

Basic Stats

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Let's learn how to read in data and then do some basic statistical analysis.

Read in data:

```
data1<-read.table("example_lengths_for_R.csv", header=TRUE, sep=',')
```

Reminder! Name your variables carefully!

Note: When we read in the data, we need to specify if there is a **header** (or column titles) and how the data is separated, or **sep**. This data is a csv so it is separated by ',' - sometimes data can be separated by '|' for example.

We can look at the data quickly using **summary()**, **nrow()** to see the row numbers, **colnames()** for column names:

```
summary(data1)
```

```
##  coverlip.code      treatment      values
##  K      :119   Control      :393   Min.    :  3.083
##  Q      :110   Treatment A:413   1st Qu.: 19.660
##  F      :109   Treatment B:414   Median : 39.663
##  C      :106                                     Mean   : 49.700
##  E      :105                                     3rd Qu.: 71.938
##  A      :102                                     Max.   :228.891
##  (Other):569
```

```
nrow(data1)
```

```
## [1] 1220
```

```
colnames(data1)
```

```
## [1] "coverlip.code" "treatment"      "values"
```

We can subset to different columns with **\$** and only see select rows with **[:]**

```
data1$coverlip.code[1:10]
```

```
## [1] G G G G G G G G G
## Levels: A B C D E F G I K O P Q
```

```
data1$treatment[1:10]
```

```
## [1] Treatment A Treatment A Treatment A Treatment A Treatment A
## [6] Treatment A Treatment A Treatment A Treatment A Treatment A
## Levels: Control Treatment A Treatment B
```

```
summary(data1$values)
```

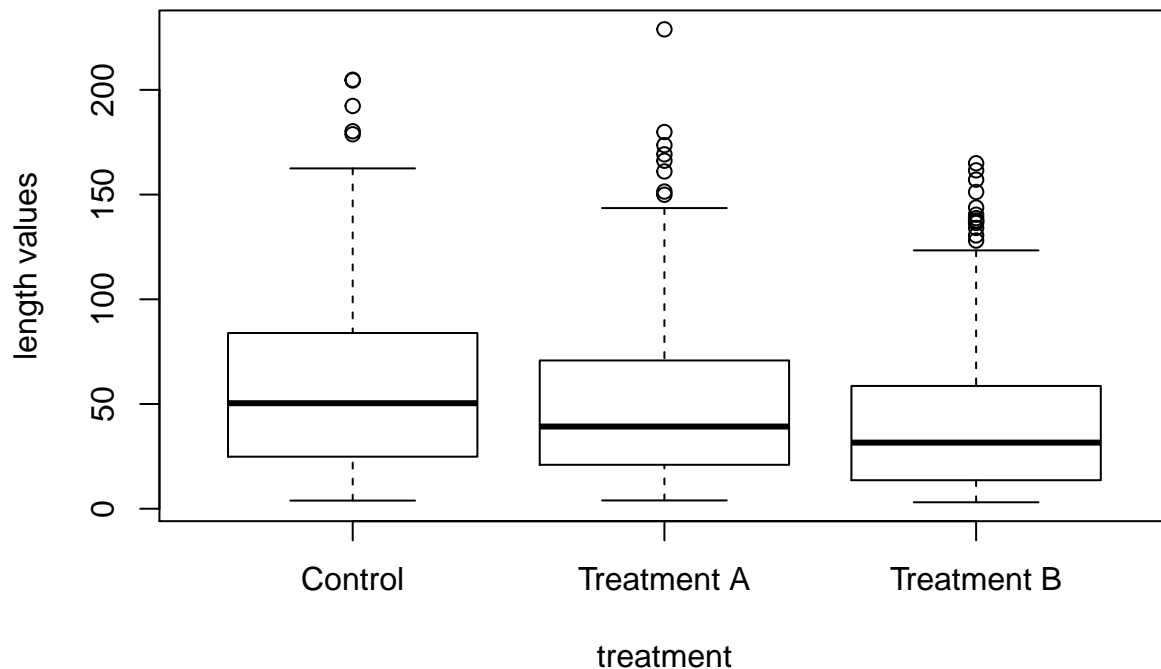
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  3.083  19.660  39.660  49.700  71.940 228.900
```

