Examen Lab. Metodos Numericos grupo 006

Prof: Félix Suriel

Alumno: Eguens Louidor 1-18-1156

```
require(UsingR)
require(dplyr)
data<-nym.2002
#elije tres variables donde place es la variable dependiente, age y time
#valor independiente y tanbiem elije solamente 100 observaciones
Datas<-nym.2002[,c(1,3,5)]
View(Datas)
datas2<-Datas[c(1:100),]
View(datas2)
```

Resultados

Place	Age	Time
3592	52	217.4833
13853	40	272.5500
12256	31	265.2833
10457	33	256.1500
9686	33	252.2500
1784	40	201.9667
16020	30	283.5667
10805	27	255.8833
12201	42	264.2500
19266	48	306.6833

15229	63	281.2667
15260	49	280.2500
10670	33	258.3333
10658	43	257.1333
200	40	163.9333
10178	33	253.6167
2467	40	206.2667
10729	36	257.9333
12093	49	262.1333
12428	34	264.2167
2730	26	209.7333
12179	50	265.2500
20460	33	315.2333
23413	71	414.7000
19921	39	309.2667
11878	28	261.2667
17683	52	295.3167
17933	28	294.8333
10151	52	254.2500
8915	41	248.9500
213	35	164.5000
21647	39	334.0167
2721	48	210.9000
14623	33	271.0667
4715	35	226.4667
10277	46	256.7167

12630	30	264.8333
3751	42	219.1333
6867	31	237.7000
737	40	184.3000
10972	41	253.7500
12968	33	267.4667
17775	37	289.6167
10333	25	256.9667
17068	39	288.0333
14690	34	277.4000
20253	42	316.3333
13301	44	271.3667
8827	45	248.0833
836	30	186.4500
7132	33	237.2000
20479	39	318.6333
23499	67	431.6167
4969	35	227.0167
22469	42	353.1000
16264	30	284.0167
23338	31	407.4333
9692	44	252.6333
16010	44	283.7500
3502	38	218.3833
2596	27	207.0167
23603	58	467.1833

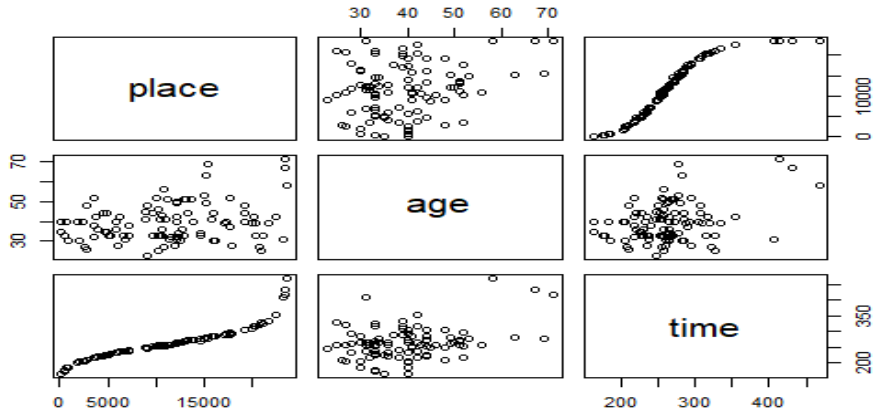
5909	36	231.4167
12677	36	265.1333
507	33	177.3667
17290	40	292.1333
6077	28	234.2000
12275	32	264.5000
3979	36	221.3833
9104	23	247.3167
6693	33	236.2333
6240	42	235.7333
15883	41	284.2500
5768	40	232.3833
12107	40	265.1167
5322	33	230.4167
20939	25	327.1667
20690	27	321.5500
13208	51	268.9667
10826	56	258.5333
9057	48	249.2667
21068	33	326.9333
12967	51	268.1833
11191	51	256.9833
11503	32	256.5000
12100	32	263.8500
15480	69	276.5000
19171	44	306.4167

