Regression

Date	Location	MinTemp	MaxTemp
2008-12-01	Albury	13.4	22.9
2008-12-02	Albury	7.4	25.1
2008-12-03	Albury	12.9	25.7
2008-12-04	Albury	9.2	28.0
2008-12-05	Albury	17.5	32.3

Given the minimum temperature, predict the maximum temperature?

Regression

Date	Location	MinTemp	MaxTemp
2008-12-01	Albury	13.4	22.9
2008-12-02	Albury	7.4	25.1
2008-12-03	Albury	12.9	25.7
2008-12-04	Albury	9.2	28.0
2008-12-05	Albury	17.5	32.3

Given the minimum temperature, predict the maximum temperature?

Month	Rainfall
Jan	100
Feb	57
March	65
April	119
May	300
June	350
July	285

Given the rainfall of previous months, predict the rainfall of the following months?

Linear Regression

Parameters

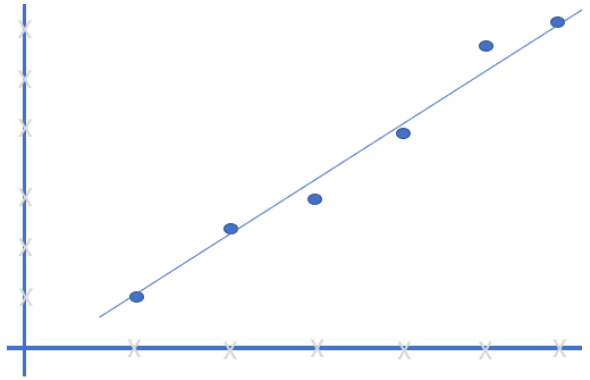
$$y = mx + c$$

Univariate

Dependent variable

Independent variable

Month	Rainfall
Jan	100
Feb	57
March	65
April	119
May	300
June	350
July	285



Linear Regression

$$y = mx + c$$

$$f(x) = Real\ Number$$

Linear Regression

$$y = m\boldsymbol{x} + c$$

Multiple Regression

$$y = m_1 x_1 + m_2 x_2 + m_3 x_3 + c$$

Linear Regression

$$\boldsymbol{y = Mx + c}$$

Multivariate Regression

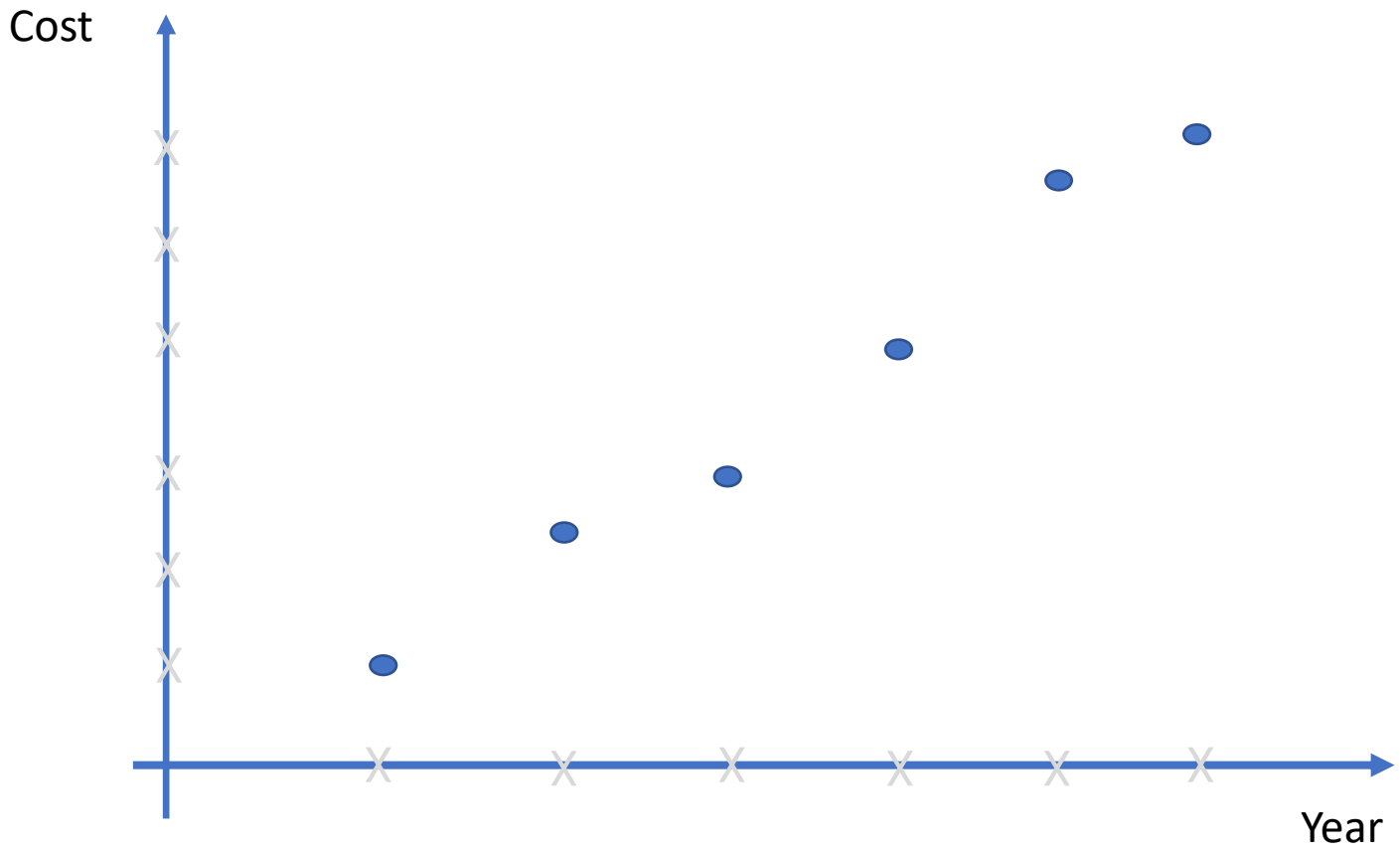
$$< y_1, y_2 >= \boldsymbol{m}_1 x_1 + \boldsymbol{m}_2 x_2 + \boldsymbol{m}_3 x_3 + \boldsymbol{c}$$

