Descriptive Statstics with R

Let's import the data

```
Album_Sales <- read_csv("Datasets/album_sales.csv")

## Parsed with column specification:
## cols(
##   Adverts = col_double(),
##   Sales = col_double(),
##   Airplay = col_double(),
##   Attract = col_double(),
##   Genre = col_character()
## )
```

Let's look at the data

```
head(Album_Sales)
```

Let's make sure our data types are correct #1

- This variable is currently stored as charcters, not as a factor / category variable

```
str(Album_Sales$Genre)

##  chr [1:200] "Country" "Pop" "HipHop" "HipHop" "Metal" "Country" "Pop" ...
```

Let's make sure our data types are correct #2

- We can save it as a factor

```
Album_Sales$Genre <- as.factor(Album_Sales$Genre)

str(Album_Sales$Genre)

##  Factor w/ 4 levels "Country","HipHop",..: 1 4 2 2 3 1 4 4 3 2 ...
```

Summarising data: Central tendency

Measures of central tendency

The main measures of central tendency are: - Mean - Median - Mode

Mean

"What is the mean of album sales?"

```
mean(Album_Sales$Sales)

## [1] 193.2
```

Trimmed mean

- The trimmed mean is used to reduce the influence of outliers on the summary

```
mean(Album_Sales$Sales, trim = 0.05)
```

```
## [1] 192.6667
```

Median

"What is the median amount of Airplay?"

```
median(Album_Sales$Airplay)
```

```
## [1] 28
```

Mode

"What is the most common attractiveness rating of bands?"

- The easiest way to get the mode in R is to generate a frequency table

```
table(Album_Sales$Attract)
```

```
##
##  1  2  3  4  5  6  7  8  9 10
##  3  1  1  4 17 44 73 44 12  1
```

- We can then look for the most frequently occuring response

Measures of dispresion or variance

Range

The range is the difference between the lowest and highest values

- You can calculate it using these values

```
max(Album_Sales$Airplay) - min(Album_Sales$Airplay)
```

```
## [1] 63
```

- Or you can use the range command to get the min and max values in one go

```
range(Album_Sales$Airplay)
```

```
## [1]  0 63
```

Interquartile range

- We know that the median is the "middle" of the data = 50th percentile
- The interquatile range is the difference between the values at the 25th and 75th percentiles

```
quantile( x = Album_Sales$Airplay, probs = c(.25,.75) )
```

```
##   25%   75%
## 19.75 36.00
```

- Interquartile range = 36 - 19.75 = 16.25

Sum of squares

- The difference between each value and the mean value, squared, and then summed together

```
sum( (Album_Sales$Adverts - mean(Album_Sales$Adverts))^2 )
```

```
## [1] 46936335
```

Variance

- Variance: Sum of sqaures divided by n-1

```
# variance calculation
varianceAdverts <- sum( (Album_Sales$Adverts - mean(Album_Sales$Adverts))^2 )
/ 199
```

Standard deviation

- Standard deviation is square root of the variance

```
# sd calculation


sqrt(varianceAdverts)
```

```
## [1] 485.6552
```

- Can be calculated using the sd() command

```
sd(Album_Sales$Adverts)
```

```
## [1] 485.6552
```

The *psych* package includes a lot of useful descriptive stats

```
library("psych")
```

```
##
## Attaching package: 'psych'
```

```
## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha
```

