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Recap:
- ⇒ Statistics
- ⇒ Introduction to Machine Learning

Agenda:
- Linear Regression
  - ↳ Theory
  - ↳ Mathematical Intuition
  - ↳ Practical Implementation

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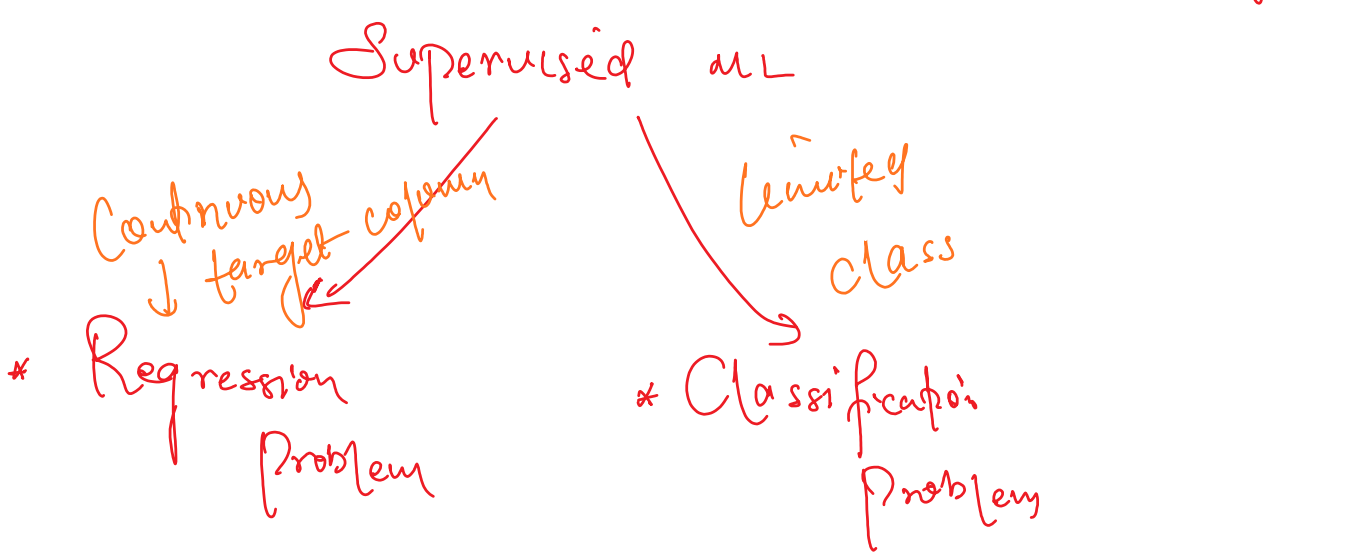
Linear Regression

* It is Supervised ML Algorithm

Supervised → Input + Output (labeled)

Unsupervised → Only Input data

* Input = Independent variable = features
* Output = dependent variable = label = Target