Non-Linear Regression

$$y = mx + m_1 x^2 + c$$

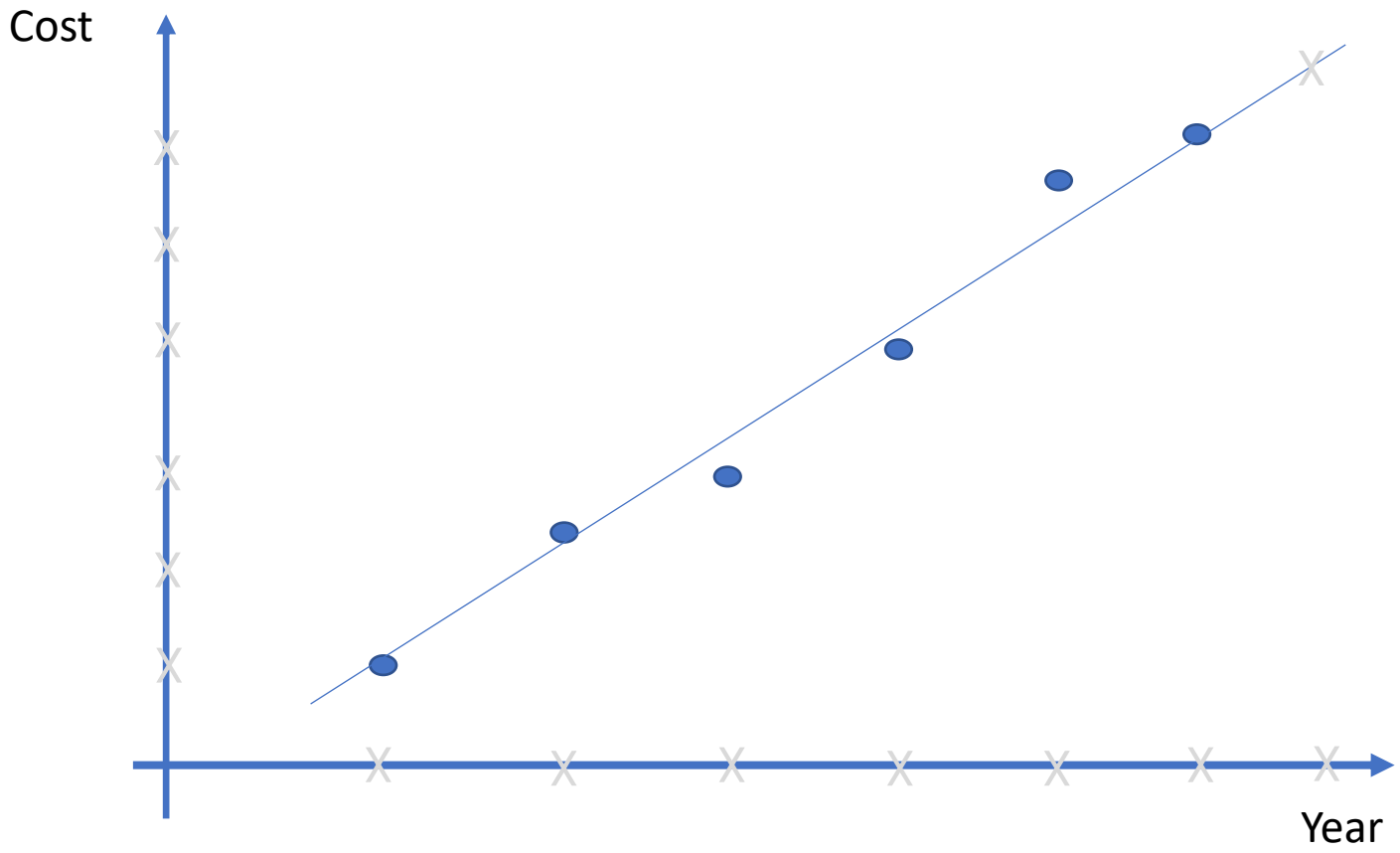
Regression

	Year	Cost
1	2017	500
2	2018	660
3	2019	700
4	2020	850
5	2021	900
