Statistical_Inference_-_ToohGrowth Analysis

Joel Calixto

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Statistical Inference - Toohgrowth analysis

In this project correspond analysis of tooth growth influencied by supplement type and dose

Load the ToothGrowth data and perform some basic exploratory data analyses

```
#load plot package
library(ggplot2)

## Warning: package 'ggplot2' was built under R version 3.2.3

#take a datasets of example
data("ToothGrowth")

#check type of type and variables
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 ...

#show a previous of data
head(ToothGrowth)

#show a plot of data for explore data
ggplot(data=ToothGrowth, aes(x=dose, y=len, fill=supp)) + geom_bar(stat="
identity",) + facet_grid(. ~ supp) + xlab("Dose in mgs") + ylab("Tooth")
+ guides(fill=guide_legend(title="Supplement type"))
```
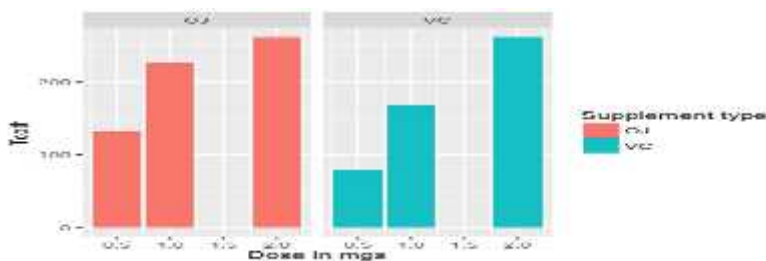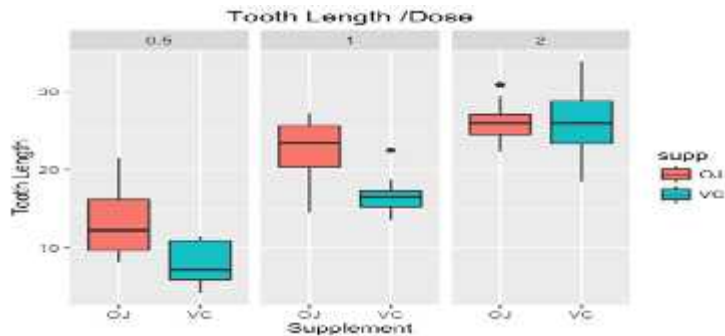


```
#check len of tooth by dose
ggplot(aes(x=supp, y=len), data=ToothGrowth) +geom_boxplot(aes(fill=supp)
) + xlab("Supplement") + ylab("Tooth Length") + facet_grid(~ dose) + ggti
tle("Tooth Length /Dose") + theme(plot.title = element_text(lineheight=.2
))
```

```
#check len of tooth by supplement type
ggplot(aes(x=supp, y=len), data=ToothGrowth) +geom_boxplot(aes(fill=supp)
) + xlab("Type of Supplement") + ylab("Tooth height") + guides(fill=guide
_legend(title="Supplement type"))
```
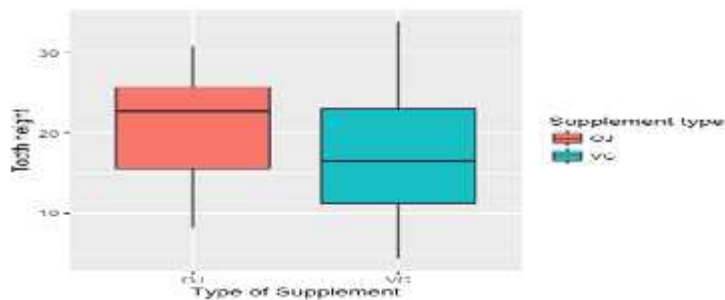

Provide a basic summary of the data.

```
#display a summary of 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
```

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)

We can see that p-value is more great than 0.05 =0.06063 and confidence intervals contains zero, then can not reject NULL hypothesis

```
#compare tooth growth grouping by supplement
t.test(len~supp,data=ToothGrowth)
```

```
## 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
```

In next combination of dose we can see that p-value is 1.268e-07, 4.398e-14, 1.906e-05 respectively and confidence invervals do not contains 0 from this way we can reject NULL hypothesis

```
# generate a var of group combination
doses_com1 <- subset (ToothGrowth, dose %in% c(0.5, 1.0))
doses_com2 <- subset (ToothGrowth, dose %in% c(0.5, 2.0))
doses_com3 <- subset (ToothGrowth, dose %in% c(1.0, 2.0))

# Check for combination 0.5 and 1.0 mg
t.test(len ~ dose, data = doses_com1)

## 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

# Check for combination 0.5 and 2.0 mg
t.test(len ~ dose, data = doses_com2)

## 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

# Check for combination 1.0 and 2.0 mg
t.test(len ~ dose, data = doses_com3)

## 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
```

State your conclusions and the assumptions needed for your conclusions.

With the results above we can conclude 1.- Type of supplement does NOT affect in grow of tooth 2.- Dose of supplement YES can influence grow the tooth