```
summary(data1$values[data1$treatment=='Control'])
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  3.876  24.850  50.390  57.880  83.900 204.800
```

Let's plot our data!

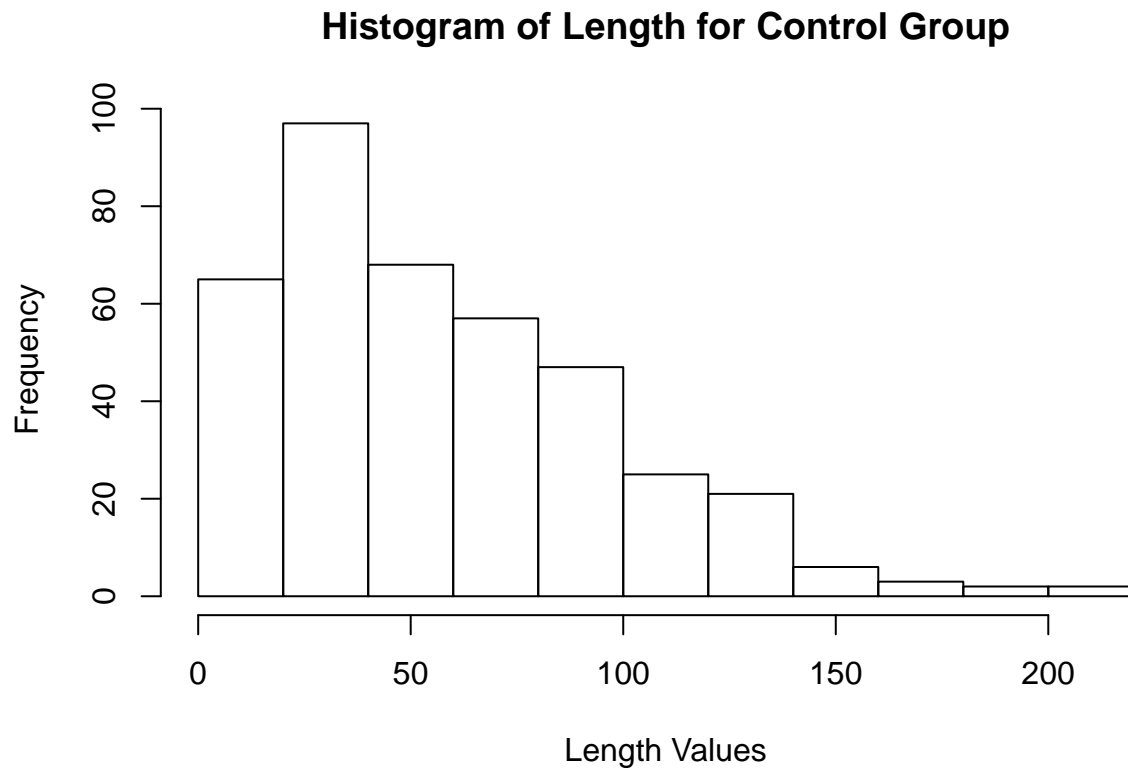
```
plot(data1$treatment, data1$values, xlab='treatment', ylab='length values')
```



Note that **xlab** and **ylab** mean x and y labels.

We can also use **hist()** to make a histogram:

```
hist(data1$values[data1$treatment=='Control'], xlab='Length Values',
      main='Histogram of Length for Control Group')
```



Note that **main** means title here.

Now let's look at how to do some basic stats:

```
mean(data1$values[data1$treatment=='Treatment A'])
```

```
## [1] 50.00254
```

```
mean(data1$values[data1$treatment=='Control'])
```

```
## [1] 57.88106
```

```
mean(data1$values[data1$treatment=='Treatment B'])
```

```
## [1] 41.63183
```

```
median(data1$values[data1$treatment=='Control'])
```

```
## [1] 50.39
```

```
var(data1$values[data1$treatment=='Control'])
```

```
## [1] 1572.929
```

```
min(data1$values[data1$treatment=='Control'])
```

```
## [1] 3.876
```

```
max(data1$values[data1$treatment=='Control'])
```

```
## [1] 204.844
```

Notice how `summary()` gave us the same info as the above functions

OK let's do a t-test now! We can use `t.test` to compare the means between 2 of the groups

```
t.test(data1$values[data1$treatment=='Control'], data1$values[data1$treatment=='Treatment B'])
```

```
##
## Welch Two Sample t-test
##
## data: data1$values[data1$treatment == "Control"] and data1$values[data1$treatment == "Treatment B"]
## t = 6.2243, df = 773.83, p-value = 7.922e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## 11.12453 21.37393
## sample estimates:
## mean of x mean of y
## 57.88106 41.63183
```

What does this tell us? How do we change the code to look at the other groups?

We can also do an ANOVA with this data using `aov` and plot the ANOVA information:

```
results<-aov(values ~ treatment, data=data1)
summary(results)
```

```
##           Df Sum Sq Mean Sq F value    Pr(>F)
## treatment    2   53291    26645   19.71 3.77e-09 ***
## Residuals 1217 1645402     1352
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

See ANOVA doc for more info on how an ANOVA works.