Assignment Statistical Inference - Part 2

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Part 2

Exploratory data analyses in the native `ToothGrowth` database

The data set ToothGrowth contains measurements on the effects on tooth length (len) based on varying dosages of vitamin C for a cohort of guinea pigs. [1]

Exploratory analysis

```
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 ...
```

```
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
```

```
unique(ToothGrowth$supp)
```

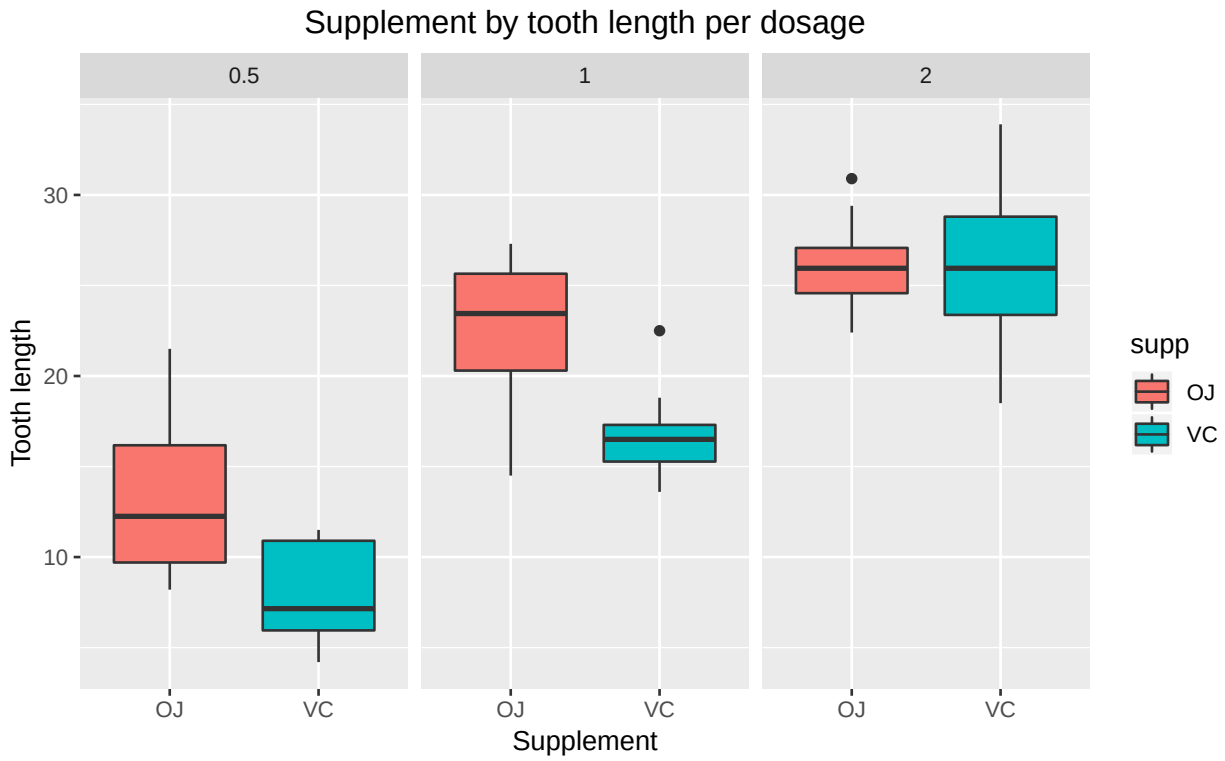
```
## [1] VC OJ
## Levels: OJ VC
```

T test aplied to Tooth length ~ Supplement used, separed by dosage

```
##                p.value  CI95.low CI95.high Orange.Juice.mean
## Dosage 0.5 0.006358607  1.719057  8.780943             13.23
## Dosage 1   0.001038376  2.802148  9.057852             22.70
## Dosage 2   0.963851589 -3.798070  3.638070             26.06
##            Vitamin.C.mean
## Dosage 0.5           7.98
## Dosage 1            16.77
## Dosage 2            26.14
```

[1] Crampton, E. W. (1947). The growth of the odontoblast of the incisor teeth as a criterion of vitamin C intake of the guinea pig. The Journal of Nutrition, 33(5), 491–504. doi: 10.1093/jn/33.5.491 The Effect of Vitamin C on Tooth Growth in Guinea Pigs https://stat.ethz.ch/R-manual/R-devel/library/datasets/html/ToothGrowth.html

See code here



See code here

Conclusion

As we can se **Orange Juice** it is more efective for tooth growth in lower dose than the **Vitamin C** with a significative p-value < 0.05 and Confident intervals over 0.

Appendix

Appendix 1

```
dose0.5 <- t.test(len ~ supp, ToothGrowth[(ToothGrowth$dose == 0.5),])
dose1 <- t.test(len ~ supp, ToothGrowth[(ToothGrowth$dose == 1),])
dose2 <- t.test(len ~ supp, ToothGrowth[(ToothGrowth$dose == 2),])

SummaryTStatistics <- data.frame(
  "p-value" = c(dose0.5$p.value, dose1$p.value, dose2$p.value),
  "CI95 low" = c(dose0.5$conf.int[1],dose1$conf.int[1], dose2$conf.int[1]),
  "CI95 high" = c(dose0.5$conf.int[2],dose1$conf.int[2], dose2$conf.int[2]),
  "Orange Juice mean" = c(dose0.5$estimate[[1]],dose1$estimate[[1]],dose2$estimate[[1]]),
  'Vitamin C mean' = c(dose0.5$estimate[[2]],dose1$estimate[[2]],dose2$estimate[[2]]),
```

```
  row.names = c("Dosage 0.5","Dosage 1","Dosage 2"))
SummaryTStatistics
```

Apendix 2

```
ggplot2::ggplot(ToothGrowth, aes(factor(supp), len, fill = supp))+
  geom_boxplot() +
  facet_grid(.~dose) +
  xlab("Supplement") +
  ylab("Tooth length") +
  ggtitle("Supplement by tooth length per dosage") +
  theme(plot.title = element_text(hjust = 0.5))
```