

Statistical Inference Course Project 2

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Overview

This project analyzes the ToothGrowth data in the R datasets package. I will be providing a basic summary of the dataset, comparing tooth growth by supp and dose.

Data

```
library(datasets)
library(ggplot2)
library(gridExtra)
```

```
## Warning: package 'gridExtra' was built under R version 3.2.5
```

```
library(GGally)
```

```
## Warning: package 'GGally' was built under R version 3.2.5
```

```
#Loading the data
data(ToothGrowth)
```

Summary of the ToothGrowth data

Let's take a look at the structure of our ToothGrowth dataset.

```
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 ...
```

```
summary(ToothGrowth)
```

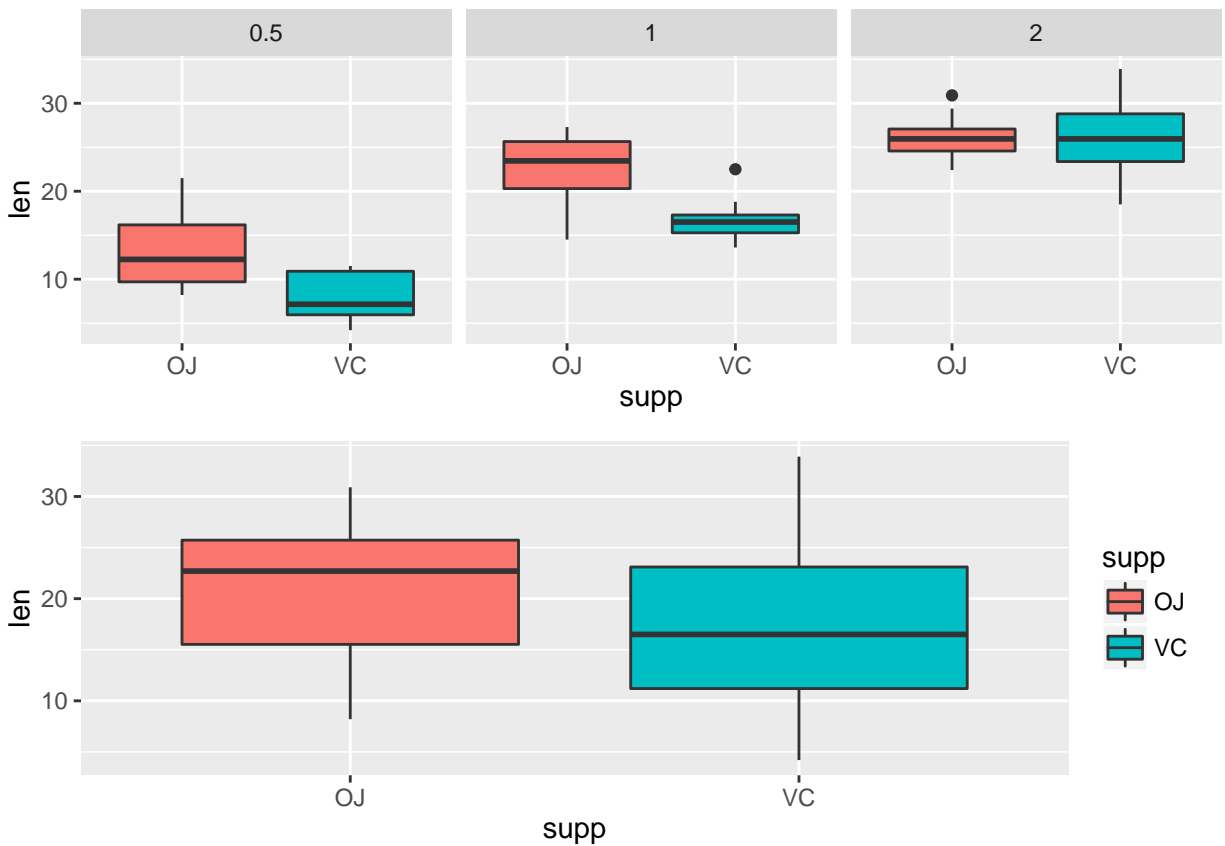
```
##      len      supp      dose
## Min.   : 4.20   OJ:30   Min.    :0.500
## 1st Qu.:13.07   VC:30   1st Qu.:0.500
## Median :19.25                Median :1.000
## Mean   :18.81                Mean    :1.167
## 3rd Qu.:25.27                3rd Qu.:2.000
## Max.   :33.90                Max.    :2.000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

There are 60 observations with 3 variables: length (numeric), supplement (factor) and dosage levels (numeric).

```
table(ToothGrowth$supp, ToothGrowth$dose)
```

```
##
##      0.5  1  2
##   OJ  10 10 10
##   VC  10 10 10
```

In this dataset, there are two types of supplements, “VC” and “OJ”. Each supplement has three dosage levels: 0.5, 1.0, and 2.0. Based on the table, there are ten observations for each combination of supplement and dosage level.



Compare tooth growth by supp and dose

We’ll use a two sample t-test to compare the difference of tooth growth by supplement and dosage levels.

Dosage level at 0.5:

```
#Run t.test
t.test(len~supp, ToothGrowth[ToothGrowth$dose == 0.5, ])
```

```
##
## Welch Two Sample t-test
##
## data: len by supp
```

```
## t = 3.1697, df = 14.969, p-value = 0.006359
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.719057 8.780943
## sample estimates:
## mean in group OJ mean in group VC
##          13.23          7.98
```

Dosage level at 1:

```
#Run t.test
t.test(len~supp, ToothGrowth[ToothGrowth$dose == 1, ])
```

```
##
## Welch Two Sample t-test
##
## data: len by supp
## t = 4.0328, df = 15.358, p-value = 0.001038
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2.802148 9.057852
## sample estimates:
## mean in group OJ mean in group VC
##          22.70          16.77
```

Dosage level at 2:

```
#Run t.test
t.test(len~supp, ToothGrowth[ToothGrowth$dose == 2, ])
```

```
##
## Welch Two Sample t-test
##
## data: len by supp
## 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 in group OJ mean in group VC
##          26.06          26.14
```

Conclusions

Based on the t-test analysis, it is statistically significant that OJ supplement results in longer tooth growth for dosage levels of 0.5 and 1.0 compared to VC supplements. However, based on the p-value for dosage level 2, we cannot conclude that the OJ supplement results in better tooth growth compared to VC supplement.