

Regressao_linear_IC

July 20, 2021

1 Regressão Linear Simples

1.0.1 O Pacote palmerpenguins

Informações aqui: [palmerpenguins](#)

Caso não tenham instale o pacote com a função `install.packages("palmerpenguins")`

Carrega pacotes e define tamanho das figuras

```
[2]: #install.packages('palmerpenguins')
options(repr.plot.width=5, repr.plot.height=5)
library(tidyverse)
library(palmerpenguins)
```

1.0.2 Verificando o conjunto de dados

```
[6]: data(penguins)
head(penguins)
```

species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	body_mass_g	sex	year
Adelie	Torgersen	39.1	18.7	181	3750	male	2007
Adelie	Torgersen	39.5	17.4	186	3800	female	2007
Adelie	Torgersen	40.3	18.0	195	3250	female	2007
Adelie	Torgersen	NA	NA	NA	NA	NA	2007
Adelie	Torgersen	36.7	19.3	193	3450	female	2007
Adelie	Torgersen	39.3	20.6	190	3650	male	2007

```
[7]: penguins %>%
      distinct(species, island)
```

species	island
Adelie	Torgersen
Adelie	Biscoe
Adelie	Dream
Gentoo	Biscoe
Chinstrap	Dream

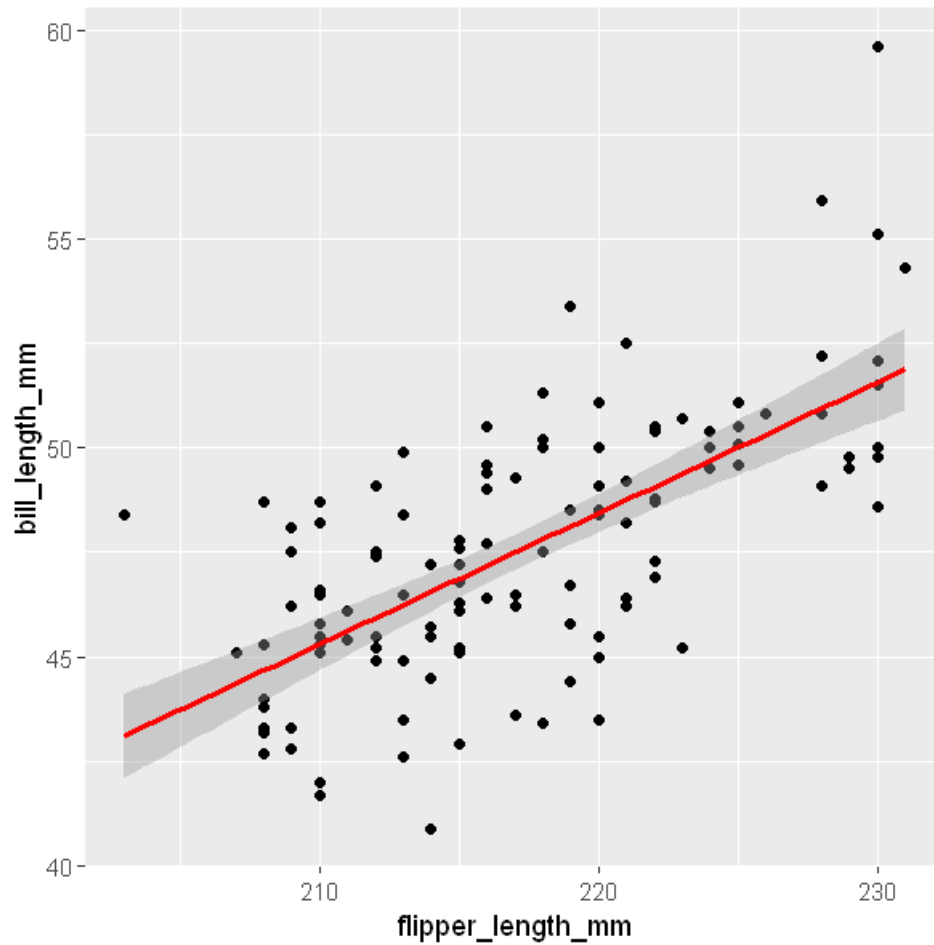
1.0.3 Selecionando a espécie Gentoo

```
[10]: Gentoo = penguins %>%  
      filter(species == 'Gentoo') %>%  
      na.omit()  
  
head(Gentoo)
```

species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	body_mass_g	sex	year
Gentoo	Biscoe	46.1	13.2	211	4500	female	2007
Gentoo	Biscoe	50.0	16.3	230	5700	male	2007
Gentoo	Biscoe	48.7	14.1	210	4450	female	2007
Gentoo	Biscoe	50.0	15.2	218	5700	male	2007
Gentoo	Biscoe	47.6	14.5	215	5400	male	2007
Gentoo	Biscoe	46.5	13.5	210	4550	female	2007

Análise exploratória

```
[31]: plt1 = ggplot(data = Gentoo, mapping = aes(x = flipper_length_mm, y =  
      ↪bill_length_mm)) +  
      geom_point() +  
      geom_smooth(method = 'lm', se = TRUE, color = 2)  
plt1
```