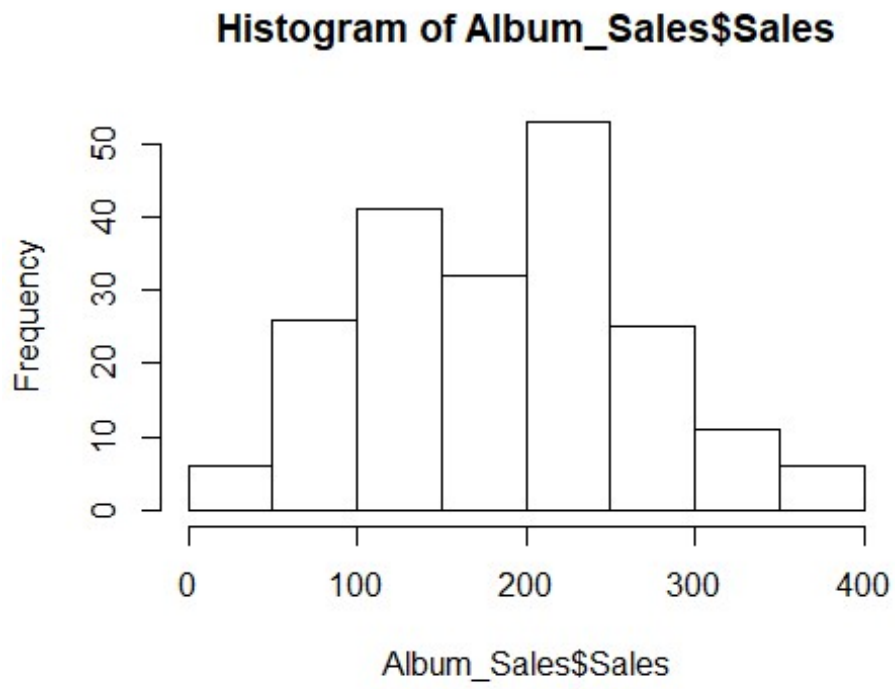
Skewness and Kurtosis

Assessing skewness of distribution #1

- It is possible to use graphs to view the distribution

- We will focus on graphic presentation of data next week

```
hist(Album_Sales$Sales)
```



Assessing skewness of distribution #2

- We can check raw skewness value using the *skew()* command in the **psych** package

```
skew(Album_Sales$Sales)
```

```
## [1] 0.0432729
```

Kurtosis

informal term	technical name	kurtosis value
"too flat"	platykurtic	negative
"just pointy enough"	mesokurtic	zero
"too pointy"	leptokurtic	positive

```
kurtosi(Album_Sales$Sales)
```

```
## [1] -0.7157339
```

Assessing normality of distribution

- We can use the shapiro-wilk test of normality
- This is part of "base" r (no package needed)

```
shapiro.test(Album_Sales$Sales)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  Album_Sales$Sales
## W = 0.98479, p-value = 0.02965
```

Getting and overall summary

summary() - in "base R"

```
summary(Album_Sales)
```

```
##     Adverts             Sales            Airplay         Attract
##  Min.   :   9.104   Min.   : 10.0   Min.   : 0.00   Min.   : 1.00
##  1st Qu.: 215.918   1st Qu.:137.5   1st Qu.:19.75   1st Qu.: 6.00
##  Median : 531.916   Median :200.0   Median :28.00   Median : 7.00
##  Mean   : 614.412   Mean   :193.2   Mean   :27.50   Mean   : 6.77
##  3rd Qu.: 911.226   3rd Qu.:250.0   3rd Qu.:36.00   3rd Qu.: 8.00
##  Max.   :2271.860   Max.   :360.0   Max.   :63.00   Max.   :10.00
##      Genre
##  Country:46
##  HipHop :53
##  Metal  :48
##  Pop    :53
##
##
```

