	43

##	variable	value
## 1	Barbell_Squats_(weights_lbs/per_set)	75
## 2	Barbell_Squats_(weights_lbs/per_set)	NA
## 3	Barbell_Squats_(weights_lbs/per_set)	NA
## 4	Barbell_Squats_(weights_lbs/per_set)	NA
## 5	Barbell_Squats_(weights_lbs/per_set)	110
## 6	Barbell_Squats_(weights_lbs/per_set)	NA
## 7	Barbell_Squats_(weights_lbs/per_set)	NA
## 8	Barbell_Squats_(weights_lbs/per_set)	115
## 9	Barbell_Squats_(weights_lbs/per_set)	NA
## 10	Barbell_Squats_(weights_lbs/per_set)	NA
## 11	Barbell_Squats_(weights_lbs/per_set)	130
## 12	Barbell_Squats_(weights_lbs/per_set)	NA
## 13	Barbell_Squats_(weights_lbs/per_set)	NA
## 14	Barbell_Squats_(weights_lbs/per_set)	150
## 15	Barbell_Squats_(weights_lbs/per_set)	NA
## 16	Barbell_Squats_(weights_lbs/per_set)	NA
## 17	Barbell_Squats_(weights_lbs/per_set)	NA
## 18	Barbell_Squats_(weights_lbs/per_set)	NA
## 19	Barbell_Squats_(weights_lbs/per_set)	NA
## 20	Barbell_Squats_(weights_lbs/per_set)	NA

The melt function is converting the data frame “workouts2” into a molten data frame. The melt function is taking the wide format and is stacking each set of columns into one column of data. This is stacking the columns of the exercises into one column. for example; head(workouts.melt, n = 20) *prints out the first 20 rows in the dataset “workouts.melt.” The first 20 rows show that the data is being stacked based on the type of exercised. So it will have all barbell squats in the first couple of rows and then smith machine calf raises, etc.

```
workouts.final <- workouts.melt[-which(is.na(workouts.melt$value) == TRUE),]
# remove na value-ed rows
head(workouts.final, n = 20)
```

```
##           Day Workout_Day Calories_Burned Weight Week
## 1    9/12/2017           Leg           654    144   37
## 5    9/19/2017           Leg           448    145   38
## 8    9/26/2017           Leg           510    145   39
## 11   10/3/2017           Leg           561    145   40
## 14  10/10/2017           Leg           641    148   41
## 22  11/1/2017           Leg           578    148   44
## 26  11/7/2017           Leg           490    150   45
## 29  11/16/2017          Leg           507    144   46
## 32  11/28/2017          Leg           568    146   49
## 38  12/12/2017          Leg           566    150   51
## 60  11/1/2017           Leg           578    148   44
## 64  11/7/2017           Leg           490    150   45
## 70  11/28/2017          Leg           568    146   49
## 74  12/5/2017           Leg           626    148   50
## 76  12/12/2017          Leg           566    150   51
## 77  9/12/2017           Leg           654    144   37
## 81  9/19/2017           Leg           448    145   38
## 84  9/26/2017           Leg           510    145   39
## 87  10/3/2017           Leg           561    145   40
## 90  10/10/2017          Leg           641    148   41
##                                     variable value
## 1  Barbell_Squats_(weights_lbs/per_set)    75
## 5  Barbell_Squats_(weights_lbs/per_set)   110
## 8  Barbell_Squats_(weights_lbs/per_set)   115
## 11 Barbell_Squats_(weights_lbs/per_set)   130
## 14 Barbell_Squats_(weights_lbs/per_set)   150
## 22 Barbell_Squats_(weights_lbs/per_set)   130
## 26 Barbell_Squats_(weights_lbs/per_set)   120
## 29 Barbell_Squats_(weights_lbs/per_set)    70
## 32 Barbell_Squats_(weights_lbs/per_set)   120
## 38 Barbell_Squats_(weights_lbs/per_set)   100
## 60           Seated_Calf_Extensions    100
## 64           Seated_Calf_Extensions    130
## 70           Seated_Calf_Extensions    115
## 74           Seated_Calf_Extensions    115
## 76           Seated_Calf_Extensions    130
## 77           Smith_Calf_Raises    150
## 81           Smith_Calf_Raises    140
## 84           Smith_Calf_Raises    150
## 87           Smith_Calf_Raises    150
## 90           Smith_Calf_Raises    170
```

```
# Looks at the first couple rows of the new data.frame
```