6	2022	950



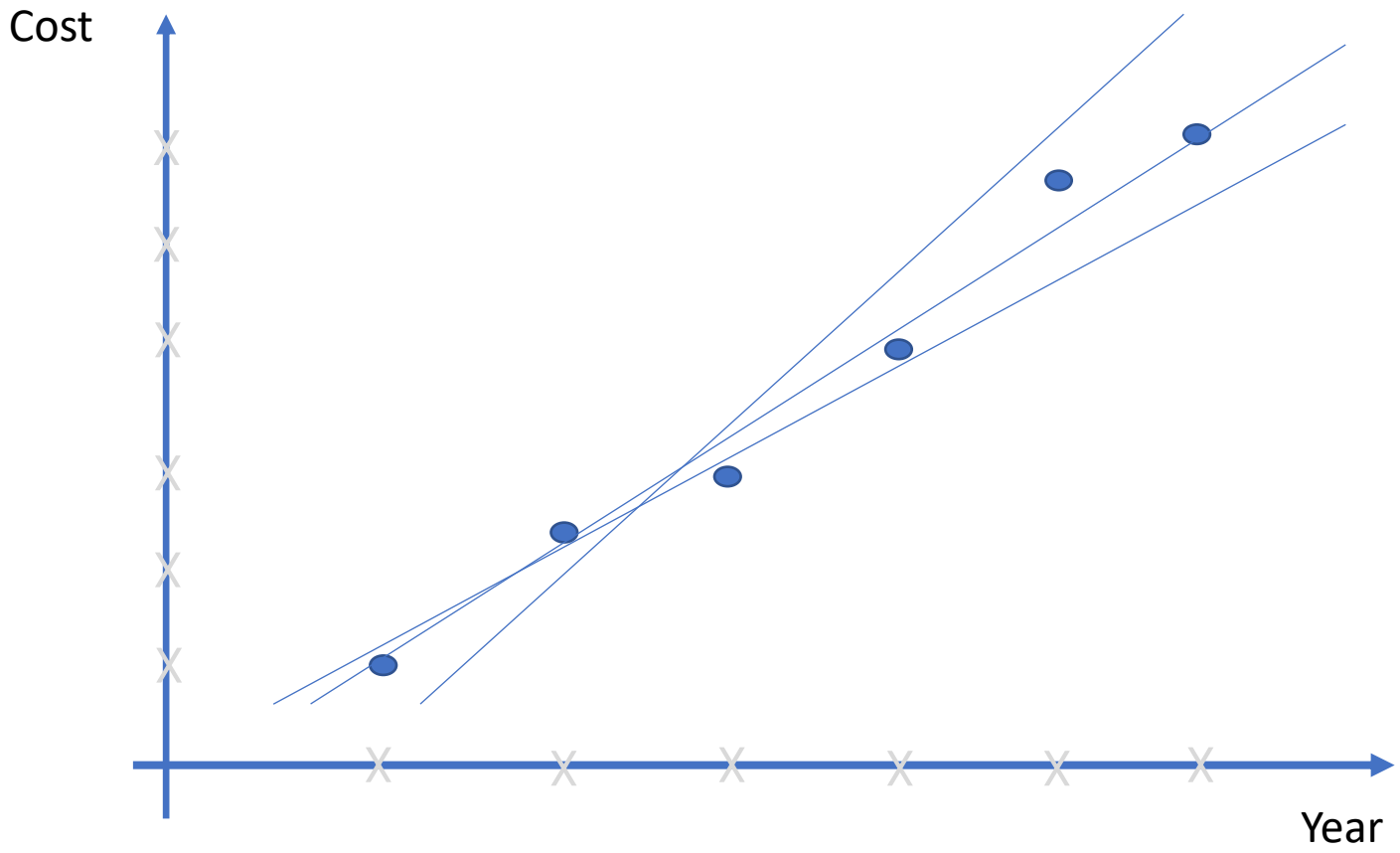
Regression

	Year	Cost
1	2017	500
2	2018	660
3	2019	700
4	2020	850
5	2021	900
6	2022	950



How to fit a line?

