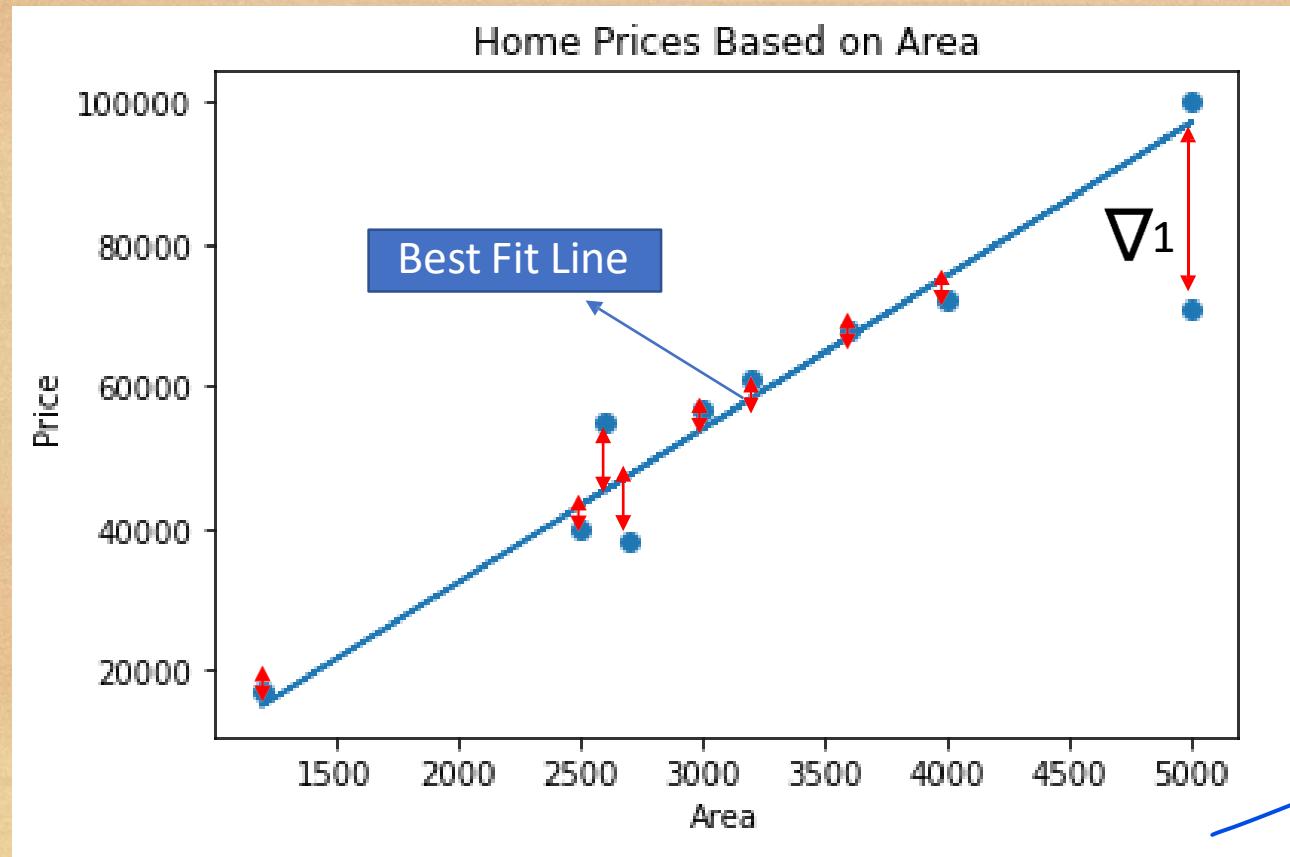


Linear Regression with Multiple Variable

Overview:

- Single Variable Linear Regression
- Multiple Variable Linear Regression
- Single vs Multiple
- Cost Function
- Gradient Decent
- Accuracy
 - R2 Value
- Implementing with Python

All about Single Linear Regression



$$y = mx + b ; \text{ or,}$$
$$Y = 21.43 * X + 4980.13$$

Coefficient = 21.43
Intercept = 4980.13

All about Single Linear Regression

All about Single Linear Regression

$$y = mx + b + \text{error}$$

$$y = b + mx + \text{error}$$

$$Y_i = \underbrace{\beta_0 + \beta_1 X_i}_{\text{Linear component}} + \varepsilon_i$$

Dependent Variable → Population Y intercept → Population Slope Coefficient → Independent Variable → Random Error term

Random Error

Linear Regression with **Multiple** Variable

Multiple

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \varepsilon$$

predictor, 'x-variable',
independent variable,
explanatory variable

coefficient

linear predictor

response, dependent variable,
observation, 'y-variable'

random error,
"noise"

Linear Regression with **Multiple** Variable

Single

$$y = b_0 + b_1 * x_1$$

Multiple

Dependent variable (DV) Independent variables (IVs)

$$y = b_0 + \underline{b_1 * x_1} + \underline{b_2 * x_2} + \dots + \underline{b_n * x_n}$$

