

## Statistical Inference Assignment Week 3- Part 2

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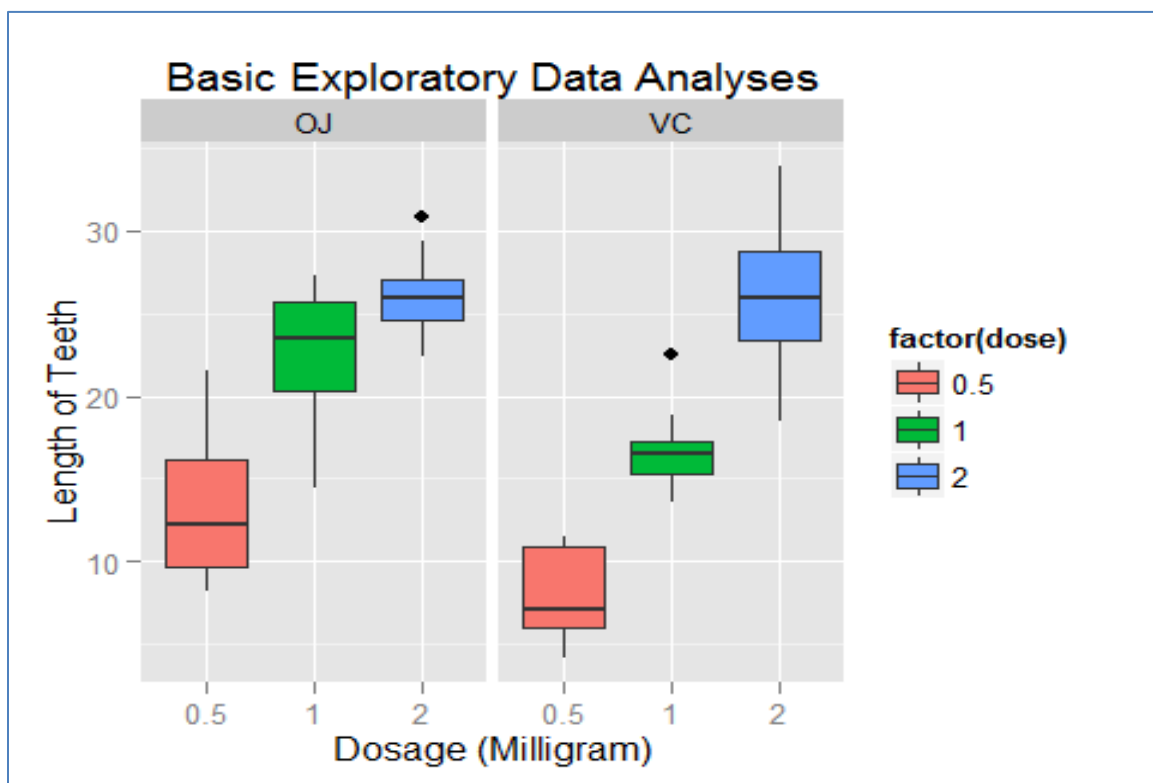
- Load the ToothGrowth data and perform some basic exploratory data analyses
- Provide a basic summary of the data.
- Use confidence intervals and/or hypothesis tests to compare tooth growth by supp and dose. (Only use the techniques from class, even if there's other approaches worth considering)
- State your conclusions and the assumptions needed for your conclusions.