	Year	Cost
1	2017	500
2	2018	660
3	2019	700
4	2020	850
5	2021	900
6	2022	950



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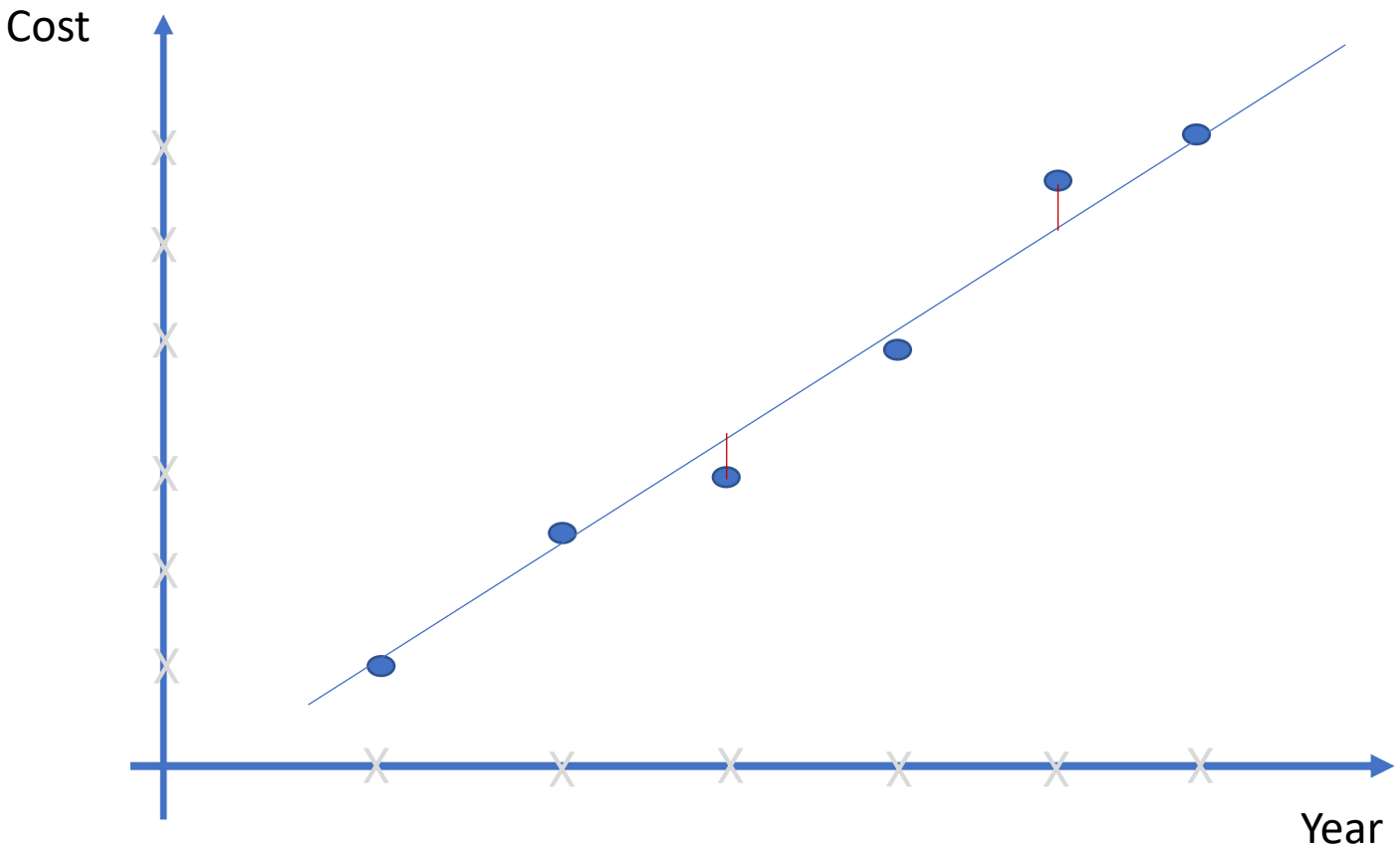
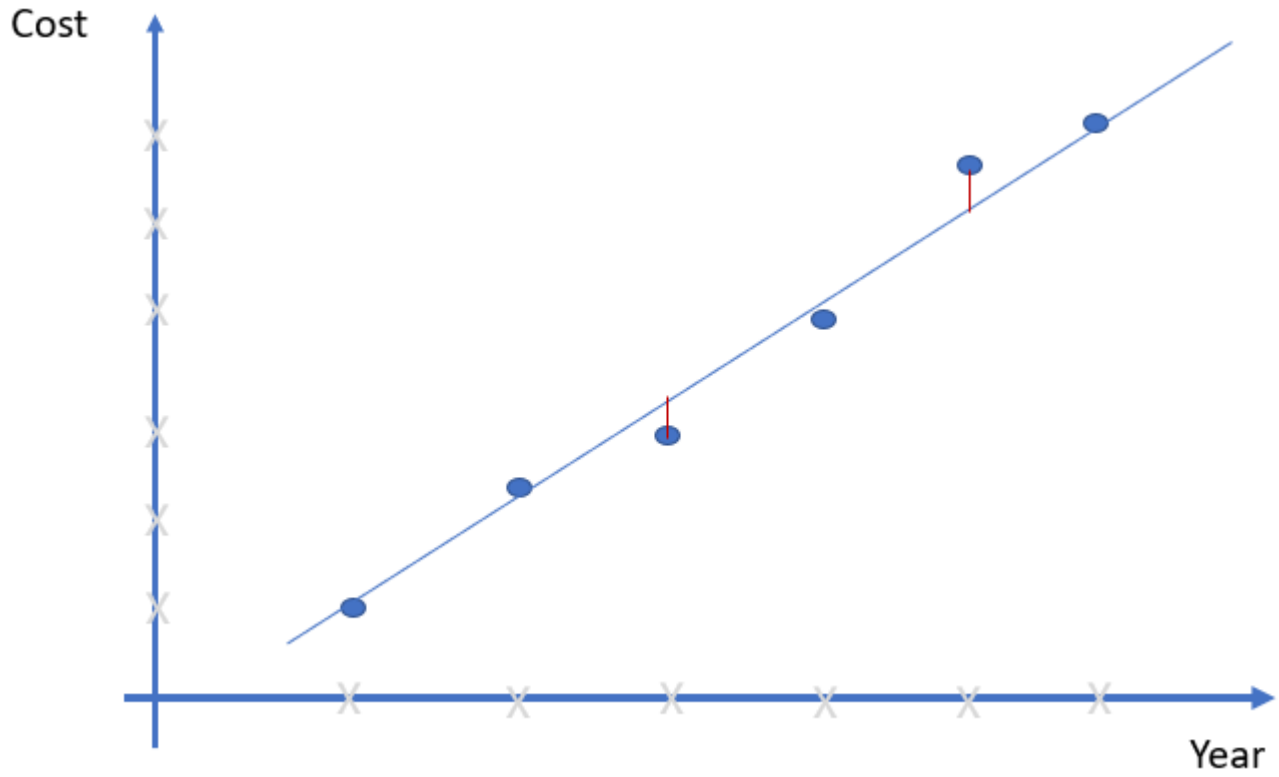