“workouts.final” is the same data frame of “workouts.melt,” but without the NA values present. TO compare “workouts.melt” and “workouts.final” the head() command of the first 20 rows is computed.

```
## for ggplot looking at calories over time
workouts3 <- workouts2[, -c((length(workouts2)-35):(length(workouts2)-2)))]
workout.cal <- melt(workouts3,
                    id.vars = c('Day', 'Workout_Day', 'Calories_Burned', 'Weight',
                                'Week'))
head(workout.cal)
```

```
##      Day      Workout_Day Calories_Burned Weight Week
## 1 9/12/2017           Leg           654   144.0   37
## 2 9/13/2017    Shoulders           366   145.2   37
## 3 9/14/2017      Arms           489   145.0   37
## 4 9/18/2017      Back           464   145.0   38
## 5 9/19/2017      Leg           448   145.0   38
## 6 9/21/2017 Shoulders/Arms           594   144.0   38
##                                variable value
## 1 Barbell_Squats_(weights_lbs/per_set)    75
## 2 Barbell_Squats_(weights_lbs/per_set)    NA
## 3 Barbell_Squats_(weights_lbs/per_set)    NA
## 4 Barbell_Squats_(weights_lbs/per_set)    NA
## 5 Barbell_Squats_(weights_lbs/per_set)   110
## 6 Barbell_Squats_(weights_lbs/per_set)    NA
```

“workouts3” is a revised data frame of “workouts2.” This new data frame takes the columns that are all the exercises performed. So the data set is only considering Day, Week, Workout Day, Calories Burned, and Weight variables. “workouts3” will be used when depicting the average calories burned for each workout day.

