

Tooth investigation

Jimi Damon

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Overview

In this paper I will be examining the ToothGrowth dataset that comes by default with the R programming language. I will be constructing plots that back up the statistical calculations that I will be making.

I loaded up basic libraries first and then examined the ToothGrowth data by running

```
?ToothGrowth
```

From the query of the ToothGrowth data I found that there are 3 columns of data : one column is the length of teeth specified as len, and two other columns are independent variables labeled as Supp , indicating the type of supplement and dose, indicating the dosage in milligrams. The type of supplement is either Vitamic C provided by Orange Juice (OJ) or by ascorbic acid supplements (VC).

In order to do a basic analysis on this data set , I will convert the ToothGrowth data frame into a tbl_df and make modifications using the

dplyr library.

```
library(dplyr)
library(ggplot2)
tg <- tbl_df(ToothGrowth)
tg$dose <- factor(tg$dose)
```

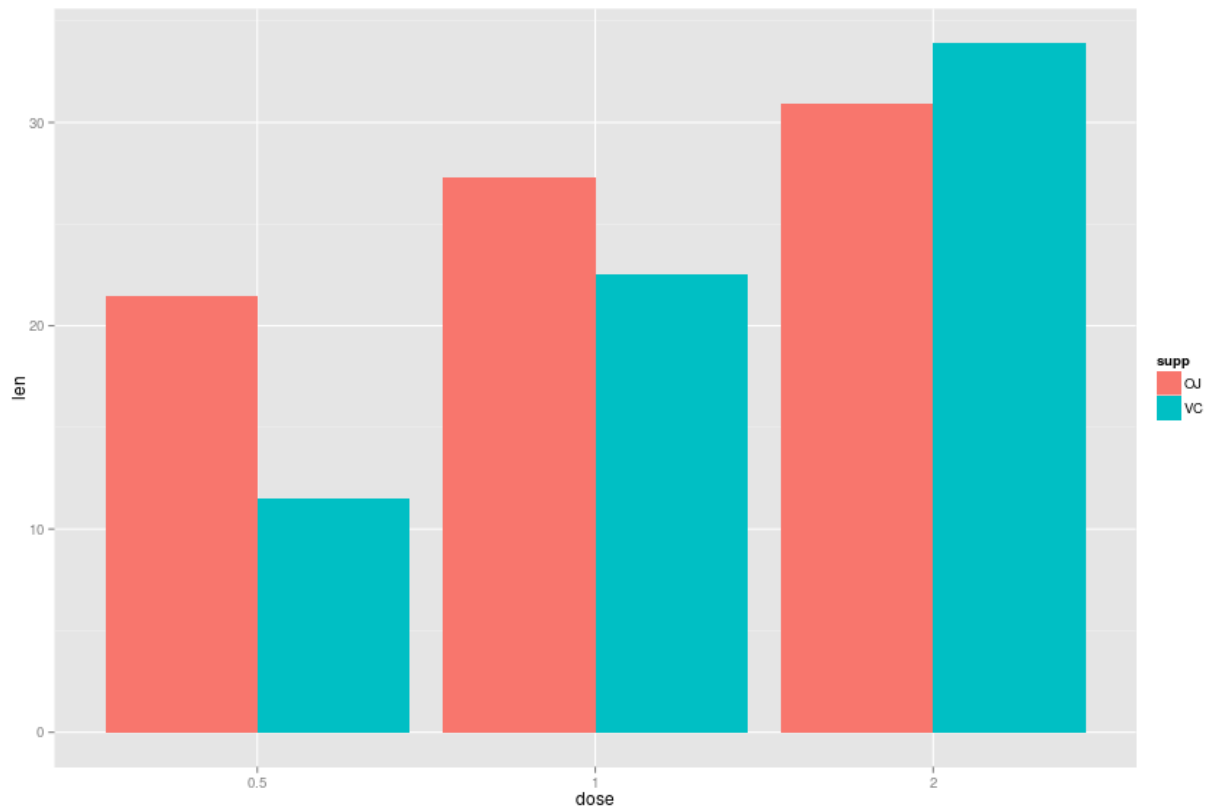
From here I see that there are only two groups of supp. They are

```
unique(factor(tg$supp))
```

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

A quick plot of the data

```
ggplot( tg, aes(x=dose,y=len,fill=supp)) + geom_bar(position=position_dodge(), stat="identity")
```



A quick examination of the data

```
knitr::kable(tg %>% group_by( supp, dose ) %>% summarize( len=mean(len) ) %>% arrange(dose))
```

supp	dose	len
OJ	0.5	13.23
OJ	1	22.70
OJ	2	26.06
VC	0.5	7.98
VC	1	16.77
VC	2	26.14

Statistical Tests

```
t.test(len ~ supp, data=tg , paired=TRUE )
```

```
##
## Paired t-test
##
## data: len by supp
```

```
## t = 3.3026, df = 29, p-value = 0.00255
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.408659 5.991341
## sample estimates:
## mean of the differences
##                      3.7
```

The samples are not equal as our calculated p-value is less than 0.05, the significance level. Hence we reject the null-hypothesis thereby saying that there is in fact a difference between using Orange Juice and the Ascorbic Acid supplements of Vitamin C.