$$Error = d_1 + d_2 + d_3 + d_4 + d_5 + d_6$$

Mean Absolute Error

$$Error = \frac{1}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n} (f(x_i) - \acute{y}_i)$$

$$Error = \frac{1}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n} (f(x_i) - \acute{y}_i)^2$$

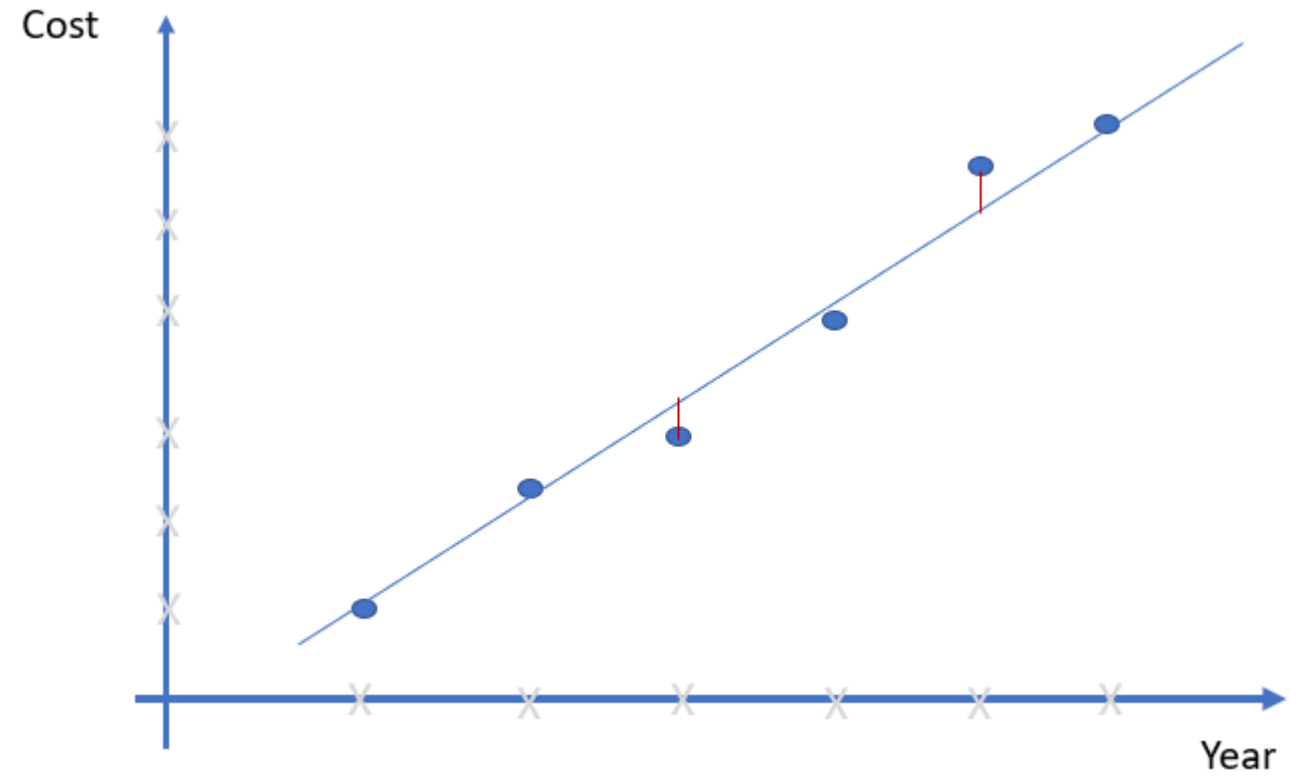


Mean Absolute Error

$$Error = \frac{1}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n} (f(x_i) - \acute{y}_i)$$

