Course6Week4Assignment-YR-Part1

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Overview

Part 2 of this report is a deep dive of ToothGrowth data.

Exploratory data analyses and Summary

Load the ToothGrowth data set. Check out the top lines, dimensions to cover basic exploratory analysis.

```
library(datasets)
data("ToothGrowth")
head(ToothGrowth)
```

```
##    len supp dose
## 1  4.2   VC  0.5
## 2 11.5   VC  0.5
## 3  7.3   VC  0.5
## 4  5.8   VC  0.5
## 5  6.4   VC  0.5
## 6 10.0   VC  0.5
```

```
dim(ToothGrowth)
```

```
## [1] 60  3
```

```
str(ToothGrowth)
```

```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

Provide a summary of the data.

```
summary(ToothGrowth)
```

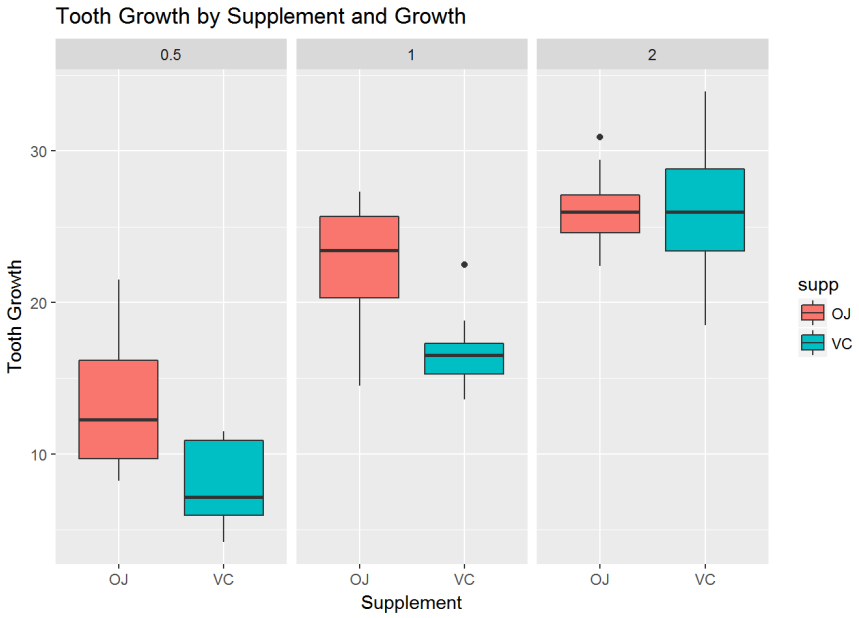
```
##       len        supp         dose
##  Min.   : 4.20   OJ:30   Min.   :0.500
##  1st Qu.:13.07   VC:30   1st Qu.:0.500
##  Median :19.25           Median :1.000
##  Mean   :18.81           Mean   :1.167
##  3rd Qu.:25.27           3rd Qu.:2.000
##  Max.   :33.90           Max.   :2.000
```

Visualize data by supplement and dose.

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.4.1
```

```
g <- ggplot(ToothGrowth, aes(supp, len, fill = supp)) + geom_boxplot() + facet_grid(.~dose) + labs(x = "Supplement", y = "To
oth Growth", title = "Tooth Growth by Supplement and Growth")
print(g)
```



The table above starts to show that the effect is strong on OJ than VC. It also shows that there is that there is no difference in supplement when the dosage is 2. We'll test the

Testing

Test #1 will check to see if the OJ supplement is more impactful in growing teeth than the VC supplement. - Null hypothesis: OJ = VC. - Alternative hypothesis: OJ > VC

```
OJtable <- ToothGrowth[ToothGrowth$supp == "OJ", 1]
VCtable <- ToothGrowth[ToothGrowth$supp == "VC", 1]
t.test(OJtable, VCtable, alternative = "greater", paired = FALSE, var.equal = FALSE, conf.level = .95)
```

```
##
##  Welch Two Sample t-test
##
## data:  OJtable and VCtable
## t = 1.9153, df = 55.309, p-value = 0.03032
## alternative hypothesis: true difference in means is greater than 0
## 95 percent confidence interval:
##  0.4682687       Inf
## sample estimates:
## mean of x mean of y
##  20.66333  16.96333
```

The p-value of .03032 is less than .05, so we are 95% confident that the effect of the OJ supplement is greater than the effect of the VC supplement.

Test #2 will see if there is a difference in effect for OJ versus VC, when the dosage is 2. Null hypothesis: OJ when dosaage is 2 = VC when dosage is 2 Alternative hypothesis: OJ when dosage is 2 /= VC when dosage is 2

```
OJtable2 <- ToothGrowth[ToothGrowth$supp == "OJ" & ToothGrowth$dose == "2", 1]
VCtable2 <- ToothGrowth[ToothGrowth$supp == "VC" & ToothGrowth$dose == "2", 1]
t.test(OJtable2, VCtable2, alternative = "two.sided", paired = FALSE, var.equal = FALSE, conf.level = .95)
```

```
##
##  Welch Two Sample t-test
##
## data:  OJtable2 and VCtable2
## t = -0.046136, df = 14.04, p-value = 0.9639
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -3.79807  3.63807
## sample estimates:
## mean of x mean of y
##     26.06     26.14
```

With a p-value = .9639, we fail to reject the possibility that the effect of OJ and VC are the same when dosage is 2.

Assumption and Conclusions

Assumptions: 1. Populations are independent and random populations were used. 2. The sample population is normally distributed.

Conclusion: The effect of OJ is greater than the effect of VC, excpect for when the dosage is 2.