describe() - in the "psych" package #1

```
describe(Album_Sales)
```

describe() - in the "psych" package #2

- We can describe by factor variables

```
describeBy(Album_Sales, group = Album_Sales$Genre)
```

```
##
##  Descriptive statistics by group
## group: Country
##          vars  n   mean     sd median trimmed    mad  min     max   range
## Adverts     1 46 656.22 507.96 574.14  620.40 581.96  9.1 1985.12 1976.01
## Sales       2 46 201.74  73.64 210.00  200.79  66.72 60.0  360.00  300.00
## Airplay     3 46  29.07  10.53  28.00   28.50  11.12  9.0   54.00   45.00
## Attract     4 46   6.52   1.63   7.00    6.71   1.48  1.0   10.00    9.00
## Genre*      5 46   1.00   0.00   1.00    1.00   0.00  1.0    1.00    0.00
##           skew kurtosis    se
## Adverts   0.51    -0.65 74.89
## Sales     0.03    -0.52 10.86
## Airplay   0.44    -0.10  1.55
## Attract -1.49     3.54  0.24
## Genre*    NaN      NaN  0.00
```

```
## ------------------------------------------------------------
## group: HipHop
##         vars  n   mean     sd median trimmed    mad   min  max   range
## Adverts    1 53 606.32 452.84 601.43  568.33 501.36 10.65 2000 1989.35
## Sales      2 53 199.62  92.71 200.00  200.70 103.78 10.00  360  350.00
## Airplay    3 53  28.09  13.86  30.00   28.33  14.83  0.00   55   55.00
## Attract    4 53   6.96   1.13   7.00    7.00   1.48  3.00    9    6.00
## Genre*     5 53   2.00   0.00   2.00    2.00   0.00  2.00    2    0.00
##          skew kurtosis    se
## Adverts  0.70     0.05 62.20
## Sales   -0.10    -0.91 12.74
## Airplay -0.14    -0.83  1.90
## Attract -0.80     2.03  0.15
## Genre*    NaN      NaN  0.00
## ------------------------------------------------------------
## group: Metal
##         vars  n   mean     sd median trimmed    mad  min     max   range
## Adverts    1 48 693.45 534.06  593.0  640.19 521.34 45.3 2271.86 2226.56
## Sales      2 48 197.71  75.18  200.0  198.25  88.96 40.0  340.00  300.00
## Airplay    3 48  27.96  11.37   27.5   28.00  11.12  2.0   57.00   55.00
## Attract    4 48   6.85   1.34    7.0    6.90   1.48  2.0    9.00    7.00
## Genre*     5 48   3.00   0.00    3.0    3.00   0.00  3.0    3.00    0.00
##          skew kurtosis    se
## Adverts  0.92     0.21 77.08
## Sales   -0.07    -0.94 10.85
## Airplay  0.02    -0.26  1.64
## Attract -0.84     1.74  0.19
## Genre*    NaN      NaN  0.00
## ------------------------------------------------------------
## group: Pop
##         vars  n   mean     sd median trimmed    mad   min     max   range
## Adverts    1 53 514.63 446.04  429.5  453.85 438.01 15.31 1789.66 1774.35
## Sales      2 53 175.28  77.92  160.0  171.86  88.96 40.00  360.00  320.00
## Airplay    3 53  25.13  12.75   26.0   25.02  11.86  1.00   63.00   62.00
## Attract    4 53   6.72   1.47    7.0    6.81   1.48  1.00    9.00    8.00
## Genre*     5 53   4.00   0.00    4.0    4.00   0.00  4.00    4.00    0.00
##          skew kurtosis    se
## Adverts  1.01     0.27 61.27
## Sales    0.34    -0.67 10.70
## Airplay  0.25     0.46  1.75
## Attract -1.11     2.51  0.20
## Genre*    NaN      NaN  0.00
```

Descriptive Statistics Exercises

1. Import the dataset "treatmentData.csv" from the datasets folder
2. Change the variable "treatment_group" to a factor
3. For "baseline" and "post_wellbeing":
    a. What is the mean?
    b. What is the 95% trimmed mean?
    c. What is the median?
    d. What is the range?
    e. What is the interquartile range?
    f. What is the standard deviation?
4. Assess the distribution of each using whatever methods you know
    a. Are the data normally distributed?
5. Use the summary() command to get a summary
6. Install and load the "psych" package
7. use the describeBy() function to get a summary of "baseline_wellbeing" and "post_wellbeing" for each "treatment_group"
8. Repeat question 12 but this time, save the summary as "summary_by_treatment"