

DR. ALVIN'S PUBLICATIONS

SIMPLE LINEAR REGRESSION USING R

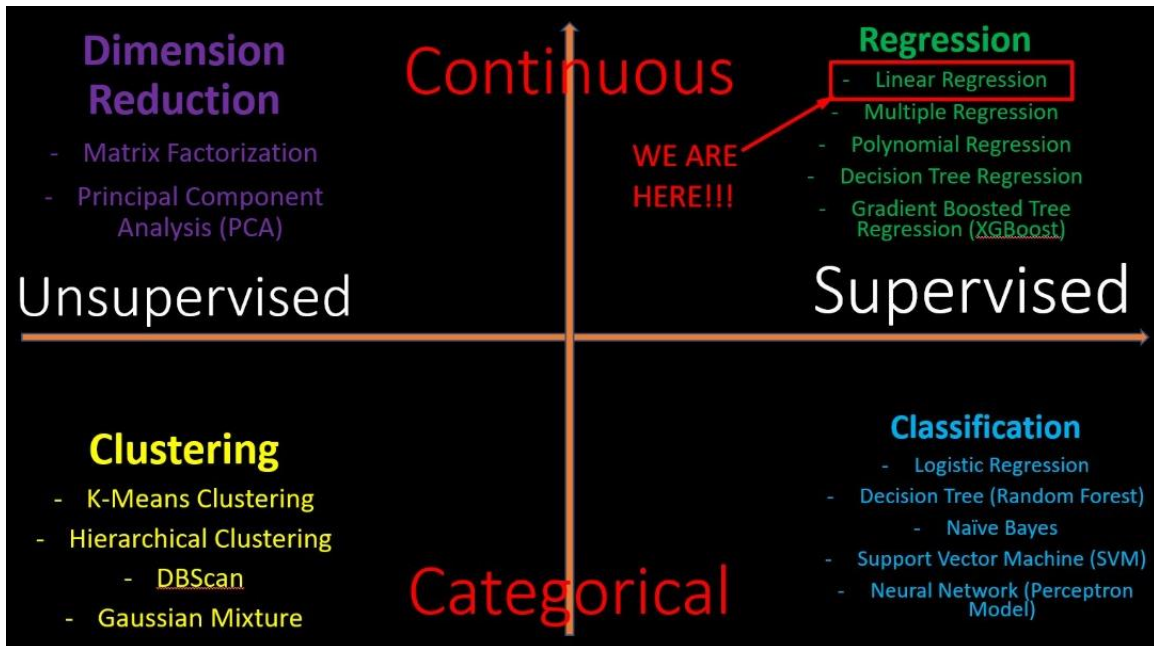
DR. ALVIN ANG



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I. INTRODUCTION

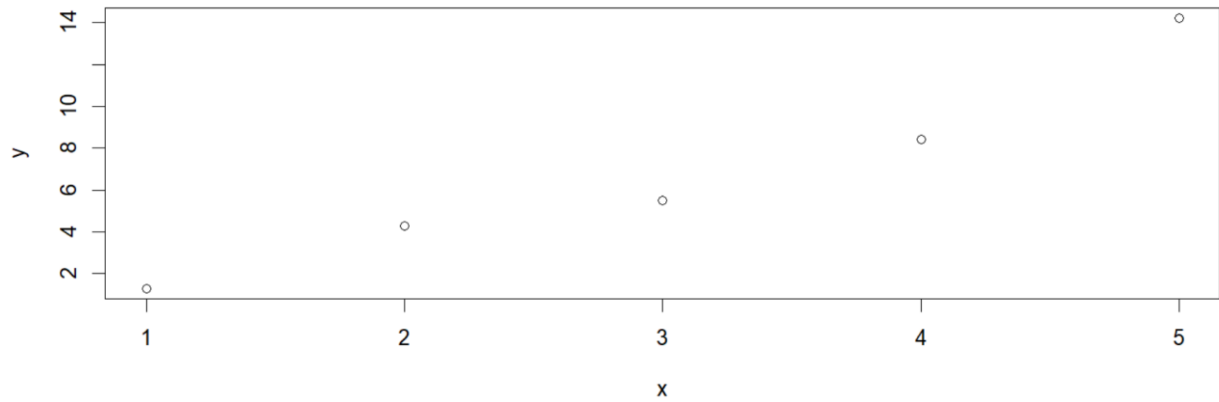


II. R – BASIC DATASET

<https://www.alvinang.sg/s/Simple-Linear-Regression-using-R-by-Dr-Alvin-Ang.R>

A. IMPORT DATASET AND PLOT

```
x = 1:5  
y = c(1.3, 4.3, 5.5, 8.4, 14.2)  
plot(x,y)
```



B. FIT LINEAR MODEL AND SUMMARY

```
m = lm(y~x)
summary(m)
```

```
> summary(m)
Call:
lm(formula = y ~ x)

Residuals:
    1     2     3     4     5 
0.54  0.55 -1.24 -1.33  1.48 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  -2.2300     1.4944  -1.492  0.23247