7158	38	239.5500
11372	31	259.2000
14966	53	277.6833
4582	44	219.7667
4808	44	227.2000
13602	51	272.2167
417	33	175.3667
10437	41	254.5333
5131	33	226.7667
3593	32	219.0500
1996	30	204.6333
19192	40	305.2833

```
#grafico
pairs(datas2)
cor(datas2)
plot(datas2)
```

Resultados

```
          place      age      time
place 1.0000000 0.2593689 0.9276942
age   0.2593689 1.0000000 0.3399526
time  0.9276942 0.3399526 1.0000000
```




```
#crear un modelo multiple para quedar una sola persona que tenga 53 anos y

#haga un tiempo de 277.68

modelo_multiple <- datas2[c(91),]

summary(modelo_multiple)
```

Resultado

```
 place          age         time
Min.   :14966   Min.   :53   Min.   :277.7
1st Qu.:14966   1st Qu.:53   1st Qu.:277.7
Median :14966   Median :53   Median :277.7
Mean   :14966   Mean   :53   Mean   :277.7
3rd Qu.:14966   3rd Qu.:53   3rd Qu.:277.7
Max.   :14966   Max.   :53   Max.   :277.7
```

La sola persona que queda tiene 50 años en un tiempo de 277.7 y ocupa el lugar de 14966; el lugar representa el valor dependiente y la edad y el tiempo representa el valor independiente.

```
#crear el model de RLM

modelo_multiple <- lm(place ~ age + time, data = datas2)

modelo_multiple

summary(modelo_multiple)
```

Resultado

```
Call:

lm(formula = place ~ age + time, data = datas2)

Coefficients:

(Intercept)         age        time

 -18243.45       -41.51       118.41

> summary(modelo_multiple)
```

Resultado

```
Call:

lm(formula = place ~ age + time, data = datas2)

Residuals:

   Min     1Q Median     3Q    Max

-11064  -1702    361   1723   3848

Coefficients:

            Estimate Std. Error t value Pr(>|t|)

(Intercept) -18243.455   1380.012 -13.220   <2e-16 ***

age           -41.515     26.088  -1.591    0.115

time          118.409      4.964  23.855   <2e-16 ***

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2353 on 97 degrees of freedom

Multiple R-squared:  0.8642, Adjusted R-squared:  0.8614

F-statistic: 308.5 on 2 and 97 DF,  p-value: < 2.2e-16
```

A medida aumenta el valor independiente el valor dependiente disminuye

```
step(modelo_multiple, direction = "both", trace = 999)
```

Resultado

Call:

lm(formula = place ~ age + time, data = datas2)

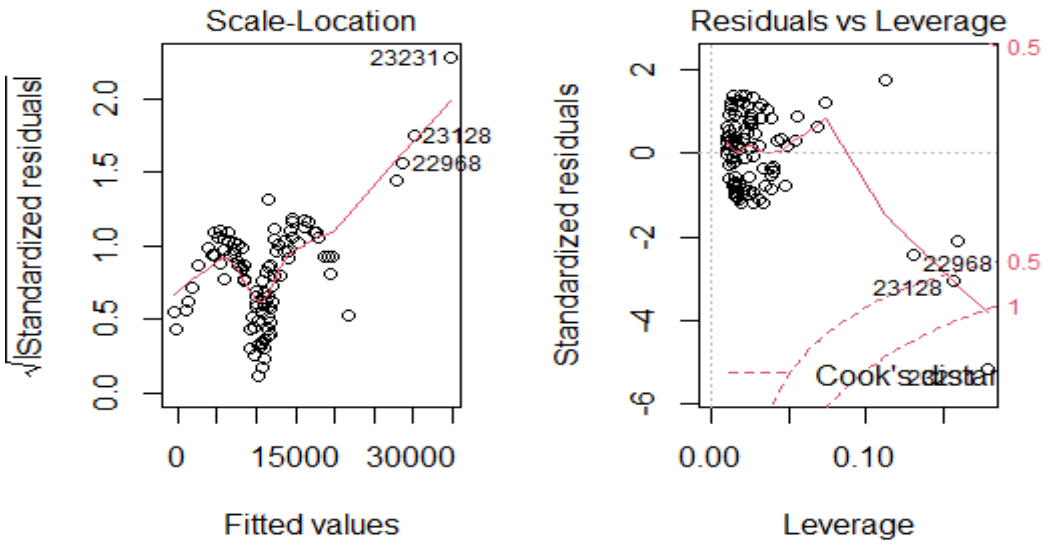
Coefficients:

