Statistical Inference project 2

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Project description

The goal of the project is to analyze tooth growth using R package and study basic expoloratry data analysis.

Load Data and Data Summary

```
data(ToothGrowth)
str(ToothGrowth)
```

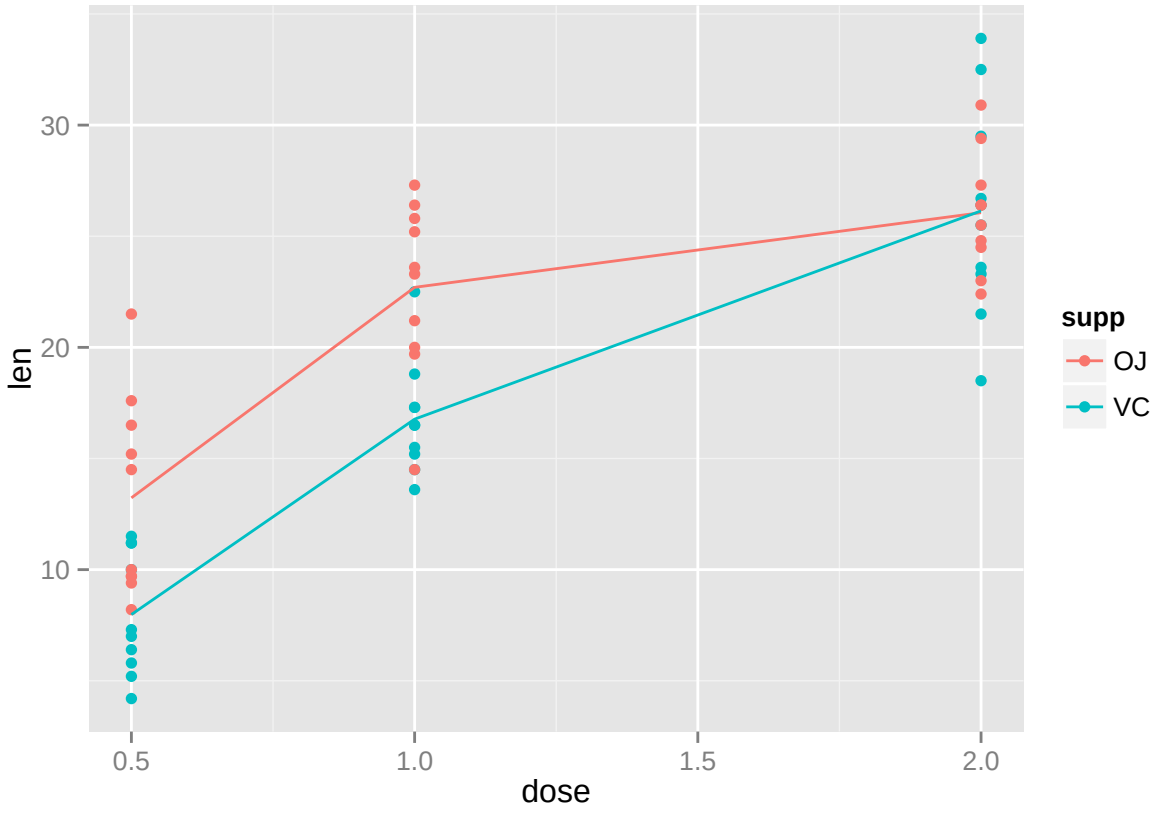
```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

Visual Analysis

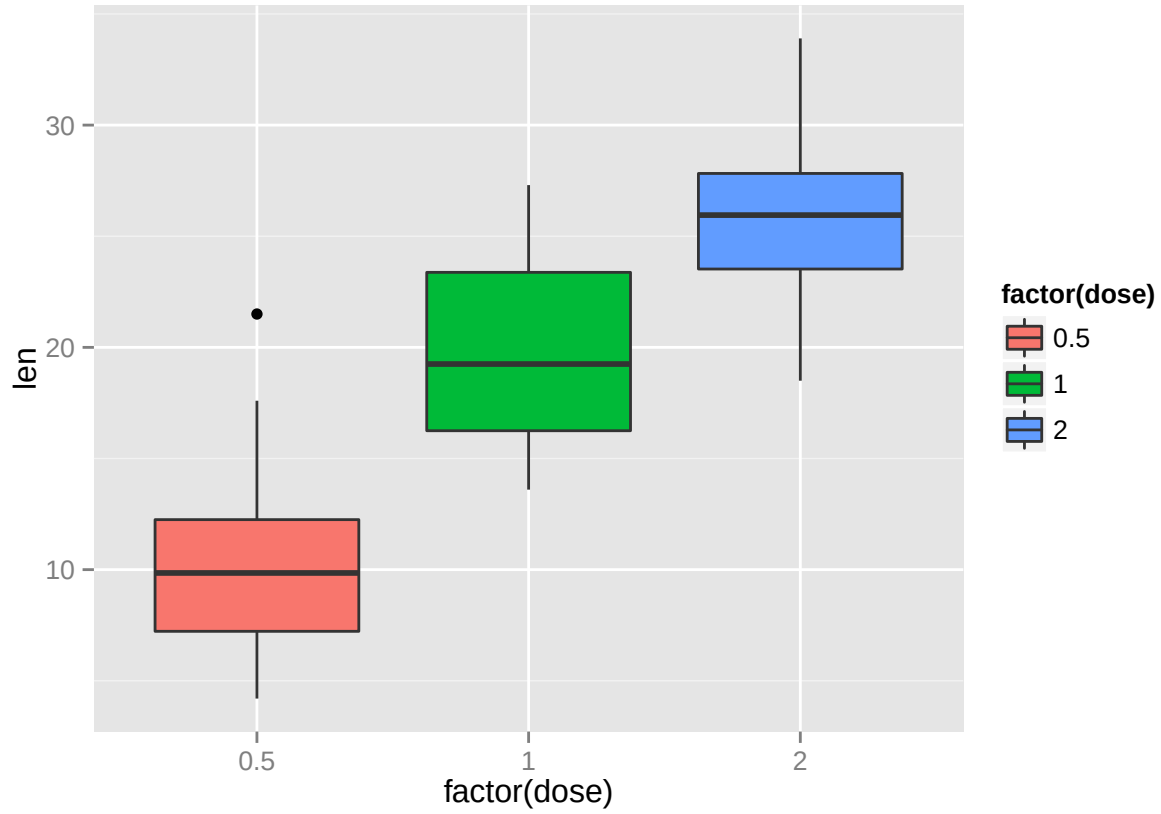
```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.2.2
```

