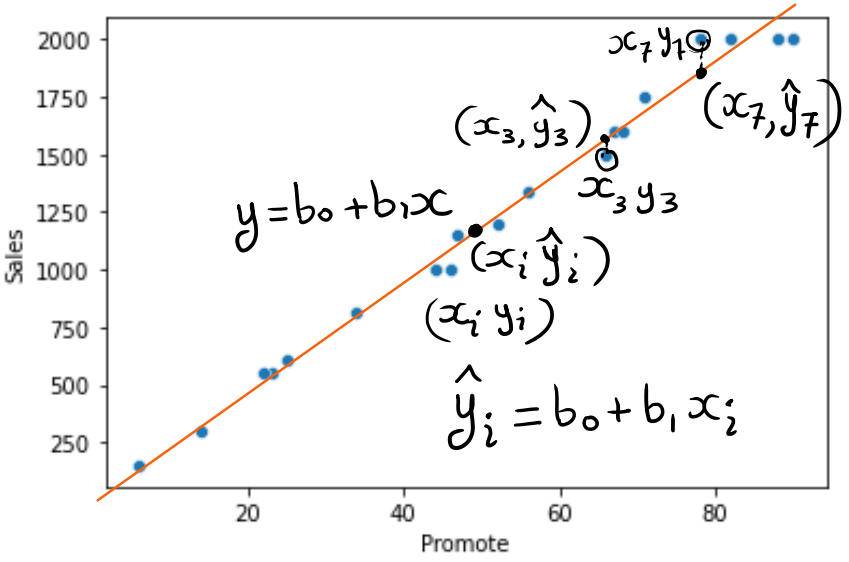
Regression

Tuesday, June 27, 2023 5:27 PM



$ax + by + c = 0$

(x_1, y_1) $\quad ax_1 + by_1 + c = 0$

$y = mx + c$

? ?

Method of least squares

$y = b_0 + b_1 x$

(c) (m)

$x_1\ y_1$

$x_2\ y_2$

$\vdots$

$x_n\ y_n$

$$\text{Residual} = e_i = y_i - \hat{y}_i$$

$\sum_i (y_i - \hat{y}_i)^2$: Residual Sum of Squares

Optimization Problem :-

Find b_0, b_1 such that

$\sum_i (y_i - \hat{y}_i)^2$ is minimum

$\Rightarrow Z = \sum_i (y_i - b_0 - b_1 x_i)^2$

$\frac{\partial Z}{\partial b_0} = 0 \quad \frac{\partial Z}{\partial b_1} = 0$

Simultaneously

to get best values of b_0, b_1

y : Dependent or Response or

X : Independent variable(s) or Predictors or Features

Response
or
Label

Predictors
or
Features

```
In [17]: print("b0 =", lr.intercept_)
b0 = 5.4858653632529695

In [18]: print("b1 =", lr.coef_)
b1 = [23.50640302]
```

$$Sales = 5.485 + 23.506 * Promote$$

$Promote = 0 \Rightarrow Sales = 5.485$

$$Sales = 5.485 + 23.506 * 100$$

? → 23.506 ; 100 → 1

$$\text{Mean Squared error} = \frac{\sum_i (y_i - \hat{y}_i)^2}{n}$$

$$\hat{y}_i = b_0 + b_1 x \quad \text{(x ← Home)}$$

```
b0 = 23045.63894523328
b1 = [215.21298174]
```
for Home

One hot Encoding / Dummying

Sex
F
F
M
M
F

F	M
1	0
1	0
0	1
0	1
1	0

rank	Aso P	Ass P	P
P	0	0	1
Ass P	0	1	0
Aso P	1	0	0
Ass P	0	1	0
Aso P	1	0	0
P	0	0	1
P	0	0	1