(Intercept) age time

-18243.45 -41.51 118.41

Analisis de los residuos

```
par(mfrow = c(1,2))

plot(modelo_multiple)

library(corrplot)

corrplot.mixed(corr = cor(datas2[,c("place", "age", "time",)] method = "pearson"))
```



#crear modelo polinomio para saber en que lugar quedaria una persona de 50 anos

#que haga un tiempo de 277.68

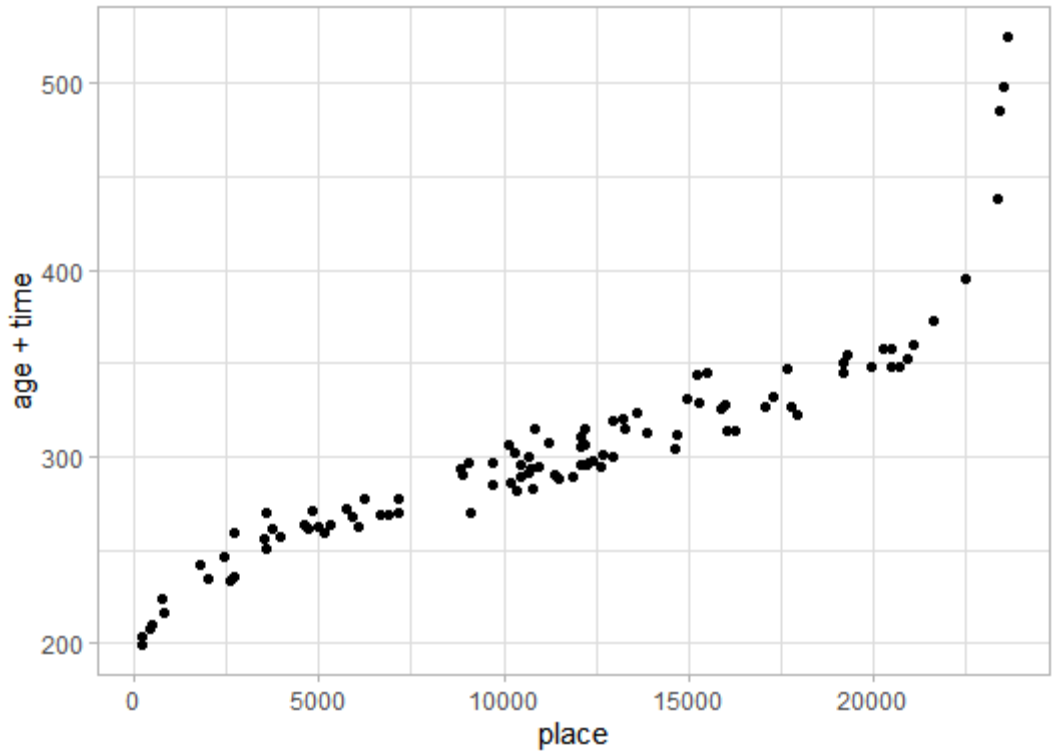
```
model1 <- datas2[c(91),]

model2 <- datas2[c(91),]

summary(model1)

summary(model2)
```