```
avg <- aggregate(len~.,data=ToothGrowth,mean)
g <- ggplot(aes(x=dose, y = len), data = ToothGrowth) +
geom_point(aes(color = supp))
g <- g + geom_line(data=avg,aes(group=supp,colour=supp))
print(g)
```

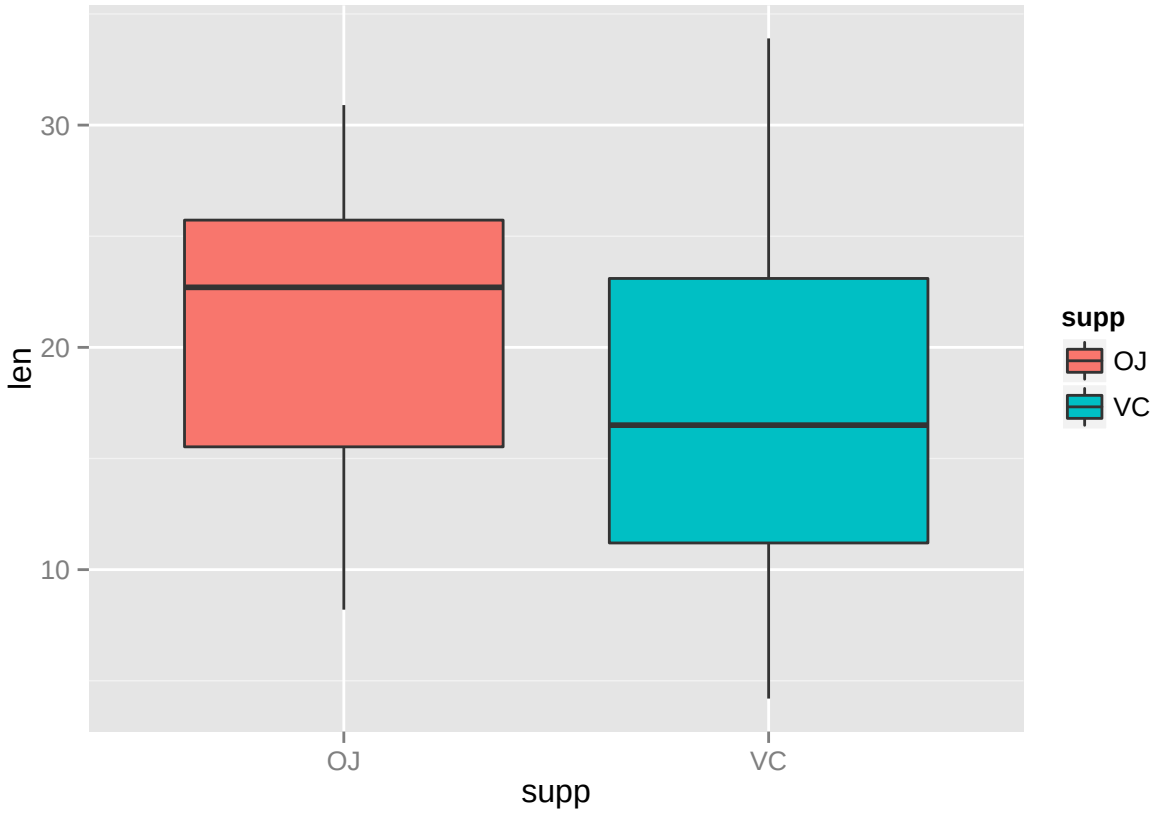