Visuals

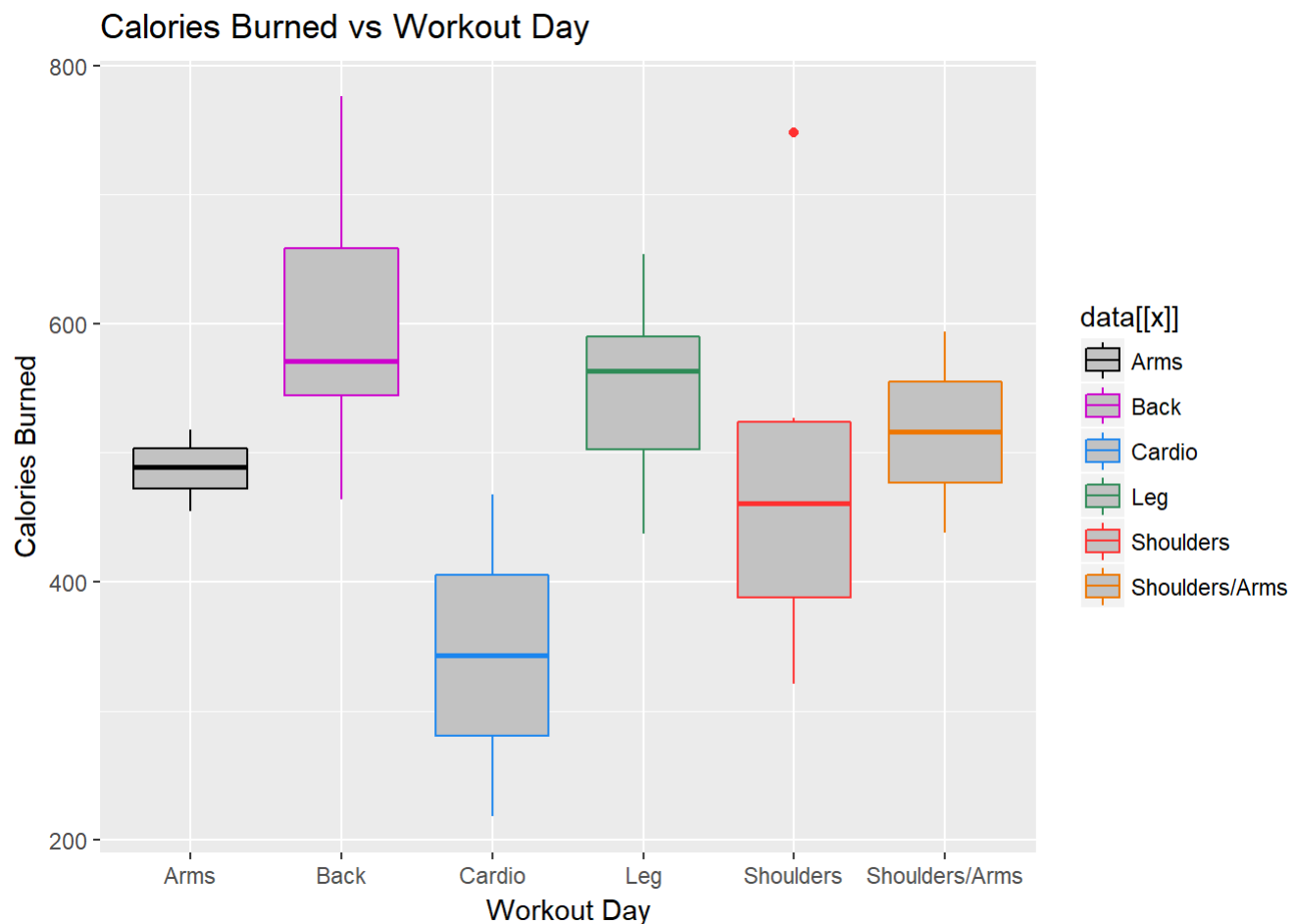
There are two plots depicting relationships within the data set of workouts. The function, `workout_boxpt`, for the boxplot allows the user to place the “x” and “y” values of their choice into the boxplot. For the example of the boxplot it is looking at the average amount of calories burned for each workout day. Everything in the `workout_boxpt` is generic enough where when the preferred “x” and “y” variables are chosen, the axis and boxplot title will depict those variables properly.

It is helpful that when creating the boxplot to have “x” as a categorical variable and “y” as numeric.

Boxplot

```
## Boxplot of the avg calories burned for each workout day

workouts::calories_burned_boxpt(workouts, "Workout_Day", "Calories_Burned")
```



Looking at calories burned for each workout day is desired because there should be a change over time. In each workout day, exercises and the number of exercises are picked at random. The exercises really depend on what I feel like doing that day. So the number of workouts done and the type of exercises will affect the outcome of the total calories burned for that workout day. The variability in calories burned for each workout day is interesting to see because you can see what days I like to favor more than the others. The favored workout day can be seen based on the distribution of the average amount of calories burned for each workout day.

In terms of the data, I like to favor "Leg" day. This is accurate with the boxplot because "Leg" day is my favorite workout day and I usually go more aggressively in those exercises than any other workout day. Thus from going more aggressively in those exercises I burn more calories. The amount of calories burned, like I mentioned above, will change based on the different exercises done for that workout day. I don't like to do the same exercises over and over again, so I will add new workouts into the rotation of exercises. The exercises done in each workout day is really based on how "bored," "motivated," or "frustrated" I am.