Mean Square Error

$$Error = \frac{1}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n} (f(x_i) - \acute{y}_i)^2$$



Mean Absolute Error

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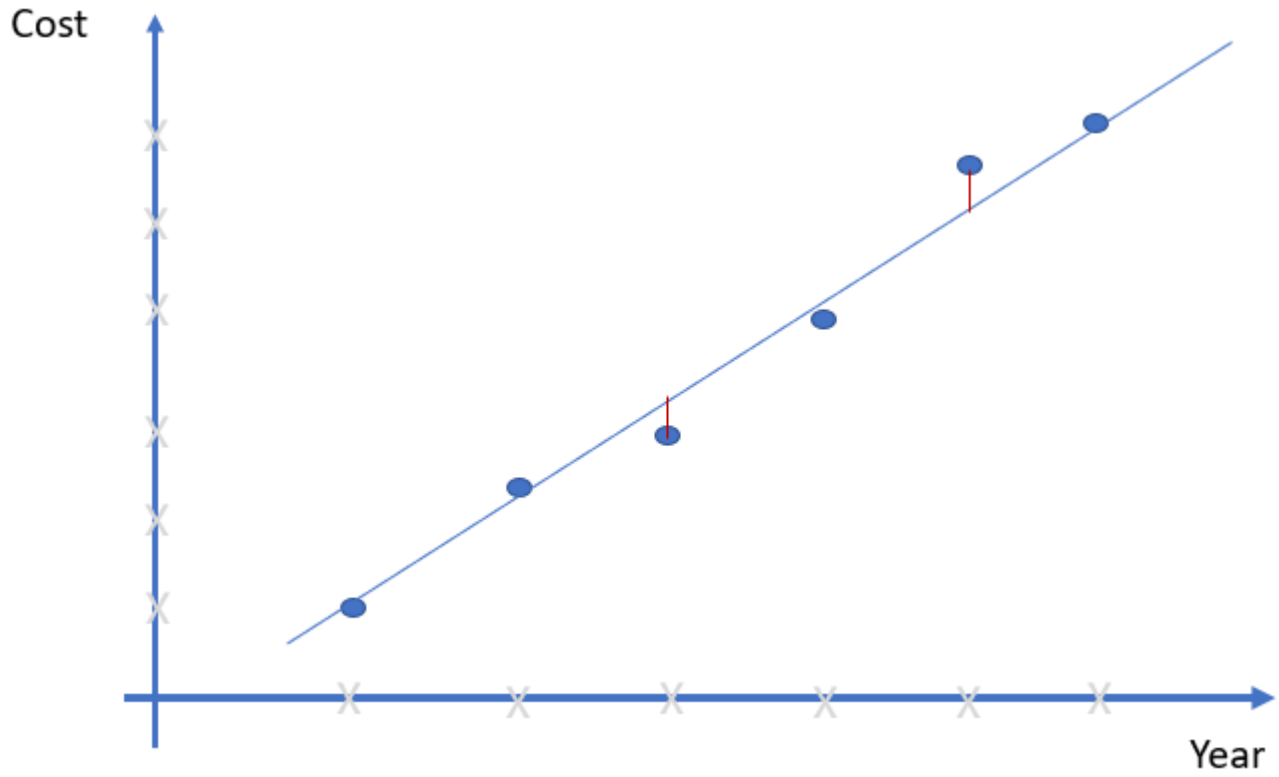
$$Error = \frac{1}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n} (f(x_i) - \acute{y}_i)^2$$



Find a line with minimum Error