ChiSquare Hyppotesting Testing

Abhirup Sen

14/05/2021

Example 1

gender and preference of taking pet V1 = Dog, V2 = Cat

##Step 1 : Set up the hypothesis HO : Gender and preference of pet is independent H1 : Gender and preference of pet is not independent

```
data <- matrix(c(207, 231, 282, 242), nrow = 2)
data
```

```
##      [,1] [,2]
## [1,]  207  282
## [2,]  231  242
```

Step 2 : Calculate the test statistics

```
chisq.test(data) # part of the stat package
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  data
## X-squared = 3.8454, df = 1, p-value = 0.04988
```

Step 3 : Calculate the critical value

for significance level 0.05, Critical value : 0.05

Step 4: Compare test Statistics with Critical value

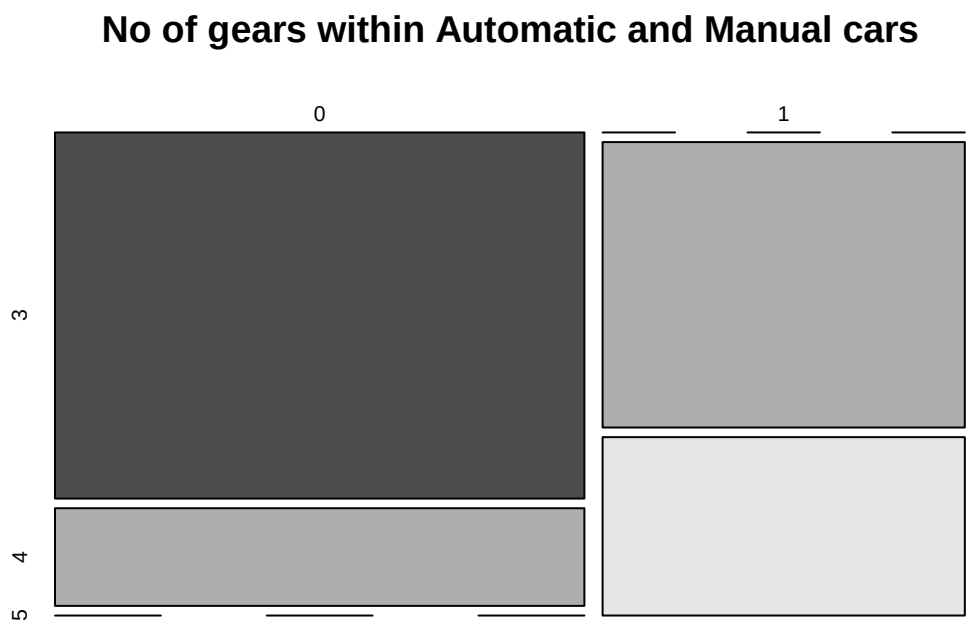
Conlusion : Men and women have difference preference of dog and cat

Example : 2

```
ftable <- table(mtcars$am, mtcars$gear)
ftable
```

```
##
##      3  4  5
##   0 15  4  0
##   1  0  8  5
```

```
mosaicplot(ftable, main ="No of gears within Automatic and Manual cars", col = TRUE)
```




```
chisq.test(ftable)
```

```
## Warning in chisq.test(ftable): Chi-squared approximation may be incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  ftable
## X-squared = 20.945, df = 2, p-value = 2.831e-05
```

```
? chisq.test(ftable)
```

```
## starting httpd help server ... done
```

2.831e-05 is the P value which is much less that 0.05 and hence NULL hypothesis can be rejected.There is a strong association betwene AM and gear.

#Case study

the manager of a resturant needs to know the relation between customer satisfaction and salaries of

the people. He gets > random sample of 100 customers asking if the service was excellent good or poor. > categories of salaries of people waiting as low, medium and high.

```
data <- matrix(c(9,11,12,10,9,8,7,31,3),nrow = 3)
View(data)
chisq.test(data)
```

```
##
##  Pearson's Chi-squared test
##
## data:  data
## X-squared = 18.658, df = 4, p-value = 0.0009172
```

P is less than 0.05 and hence reject the NULL hypothesis and conclude that

Service Quality is dependent on employee salary