```r
ins<-read.csv("C:/Users/Himanshu/Desktop/simpl/DATA SCIENCE WITH R/Insurance/SwedishMotorInsurance.csv",header = T)


#1 ques
#The committee is interested to know each field of the data collected through descriptive analysis
#to gain basic insights into the data set and to prepare for further analysis.
summary(ins)
```

```
##    Kilometres         Zone          Bonus            Make      
##  Min.   :1.000   Min.   :1.00   Min.   :1.000   Min.   :1.000  
##  1st Qu.:2.000   1st Qu.:2.00   1st Qu.:2.000   1st Qu.:3.000  
##  Median :3.000   Median :4.00   Median :4.000   Median :5.000  
##  Mean   :2.986   Mean   :3.97   Mean   :4.015   Mean   :4.992  
##  3rd Qu.:4.000   3rd Qu.:6.00   3rd Qu.:6.000   3rd Qu.:7.000  
##  Max.   :5.000   Max.   :7.00   Max.   :7.000   Max.   :9.000  
##     Insured              Claims           Payment        
##  Min.   :     0.01   Min.   :   0.00   Min.   :       0  
##  1st Qu.:    21.61   1st Qu.:   1.00   1st Qu.:    2989  
##  Median :    81.53   Median :   5.00   Median :   27404  
##  Mean   :  1092.20   Mean   :  51.87   Mean   :  257008  
##  3rd Qu.:   389.78   3rd Qu.:  21.00   3rd Qu.:  111954  
##  Max.   :127687.27   Max.   :3338.00   Max.   :18245026  
```

```r
#2ques
# The total value of payment by an insurance company is an important factor to be monitored.
#So the committee has decided to find whether this payment is related to number of claims
#and the number of insured policy years.
#They also want to visualize the results for better understanding.
#myapprocah1
lm1<-lm(ins$Payment~ins$Claims+ins$Insured)
lm1
```

```