```
ggplot(aes(x = factor(dose), y = len), data = ToothGrowth) +
geom_boxplot(aes(fill = factor(dose)))
```



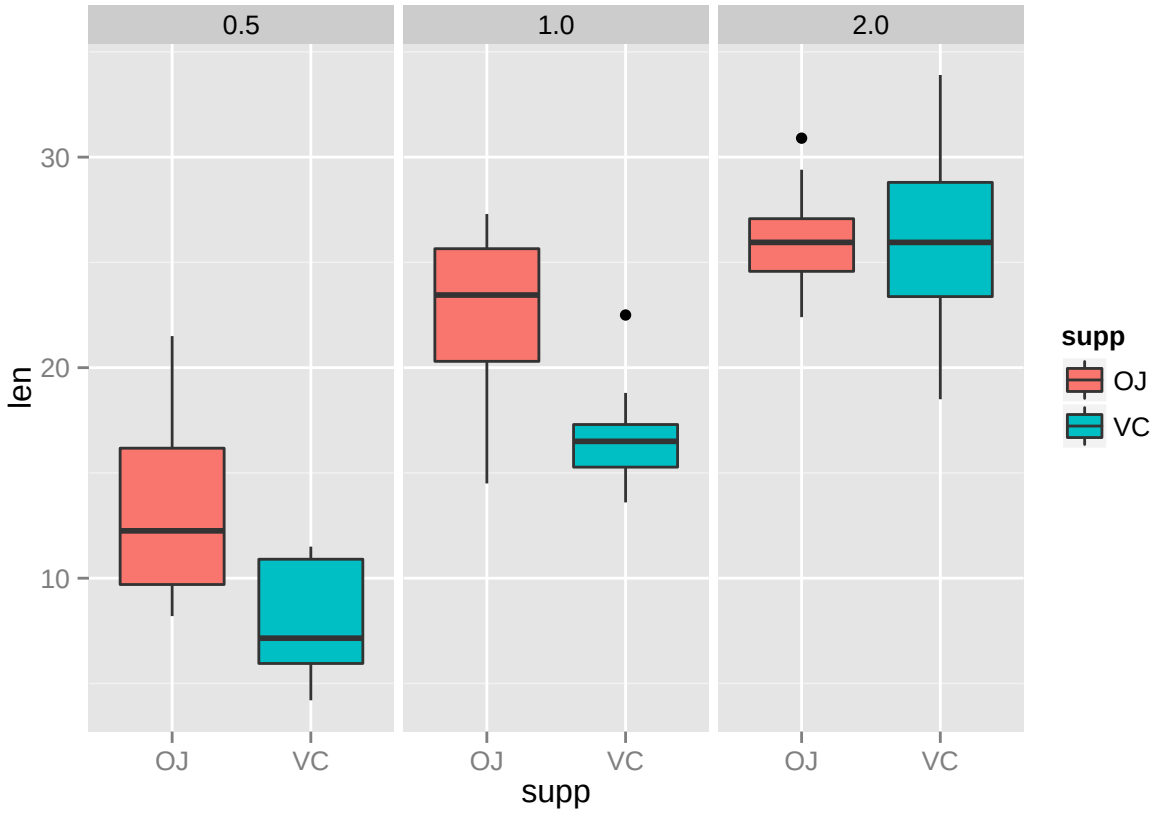
Tooth length and delivary method