x              2.9900     0.4506   6.636  0.00697 **
---
Signif. codes:
  0 '***' 0.001 '**' 0.01 '*' 0.05 '.'
  0.1 ' ' 1

Residual standard error: 1.425 on 3 degrees of freedom
Multiple R-squared:  0.9362,    Adjusted R-squared:  0.915 
F-statistic: 44.03 on 1 and 3 DF,  p-value: 0.006973
```

$$Y = mX + C \rightarrow Y = 2.99X - 2.23$$

C. PREDICT

```
predict(m, data.frame(x = 6))
```

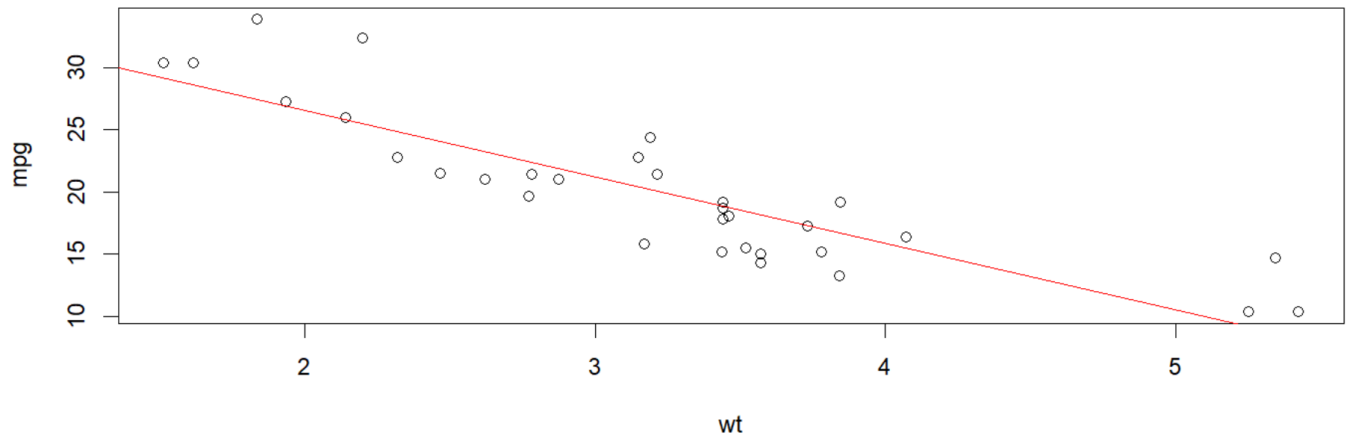
```
1
15.71
```

When $x = 6$, $y = 15.71$

File can be found here: <https://www.alvinang.sg/s/mtcars.csv>

A. IMPORT DATASET, PLOT AND FIT LINEAR MODEL

```
plot(mpg~wt, data = mtcars)
m = lm(mpg~wt, data = mtcars)
abline(m, col = 'red')
```