Resultado

```
 place          age         time
Min.   :14966   Min.   :53   Min.   :277.7
1st Qu.:14966   1st Qu.:53   1st Qu.:277.7
Median :14966   Median :53   Median :277.7
Mean   :14966   Mean   :53   Mean   :277.7
3rd Qu.:14966   3rd Qu.:53   3rd Qu.:277.7
Max.   :14966   Max.   :53   Max.   :277.7
> summary(model2)
    place          age         time
Min.   :14966   Min.   :53   Min.   :277.7
1st Qu.:14966   1st Qu.:53   1st Qu.:277.7
Median :14966   Median :53   Median :277.7
Mean   :14966   Mean   :53   Mean   :277.7
3rd Qu.:14966   3rd Qu.:53   3rd Qu.:277.7
Max.   :14966   Max.   :53   Max.   :277.7
```

La sola persona que queda tiene 50 años en un tiempo de 277.7 y ocupa el lugar de 14966; el lugar representa el valor dependiente y la edad y el tiempo representa el valor independiente.

```
#grafico
library(ggplot2)
ggplot(datas2, aes(x=place, y=age+time)) + geom_point() + theme_light()
```




```
model3 <- lm(place ~ age + time, data = datas2)

model4 <- lm(place ~ age + time + I(place^2), data = datas2)

summary(model3)

summary(model4)
```

Resultado

lm(formula = place ~ age + time, data = datas2)

Residuals:

Min	1Q	Median	3Q	Max
-11064	-1702	361	1723	3848

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-18243.455	1380.012	-13.220	<2e-16	***
age	-41.515	26.088	-1.591	0.115	
time	118.409	4.964	23.855	<2e-16	***

```
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2353 on 97 degrees of freedom

Multiple R-squared:  0.8642, Adjusted R-squared:  0.8614

F-statistic: 308.5 on 2 and 97 DF,  p-value: < 2.2e-16

> summary(model4)

Call:

lm(formula = place ~ age + time + I(place^2), data = datas2)

Residuals:

   Min     1Q  Median     3Q    Max

-5639.1  -944.7   807.7  1355.2  1944.6

Coefficients:

             Estimate Std. Error t value Pr(>|t|)

(Intercept) -1.538e+03  2.090e+03  -0.736  0.46367

age         -1.227e+01  1.944e+01  -0.631  0.52949

time         3.142e+01  1.019e+01   3.084  0.00267 **

I(place^2)   3.018e-05  3.301e-06   9.142 1.04e-14 ***

---

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1729 on 96 degrees of freedom

Multiple R-squared:  0.9274, Adjusted R-squared:  0.9251

F-statistic: 408.7 on 3 and 96 DF,  p-value: < 2.2e-16

#comparacion de los modelos

ggplot(datas2, aes(x=place, y=age+time)) +geom_point() +

 geom_smooth(method = 'lm', formula = y~x, se=FALSE, col='dodgerblue1') +

 geom_smooth(method = 'lm', formula = y~x+I(x^2), se=FALSE, col='tomato') +

 theme_light()
```

```
anova(model1, model2)
```

