Statistical Inference Course Project Part 2

Amy Su Jiang

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Basic Inferencial Data Analysis

In this exercise we analyze the ToothGrowth data in the R datasets package. The data is set of 60 observations, length of odontoblasts (teeth) in each of 10 guinea pigs at each of three dose levels of Vitamin C (0.5, 1 and 2 mg) with each of two delivery methods (orange juice or ascorbic acid).

```
library(datasets)
library(ggplot2)
ggplot(data=ToothGrowth, aes(x=as.factor(dose), y=len, fill=supp)) +
    geom_bar(stat="identity",) +
    facet_grid(. ~ supp) +
    xlab("Dose in miligrams") +
    ylab("Tooth length") +
    guides(fill=guide_legend(title="Supplement type"))
```
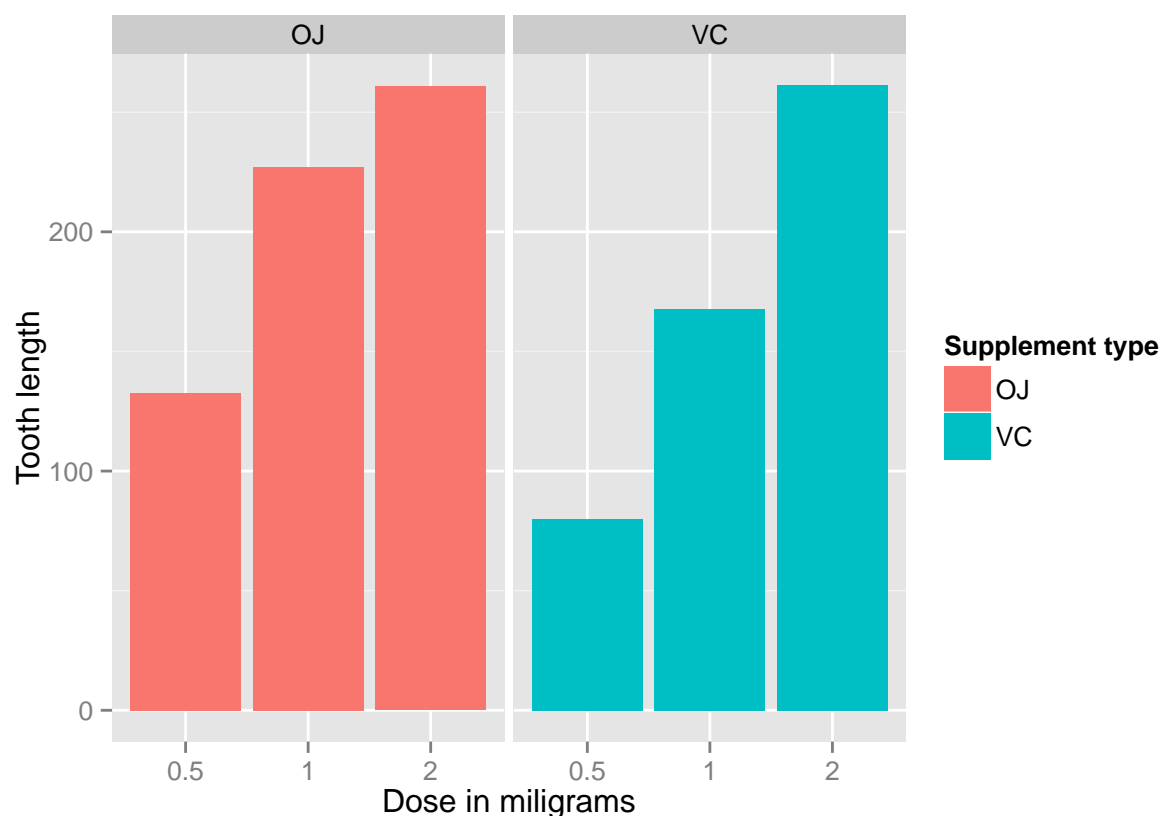

The above diagram shows a clear positive correlation between the tooth length and the dose levels of Vitamin C, for both supplementary types.

The hypothesis test and confidence internal for the postive correlation between tooth length and the intake dose of VC (Vitamin C) is shown as follows:

```
ToothVC <- subset(ToothGrowth,supp=="VC")
VCfit <- lm(len ~ dose, data=ToothVC)
summary(VCfit)
```

```
##
## Call:
## lm(formula = len ~ dose, data = ToothVC)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -8.2264 -2.6029  0.0814  2.2288  7.4893
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)    3.295      1.427   2.309   0.0285 *
## dose          11.716      1.079  10.860 1.51e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.685 on 28 degrees of freedom
## Multiple R-squared:  0.8082, Adjusted R-squared:  0.8013
## F-statistic: 117.9 on 1 and 28 DF,  p-value: 1.509e-11
```

```
confint(VCfit)
```

```
##                  2.5 %    97.5 %
## (Intercept) 0.3717998   6.21820
## dose        9.5059827  13.92545
```

The hypothesis test and confidence internal for the postive correlation between tooth length and the intake dose of OJ (Orange Juice) is shown as follows:

```
ToothOJ <- subset(ToothGrowth,supp=="OJ")
OJfit <- lm(len ~ dose, data=ToothOJ)
summary(OJfit)
```

```
##
## Call:
## lm(formula = len ~ dose, data = ToothOJ)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -7.2557 -3.7979 -0.0643  3.3521  7.9386
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   11.550      1.722   6.708 2.79e-07 ***
## dose           7.811      1.302   6.001 1.82e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 4.446 on 28 degrees of freedom
```

```
## Multiple R-squared:  0.5626, Adjusted R-squared:  0.547
## F-statistic: 36.01 on 1 and 28 DF,  p-value: 1.825e-06
```

confint(OJfit)

```
##                  2.5 %   97.5 %
## (Intercept) 8.022743 15.07726
## dose        5.145073 10.47778
```