It is also captivating to see the different range of calories burned for each exercise day. As of right now both "Back" and "Leg" workout days are accumulating the most calories burned in a workout session where "Cardio" and "Shoulders" don't burn as many calories. In terms of my body that makes sense because my legs and back are actually the strongest parts where my arms are average and my shoulders are the weakest. My back and legs are the strongest due to years of being a catcher in softball, jumper in track and field, and lifting on and off. My arms were stronger during my years of softball and track and field, but my durability has decreased just from lack of endurance on that muscle group. Cardio also has a low distribution of calories because I haven't been doing just Cardio days and when I do I only go for a half hour to an hour. I need to get back into the rhythm of running and going a little at a time will help. I also have to be respectful to my knee when running because once I fell off my

horse in Equestrian club it fills up with fluid with high impact. There are actually many reasons why my shoulders are the weakest, but the main reason is because tendinitis and from never working on those muscles during a workout.

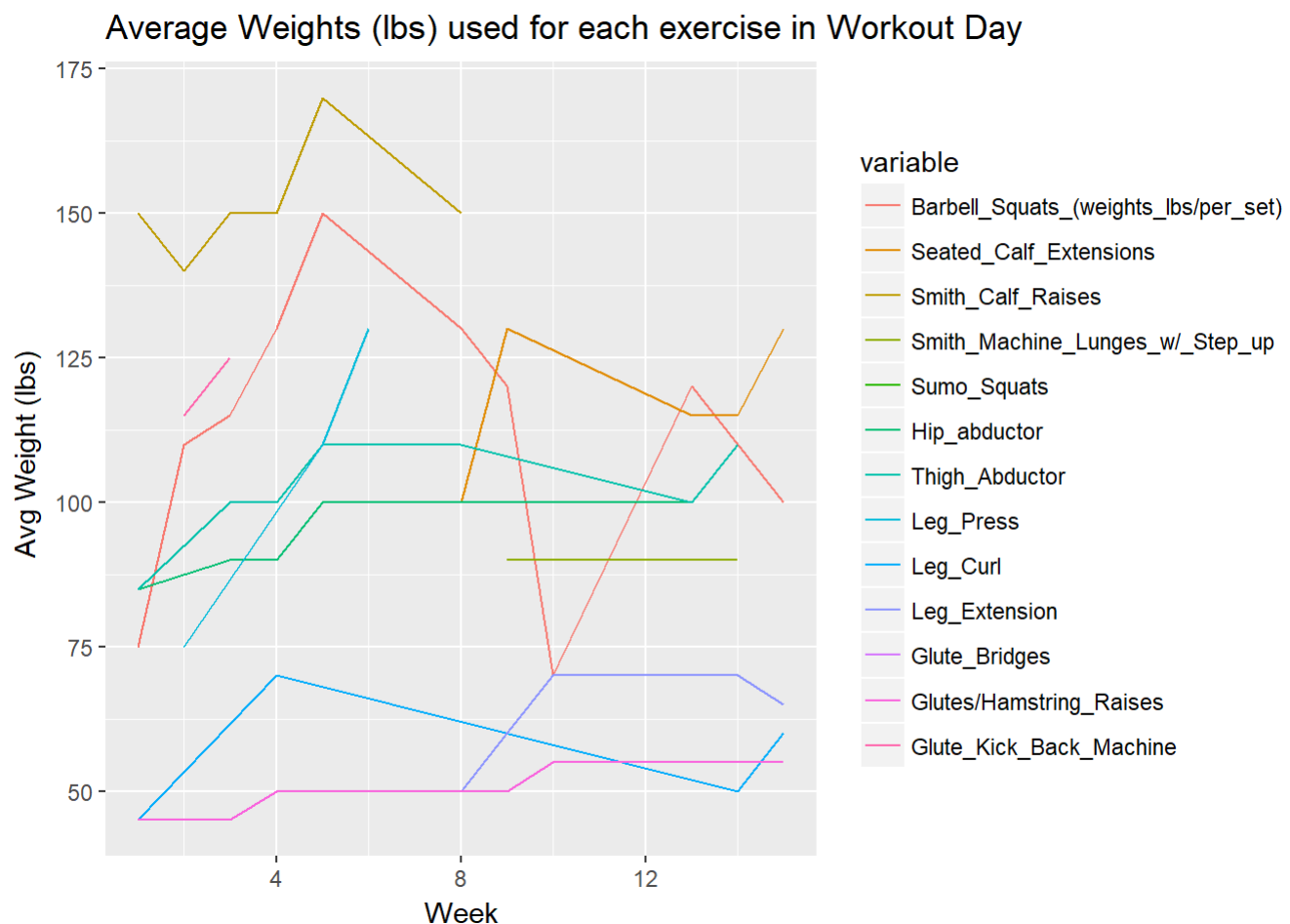
My endurance for each workout day has and will continue to increase which is shown by the amount of weight being needed or the number of reps will have to increase. I haven't increased the number of reps mainly because I like having the same amount done for each exercise. It made more sense to keep increasing the amount of weight being used. This shows a steady increase in calories burned over time and demonstrates a larger distribution of calories burned in each workout day.