Resultado

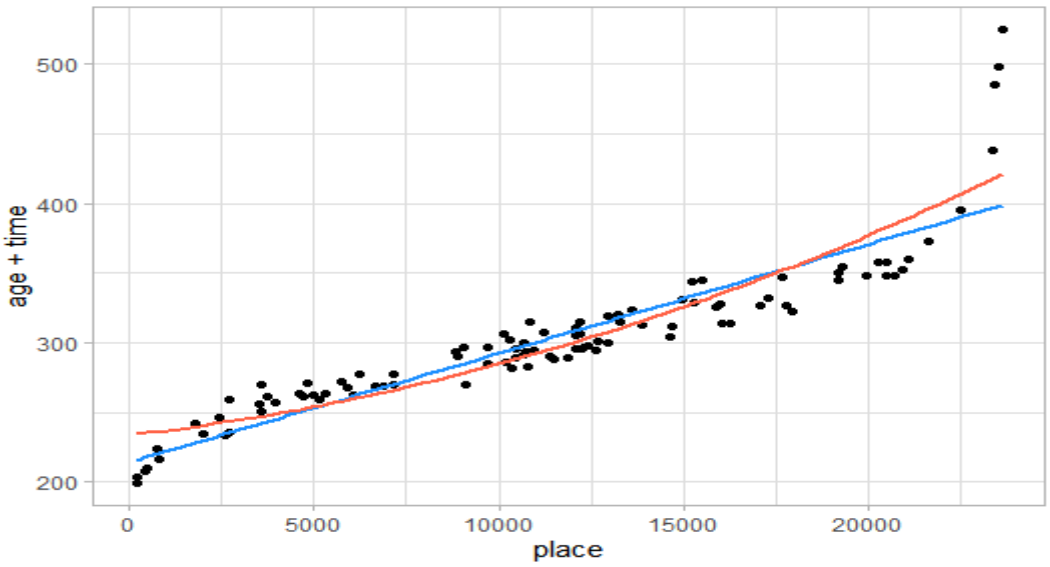
Analysis of Variance Table

Model 1: place ~ age + time

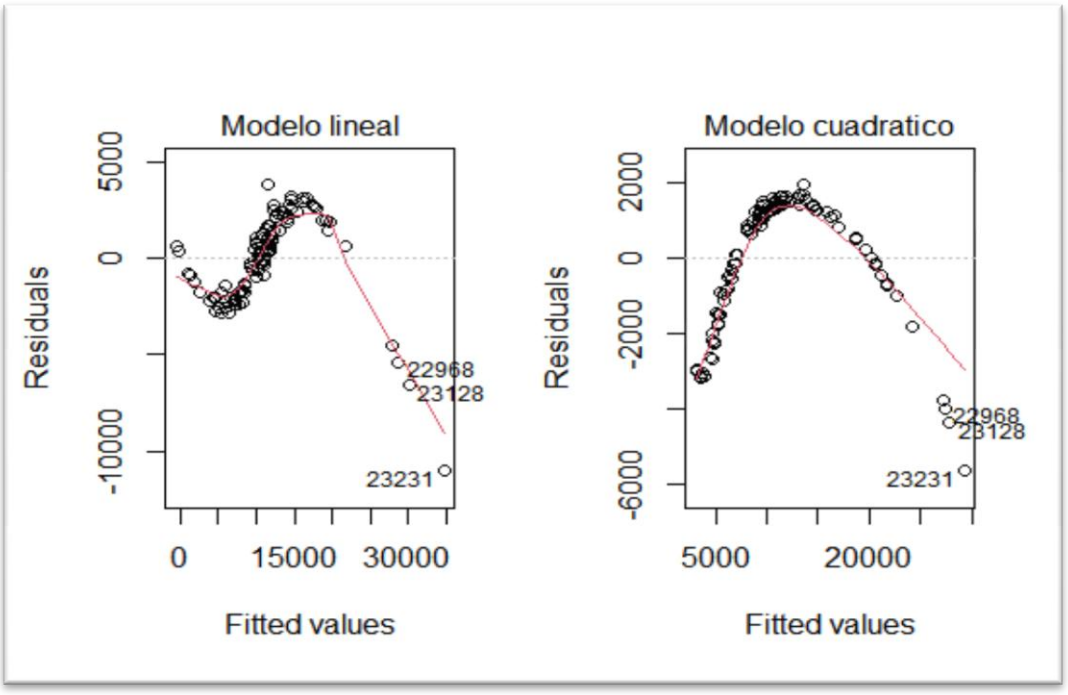
Model 2: place ~ age + time + I(place^2)

Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
1	97	537097920			
2	96	287126181	1	249971739	83.578 1.037e-14 ***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1




```
#analisis residuales del modelo

par(mfrow=c(1, 2))

plot(model1, which=1, caption='Modelo lineal')

plot(model2, which=1, caption='Modelo cuadratico')
```



Mientras que se presenta como un cubo estoy concluyendo para decir que el modelo de polinomio esta correcto