## 
## Call:
## lm(formula = ins$Payment ~ ins$Claims + ins$Insured)
```

```
##
## Coefficients:
## (Intercept)   ins$Claims  ins$Insured
##     3250.74      4294.77        28.39
```

```
summary(lm1)
```

```
##
## Call:
## lm(formula = ins$Payment ~ ins$Claims + ins$Insured)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -799392  -12743   -3733   10591  861235
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 3250.7447  1582.7077   2.054   0.0401 *
## ins$Claims  4294.7750    18.2819 234.920   <2e-16 ***
## ins$Insured   28.3881     0.6514  43.580   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 71270 on 2179 degrees of freedom
## Multiple R-squared:  0.9951, Adjusted R-squared:  0.9951
## F-statistic: 2.211e+05 on 2 and 2179 DF,  p-value: < 2.2e-16
```

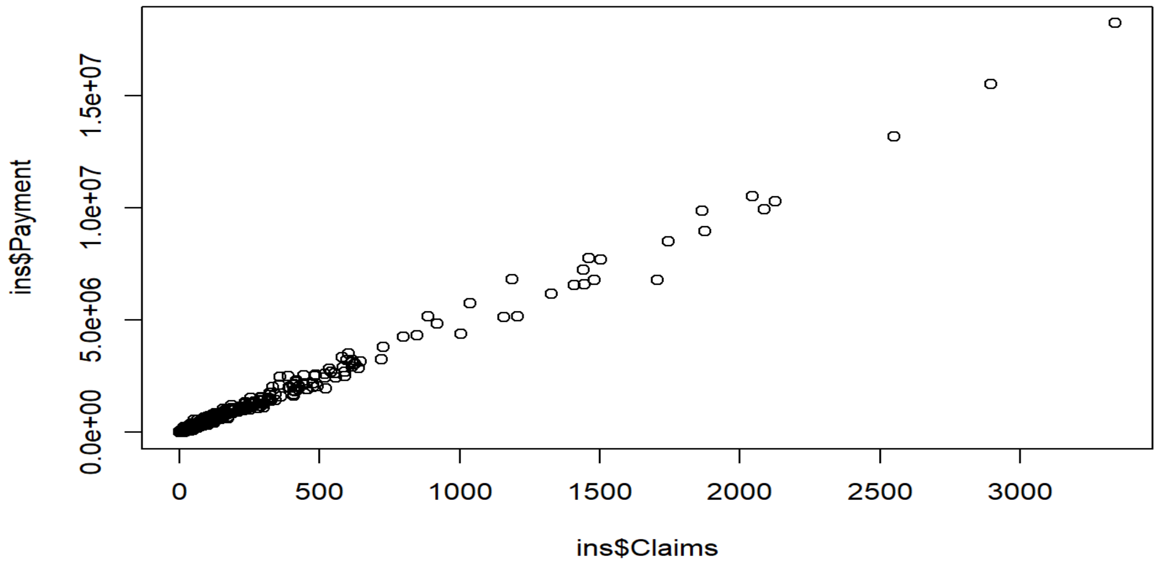
```
#myapproach 2
#with linear we cant differnetiate only tell is it related strongly or not
#pvalue of claima and isnured is less therefor this means significant role of both for the total payment


cor(ins$Claims,ins$Payment)
```

```
## [1] 0.9954003
```

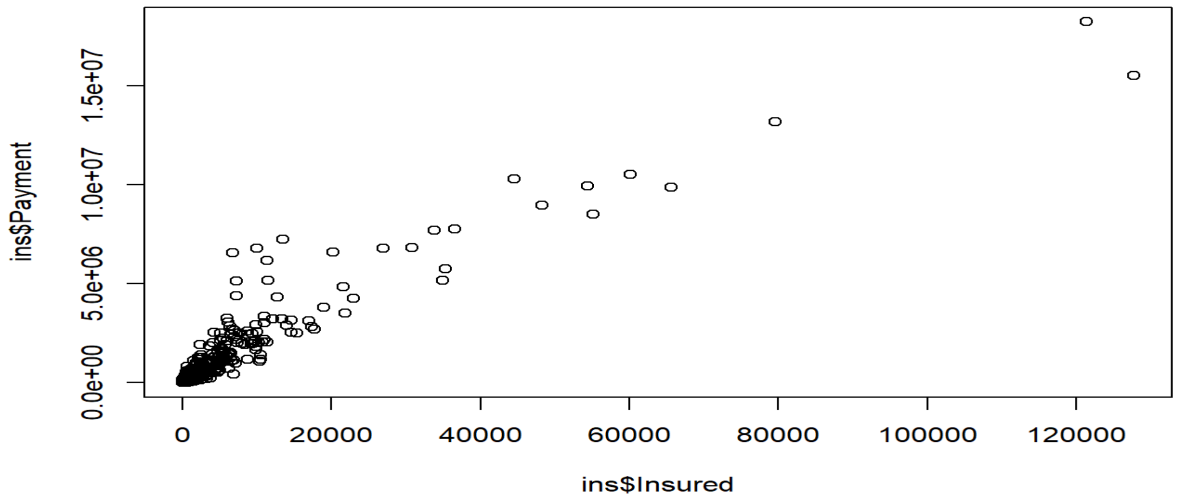
```
#99.54% means positively corelated with payment
cor(ins$Insured,ins$Payment)
```

```
## [1] 0.933217
```

```
#93.33% positively corelated insured with paymnet
#now to plot
plot(ins$Claims,ins$Payment)
```



```
plot(ins$Insured,ins$Payment)
```



```
#3ques
```

```r
#The committee wants to figure out the reasons for insurance payment increase and decrease.
#So they have decided to find whether distance, location, bonus, make, and insured amount or
#claims are affecting the payment or all or some of these are affecting it.