```
ggplot(aes(x = supp, y = len), data = ToothGrowth) +
geom_boxplot(aes(fill = supp))
```



Relation between delivary methods

```
ggplot(aes(x = supp, y = len), data = ToothGrowth) +
geom_boxplot(aes(fill = supp)) + facet_wrap(~ dose)
```



Hypothesis testing

```
dose1 <- subset(ToothGrowth, dose %in% c(0.5, 1.0))
dose2 <- subset(ToothGrowth, dose %in% c(0.5, 2.0))
dose3 <- subset(ToothGrowth, dose %in% c(1.0, 2.0))
t.test(len ~ dose, paired = F, var.equal = F, data = dose1)
```

```
##
##  Welch Two Sample t-test
##
## data:  len by dose
## t = -6.4766, df = 37.986, p-value = 1.268e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -11.983781  -6.276219
## sample estimates:
## mean in group 0.5   mean in group 1
##            10.605            19.735
```

```
t.test(len ~ dose, paired = F, var.equal = F, data = dose2)
```

```
##
##  Welch Two Sample t-test
```

```
##
## data:  len by dose
## t = -11.799, df = 36.883, p-value = 4.398e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -18.15617 -12.83383
## sample estimates:
## mean in group 0.5   mean in group 2
##            10.605            26.100
```

```
t.test(len ~ dose, paired = F, var.equal = F, data = dose3)
```

```
##
##  Welch Two Sample t-test
##
## data:  len by dose
## t = -4.9005, df = 37.101, p-value = 1.906e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -8.996481 -3.733519
## sample estimates:
## mean in group 1 mean in group 2
##          19.735          26.100
```

Supplement as a factor

```
t.test(len ~ supp, paired = F, var.equal = F, data = ToothGrowth)
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 1.9153, df = 55.309, p-value = 0.06063
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1710156  7.5710156
## sample estimates:
## mean in group OJ mean in group VC
##         20.66333         16.96333
```

Conclusion

From this study we can conclude that the supplement type does not have effect on tooth growth and increasing dose levels leads to increased tooth growth.