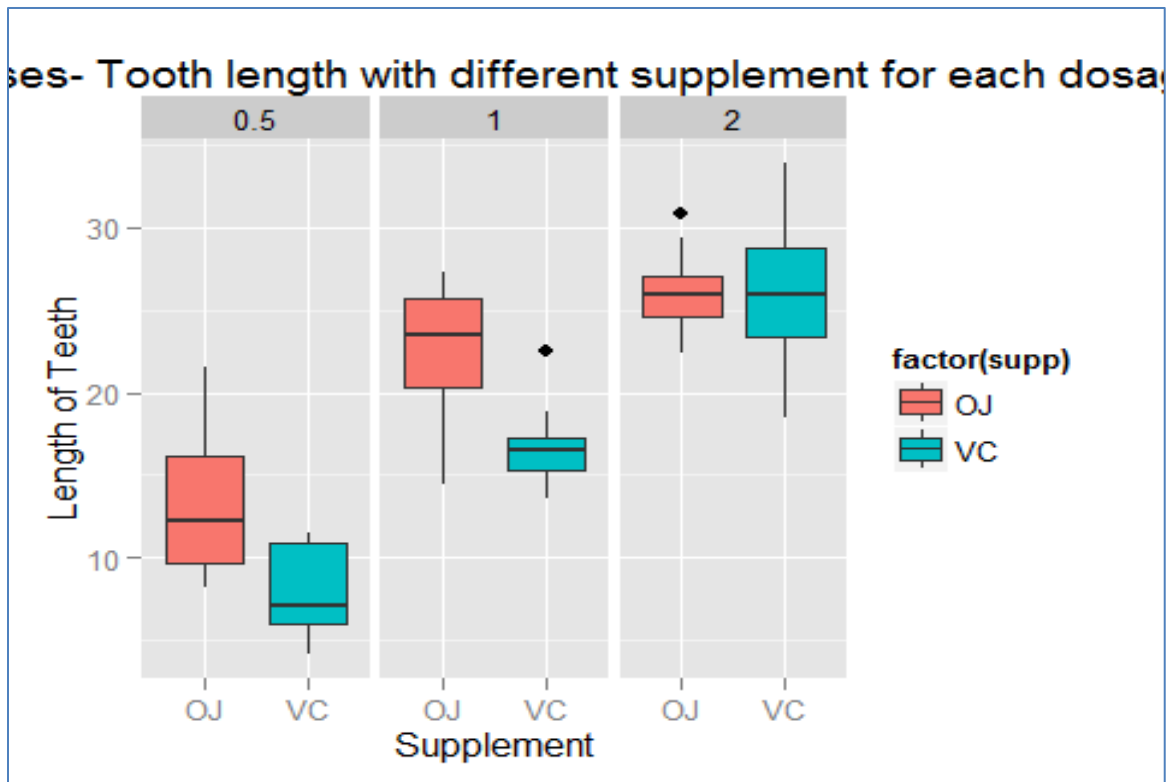
### Q1 . Load the ToothGrowth data and perform some basic exploratory data analyses.

```
library(ggplot2)
library(datasets)
data(ToothGrowth)
str(ToothGrowth)
head(ToothGrowth)
plot <- ggplot(ToothGrowth,
               aes(x=factor(dose),y=len,fill=factor(dose)))
plot + geom_boxplot(notch=F) + facet_grid(.~supp) +
  scale_x_discrete("Dosage (Milligram)") +
  scale_y_continuous("Length of Teeth") +
  ggtitle("Basic Exploratory Data Analyses")
plot <- ggplot(ToothGrowth,
               aes(x=factor(supp),y=len,fill=factor(supp)))
plot + geom_boxplot(notch=F) + facet_grid(.~dose) +
  scale_x_discrete("Supplement") +
  scale_y_continuous("Length of Teeth") +
  ggtitle("Data Analyses- Tooth length with different supplement for each dosage")
```

```
## Warning: package 'ggplot2' was built under R version 3.1.3
## '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 ...

## 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
```





Q2 . Provide a basic summary of the data.

```

ToothGrowth$dose <- as.factor(ToothGrowth$dose)
summary(ToothGrowth)

##           len           supp      dose
##  Min.      : 4.20    OJ:30    0.5:20
##  1st Qu.:13.07    VC:30    1 :20
##  Median :19.25                2 :20
##  Mean      :18.81
##  3rd Qu.:25.27
##  Max.      :33.90

table(ToothGrowth$supp, ToothGrowth$dose)

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

```

**Q3. Use confidence intervals and/or hypothesis tests to compare tooth growth by supp and dose. (Only use the techniques from class, even if there's other approaches worth considering).**

##		p.value	Conf.Low	Conf.High
##	Equal Var	0.06039337	-0.1670064	7.567006
##	Unequal Var	0.06063451	-0.1710156	7.571016

**Q4. State your conclusions and the assumptions needed for your conclusions.**

Based on the analysis above, we can conclude that

- The 2mg dose has larger impact on tooth growth than 1mg and 0.5mg, while 1mg dose has more impact than 0.5mg dose. So there is a different in the growth of the tooth while the doses are larger.
- There is no doubt that orange juice and vitamin C have obvious different impact on tooth growth.