1.0.4 Regressão linear simples

$$Y_i = -20.48 + 0.31X_i$$

Função lm

```
[15]: m = lm(bill_length_mm ~ flipper_length_mm, data = Gentoo)
      summary(m)
```

Call:

```
lm(formula = bill_length_mm ~ flipper_length_mm, data = Gentoo)
```

Residuals:

Min	1Q	Median	3Q	Max
-5.6545	-1.5209	-0.0678	1.3123	8.0330

Coefficients:

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

```
(Intercept)      -20.4879      7.0845  -2.892  0.00457 **
flipper_length_mm  0.3133      0.0326   9.611  < 2e-16 ***
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.332 on 117 degrees of freedom

Multiple R-squared: 0.4412, Adjusted R-squared: 0.4364

F-statistic: 92.37 on 1 and 117 DF, p-value: < 2.2e-16

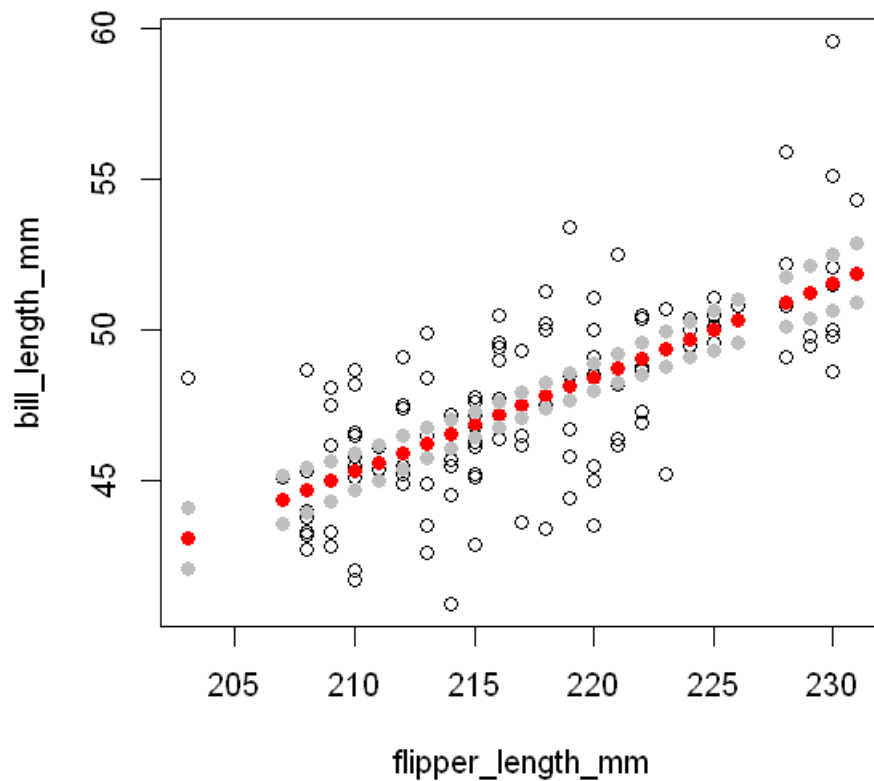
Intervalo de confiança para \hat{Y}

[34]: `?predict.lm`

[39]: `ic = predict.lm(m, interval = "confidence")`
`head(ic)`

fit	lwr	upr
45.61466	45.03049	46.19883
51.56702	50.64059	52.49346
45.30138	44.67099	45.93177
47.80764	47.38142	48.23385
46.86779	46.42052	47.31505
45.30138	44.67099	45.93177

[40]: `plot(bill_length_mm ~ flipper_length_mm, data = Gentoo)`
`points(y = ic[, 'fit'], x = Gentoo$flipper_length_mm, col = 2, pch = 19)`
`points(y = ic[, 'lwr'], x = Gentoo$flipper_length_mm, col = 'gray', pch = 19)`
`points(y = ic[, 'upr'], x = Gentoo$flipper_length_mm, col = 'gray', pch = 19)`



Intervalo de predição para Y

```
[41]: ip = predict.lm(m, interval = "prediction")
      head(ip)
```

Warning message in predict.lm(m, interval = "prediction"):
 "predictions on current data refer to _future_ responses
 "

fit	lwr	upr
45.61466	40.95969	50.26963
51.56702	46.85685	56.27720
45.30138	40.64039	49.96237
47.80764	43.16984	52.44543
46.86779	42.22802	51.50756
45.30138	40.64039	49.96237

```
[42]: plot(bill_length_mm ~ flipper_length_mm, data = Gentoo)
      points(y = ip[, 'fit'], x = Gentoo$flipper_length_mm, col = 2, pch = 19)
```

```
points(y = ip[, 'lwr'], x = Gentoo$flipper_length_mm, col = 'gray', pch = 19)
points(y = ip[, 'upr'], x = Gentoo$flipper_length_mm, col = 'red', pch = 19)
```