Aesthetics Plot

The function, `avg_lbs_day`, for the `ggplot` allows for the user to place the preferred data set and workout day to be used. This function will spit out a plot of the workout day wanted to view the progression of the average weights (lbs) being used in each exercise. The week variable is subtracted by 36 to show the 1st week of workouts rather than the 37th week in the year.

```
## function allows to plug in whatever workout day wanted to look at and
## create a graph depicting the workouts done for that day over the weeks

workouts::avg_lbs_day(workouts.final, "Leg") # Look at whatever workout day wanted
```



In my point of view, I think the aesthetic plot is the most important depiction of the workouts. It allows me to have a visual of my progress in terms of weight lifting and the overall change in strength of the muscles that are being used in each exercise. There might be drops in the average number of weight with some exercises due to how sore, sick, or rushed I am. I have a lot of problems with my knees that can affect the amount of weight I decide to

use. Tendinitis and fluid build-up are the two most concerning problems during leg day, but if they are really bad I lower the weight used so I don't injure myself. It is very important to me to see the overall progress of my workouts because it shows how much I've accomplished.

Body Fat Calculations

The `body_fat` function computes the body fat percentage for a person. Body fat percentage is based on six things; weight in pounds, lean body mass, wrist, waist, hip, and forearm circumferences. The lean body mass needs to be computed before calculating the body fat percentage. The `body_fat` function also does that computation. All that needs to be read into the function is your weight, wrist, waist, hip, and forearm circumferences and the function will do the calculations. When every desired measurement is called into the function, it will print out what your lean body mass and body fat percentages are.

```
## Bodyfat calculations based on the NAVY body fat calculations beginning of semester
```

```
workouts::bodyfat(150, 4.5, 28, 38, 9.0)
```

```
## [1] "LBM: 110.27"          "body fat %: 26.49"
```

```
## Bodyfat caculation based on the NAVY body fat calculatons at the end of the semester
```

```
workouts::bodyfat(148, 4.5, 30.5, 42, 10.5)
```

```
## [1] "LBM: 108.07"          "body fat %: 26.98"
```

The main focus of this research is calculating my body fat percentage. I want to be able to compare my body fat percentage from the start of working out to my body fat percentage at the end of the semester. It's hard to see the progress in the body weight tracked because there is a good probability that my weight will increase by the end of the semester. This can be because of an increase in fat and/or increase in muscle mass. Muscle weighs more than fat so as I continue to workout, my muscles are getting bigger and hopefully I'm decreasing the fat on my body. At the end of the semester this research will hopefully show that I have decreased my body fat percentage.

This function allows me to quickly calculate the body fat percentage without having to find an accurate body fat percentage calculator on the internet, buy calipers, nor do the calculations out by hand. From measurements taken at the end of the semester, the function indicates that my body fat percentage has increased by decimals. This is one bad thing about calculating body fat percentage by hand. There is human error involved and doesn't take into consideration water weight or muscle weight.