Statistical Inference : Course Project Part 2

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Basic Differential Analysis

This project will perform some basic inferential analysis on the "Tooth Growth" data set included in the R data sets package. For reference heres the included description;

"The response is the length of odontoblasts (cells responsible for tooth growth) in 60 guinea pigs. Each animal received one of three dose levels of vitamin C (0.5, 1, and 2 mg/day) by one of two delivery methods, (orange juice or ascorbic acid (a form of vitamin C and coded as VC)."

Loading the data we can have a look at the first few rows and see the structure

```
tooth_growth <- datasets::ToothGrowth
head(tooth_growth)
```

```
##    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
```

```
str(tooth_growth)
```

```
## '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 ...
```

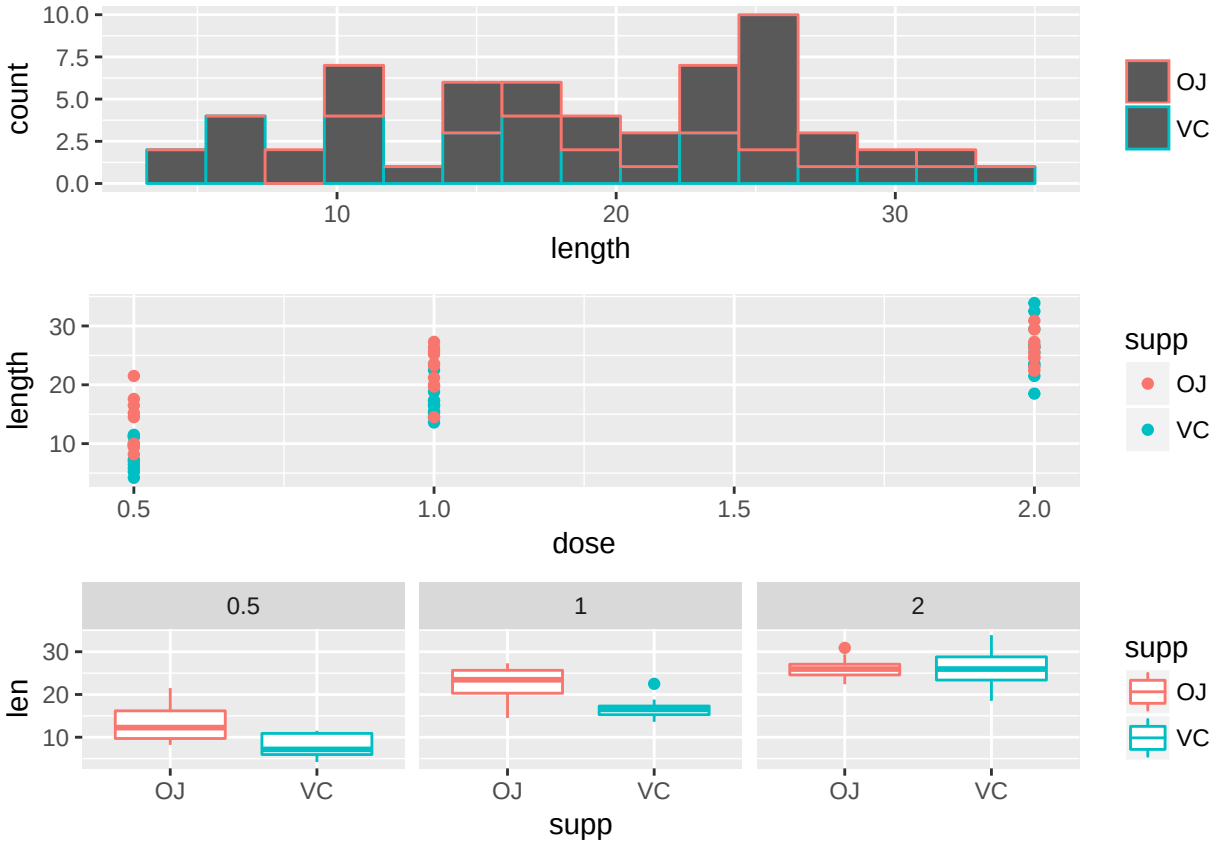
Having seen the data we can make some exploratory plots to help visualise the relationships:

1. Histogram of the recorded lengths, coloured by delivery method. This shows us an indication that orange juice may be responsible for increased growth

```
library(ggplot2)

histogram <- qplot(tooth_growth$len, color = tooth_growth$supp, xlab = 'length', bins=15) + theme(legend
points <- qplot(dose, len, data = tooth_growth, color = supp, ylab = 'length')
boxplot <- ggplot(tooth_growth, aes(supp, len)) + geom_boxplot(aes(color = supp)) + facet_grid(. ~ dose)

grid.arrange(histogram, points, boxplot, nrow=3, heights=c(10,10,10) )
```



2. Plot of dose vs length, with points distinguished by delivery method. Shows that increased dosage appears to correspond to increased length
3. Boxplot, also suggests that orange juice may cause an increased growth over ascorbic acid, at least up to a certain dosage