#Independent variable: insured, claims, make, bonus, zone, and kilometers
# Dependent variable: payment
lm2<-lm(ins$Payment~.,data=ins)
summary(lm2)
```

```
##
## Call:
## lm(formula = ins$Payment ~ ., data = ins)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -806775  -16943   -6321   11528  847015
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.173e+04  6.338e+03  -3.429 0.000617 ***
## Kilometres   4.769e+03  1.086e+03   4.392 1.18e-05 ***
## Zone         2.323e+03  7.735e+02   3.003 0.002703 **
## Bonus        1.183e+03  7.737e+02   1.529 0.126462
## Make        -7.543e+02  6.107e+02  -1.235 0.216917
## Insured      2.788e+01  6.652e-01  41.913  < 2e-16 ***
## Claims       4.316e+03  1.895e+01 227.793  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 70830 on 2175 degrees of freedom
## Multiple R-squared:  0.9952, Adjusted R-squared:  0.9952
## F-statistic: 7.462e+04 on 6 and 2175 DF,  p-value: < 2.2e-16
```

```r
#except bonus and make all are related where km,insured,claims are strongly affecting
```

```r
#4ques

#The insurance company is planning to establish a new branch office, so they are interested

#to find at what location, kilometer, and bonus level their insured amount, claims,

#and payment get increased.

grupzone<-apply(ins[,c(5,6,7)], 2, function(x) tapply(x, ins$Zone, mean))

grupzone
```

```
##      Insured     Claims   Payment
## 1 1036.17175  73.568254 338518.95
## 2 1231.48184  67.625397 319921.52
## 3 1362.95870  63.295238 307550.85
## 4 2689.38041 101.311111 537071.76
## 5  384.80188  19.047923  93001.84
## 6  802.68457  32.577778 175528.47
## 7   64.91071   2.108844   9948.19
```

```r
# Zone 4 has the highest number of claims, and thus payment as well.

# Zones 1-4 have more insured years, claims, and payments.

grupkil<-apply(ins[,c(5,6,7)],2,function(x)tapply(x,ins$Kilometres,mean))

grupkil
```

```
##     Insured   Claims   Payment
## 1 1837.8163 75.59453 361899.35
## 2 1824.0288 89.27664 442523.78
## 3 1081.9714 54.16100 272012.58
## 4  398.9632 20.79493 108213.41
## 5  284.9475 18.04215  93306.12
```

```r
# Kilometer group 2 has the maximum payments. Though the insured number of years is lesser than kilometre 1, the claims and payments are higher for group 2

grupbon<-apply(ins[,c(5,6,7)],2,function(x)tapply(x,ins$Bonus,mean))

grupbon
```

```
##     Insured    Claims   Payment
## 1  525.5502  62.50489 282921.99
## 2  451.0754  34.23397 163316.62
## 3  397.4737  24.97419 122656.17
## 4  360.3867  20.35161  98498.12
## 5  437.3936  22.82109 108790.50
## 6  805.8167  39.94286 197723.82
## 7 4620.3728 157.22222 819322.48
```

```
#The committee wants to understand what affects their claim rates so as to
decide the right
#premiums for a certain set of situations. Hence, they need to find whether
the insured
#amount, zone, kilometer, bonus, or make affects the claim rates and to what
extent.
reg<-lm(Claims~Kilometres+Zone+Bonus+Make+Insured,data=ins)
summary(reg)
```

```
##
## Call:
## lm(formula = Claims ~ Kilometres + Zone + Bonus + Make + Insured,
##     data = ins)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1214.57   -25.18    -9.41    10.04  1301.78
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) 37.1230027  7.1270679   5.209 2.08e-07 ***
## Kilometres  -3.9648601  1.2255209  -3.235  0.00123 **
## Zone        -6.2924300  0.8647405  -7.277 4.75e-13 ***
## Bonus       -4.2468101  0.8707236  -4.877 1.15e-06 ***
## Make         6.7725342  0.6755390  10.025  < 2e-16 ***
## Insured      0.0318697  0.0003158 100.933  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 80.14 on 2176 degrees of freedom
## Multiple R-squared:  0.8425, Adjusted R-squared:  0.8421
## F-statistic:  2328 on 5 and 2176 DF,  p-value: < 2.2e-16
```

```
#Dependent variable: claims Independent variable: kilometres, zone, bonus, make, and insured
#The results provides the intercept and estimated value and this in turn shows
#that all the p values of independent variables, such as kilometres, zone, bonus, make, and
#insured are highly significant and are making an impact on the claims.
```