B. GETTING COEFFICIENTS

```
coef(m)
```

```
(Intercept)      wt  
37.285126     -5.344472
```

$$Y = mX + C \rightarrow \text{MPG} = -5.3445 * \text{wt} + 37.2851$$

C. PREDICT

```
p = predict(m, data.frame(wt = 3))
```

```
> p  
      1  
21.25171
```

When wt = 3, mpg = 21.25171

IV. R – QUAKES.CSV

File can be found here: <https://www.alvinang.sg/s/quakes.csv>

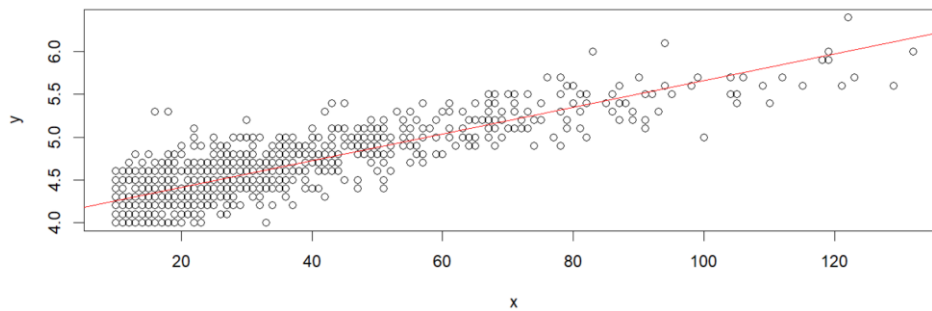
A. IMPORT DATASET, FIT LINEAR MODEL AND PLOT

```
x = quakes$stations
y = quakes$mag

m = lm(y~x)

plot(x, y)

abline(m, col = 'red')
```



B. PREDICT

```
a = predict(m, data.frame(x = 100))
a
```

```
1
5.662689
```

When there are 100 stations (X), the predicted magnitude is 5.66 (Y).

V. R - HEART.CSV

File is here: <https://www.alvinang.sg/s/heart.csv>

A. IMPORT DATASET

```
heart<- read.csv(  
  "https://www.alvinang.sg/s/heart.csv",  
  header=TRUE, sep="," , na.strings = '?')
```



The screenshot shows the RStudio interface. The top pane displays the R console with the code used to load the 'heart' dataset. The middle pane shows a table of the dataset with columns: age, sex, cp, trestbps, chol, fbs, restecg, and thalach. The right pane shows the Environment window with the 'heart' object selected. The table data is as follows:

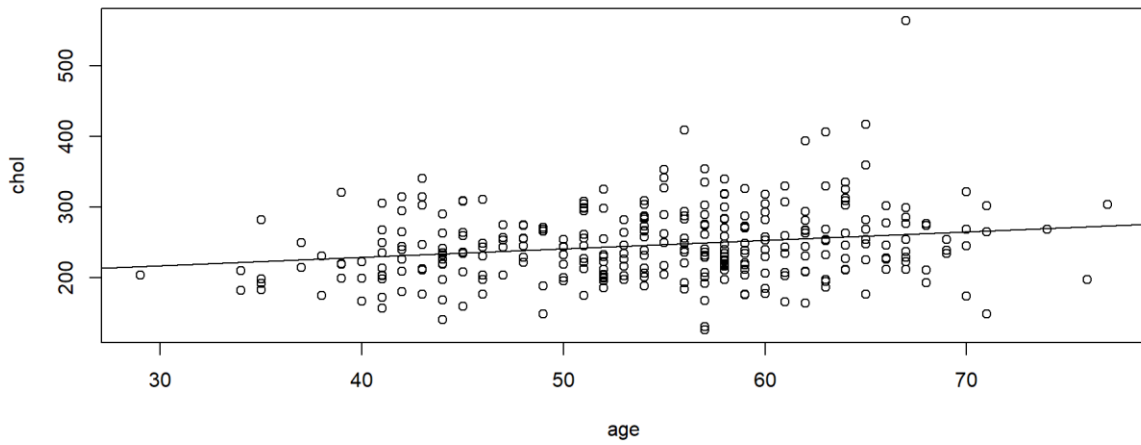
	age	sex	cp	trestbps	chol	fbs	restecg	thalach
1	63	1	1	145	233	1	2	150
2	67	1	4	160	286	0	2	108
3	67	1	4	120	229	0	2	129
4	37	1	3	130	250	0	0	187
5	41	0	2	130	204	0	2	172
6	56	1	2	120	236	0	0	178
7	62	0	4	140	268	0	2	160
8	57	0	4	120	354	0	0	163
9	63	1	4	130	254	0	2	147

B. FIT LINEAR MODEL

```
age = heart$age  
chol = heart$chol  
  
m = lm(chol~age)
```

C. PLOT

```
plot(age, chol)  
abline(m)
```



D. PREDICT

```
predict(m, data.frame(age=60))
```

```
1  
253.3494
```

ABOUT DR. ALVIN ANG



Dr. Alvin Ang earned his Ph.D., Masters and Bachelor degrees from NTU, Singapore. He is a scientist, entrepreneur, as well as a personal/business advisor. More about him at www.AlvinAng.sg.