C

$\lambda \rightarrow \gamma$

≈ 6

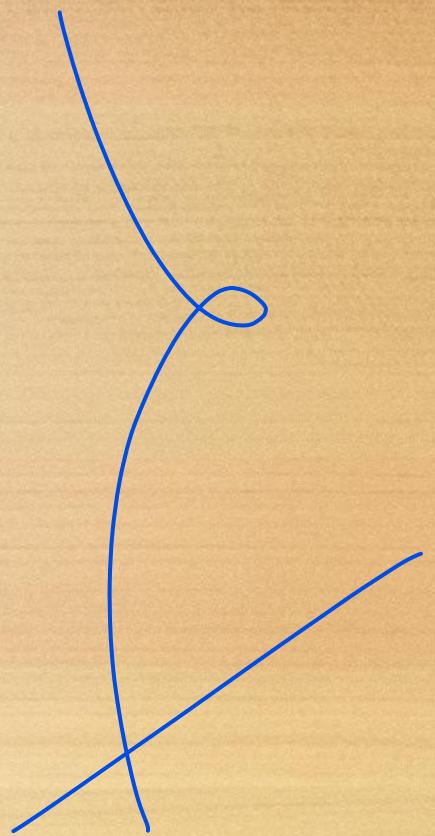
R Squared Value

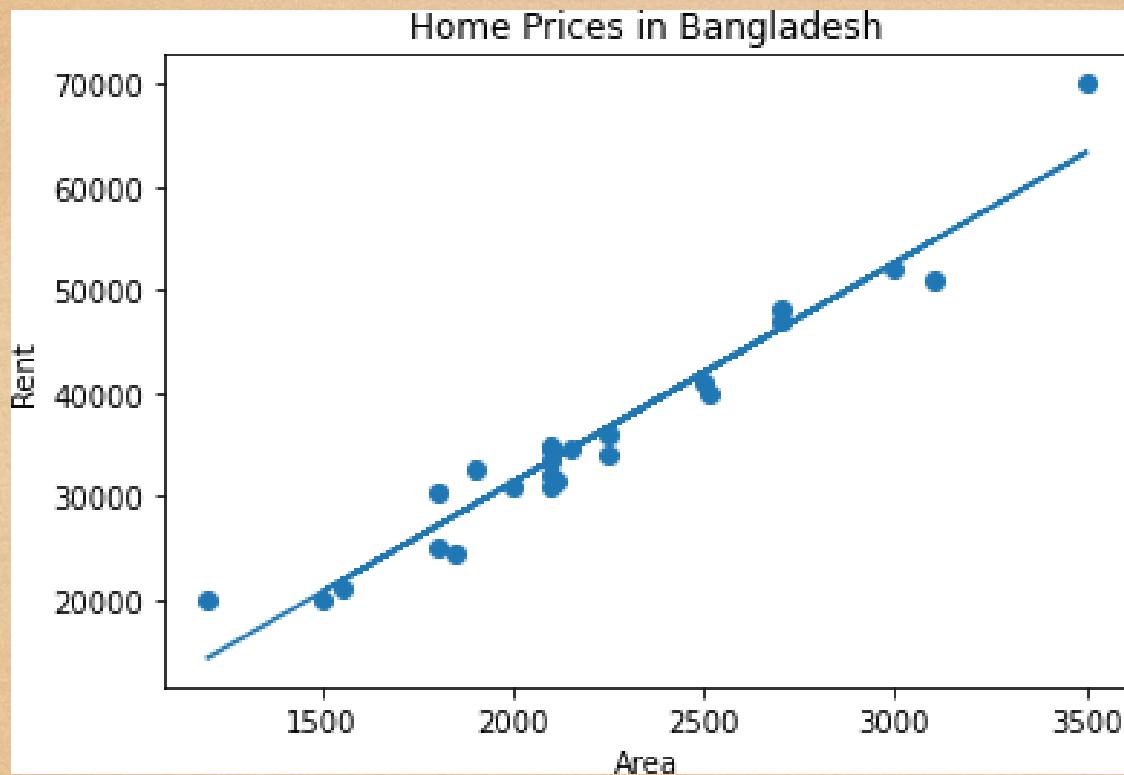
$$\text{R Squared Value} = \sum_{i=0}^{n-1} \frac{\text{Predicted Value (} Y_p \text{)} - \text{Mean Value (} \bar{Y} \text{)}}{\text{Actual Value (} Y \text{)} - \text{Mean Value (} \bar{Y} \text{)}}$$

= Something * 100

Accuracy = Something %

Abu Bakar Siddique Mahi





```
reg.score(xtest,ytest)  
0.8296548051728814
```

```
Y_pred = reg.predict(xtest) #Predicted Y  
R2 Score: from sklearn.metrics import r2_score  
Score = r2_score(ytest, Y_pred)
```