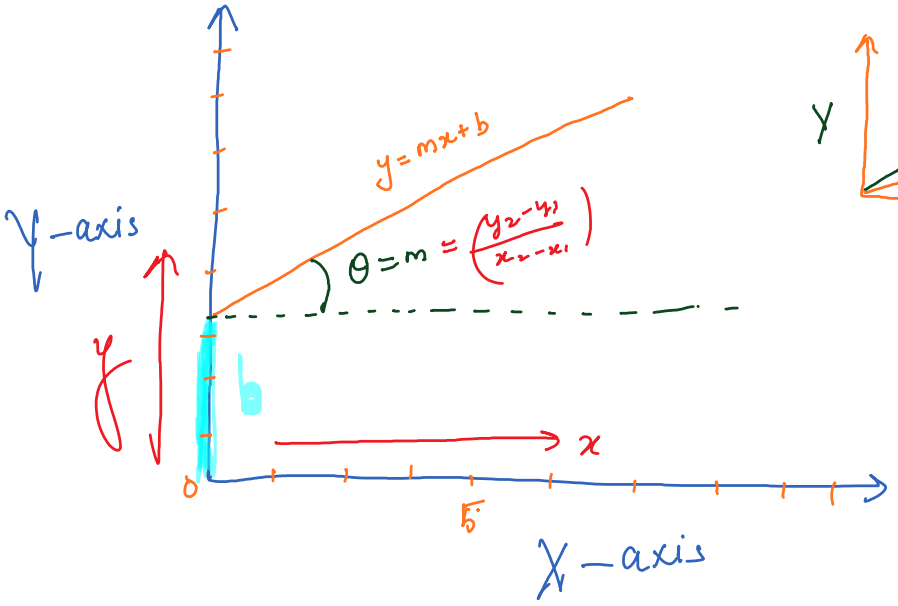


* Linear Regression is a Regression ML Algorithm
* we use linear Regression to Solve Regression type of problem.

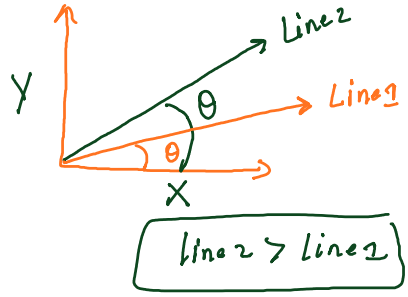
Maths Behind Linear Regression :

$y = mx + b$ $\Rightarrow$ eqn of Straight line

- y : Output
- m : slope
- x : Input data
- b : Intercept

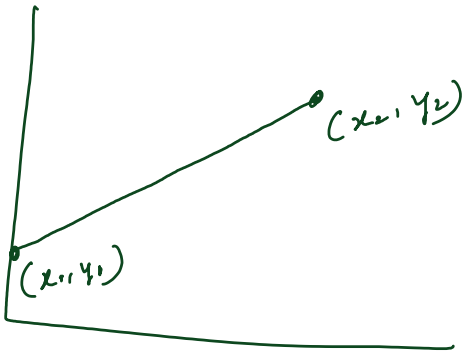


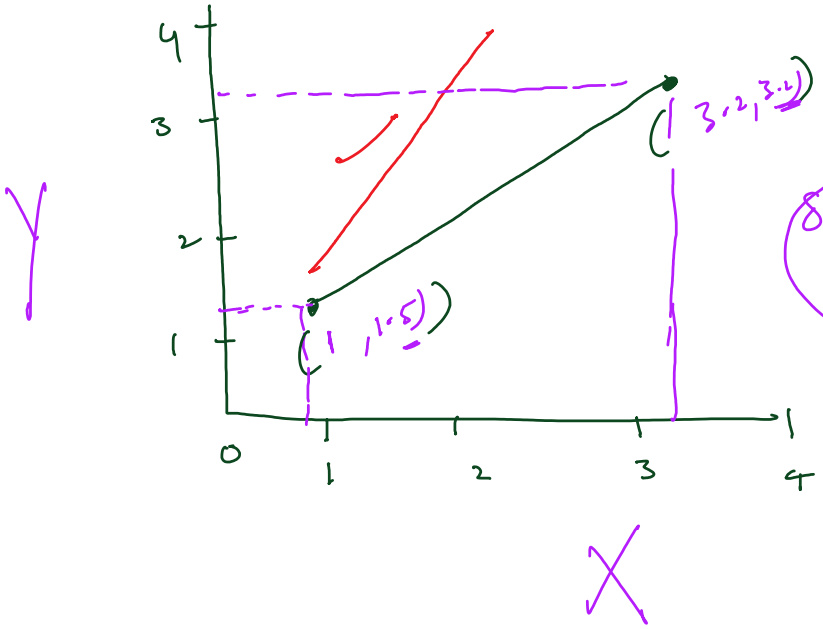
m = slope $= \frac{y_2 - y_1}{x_2 - x_1}$



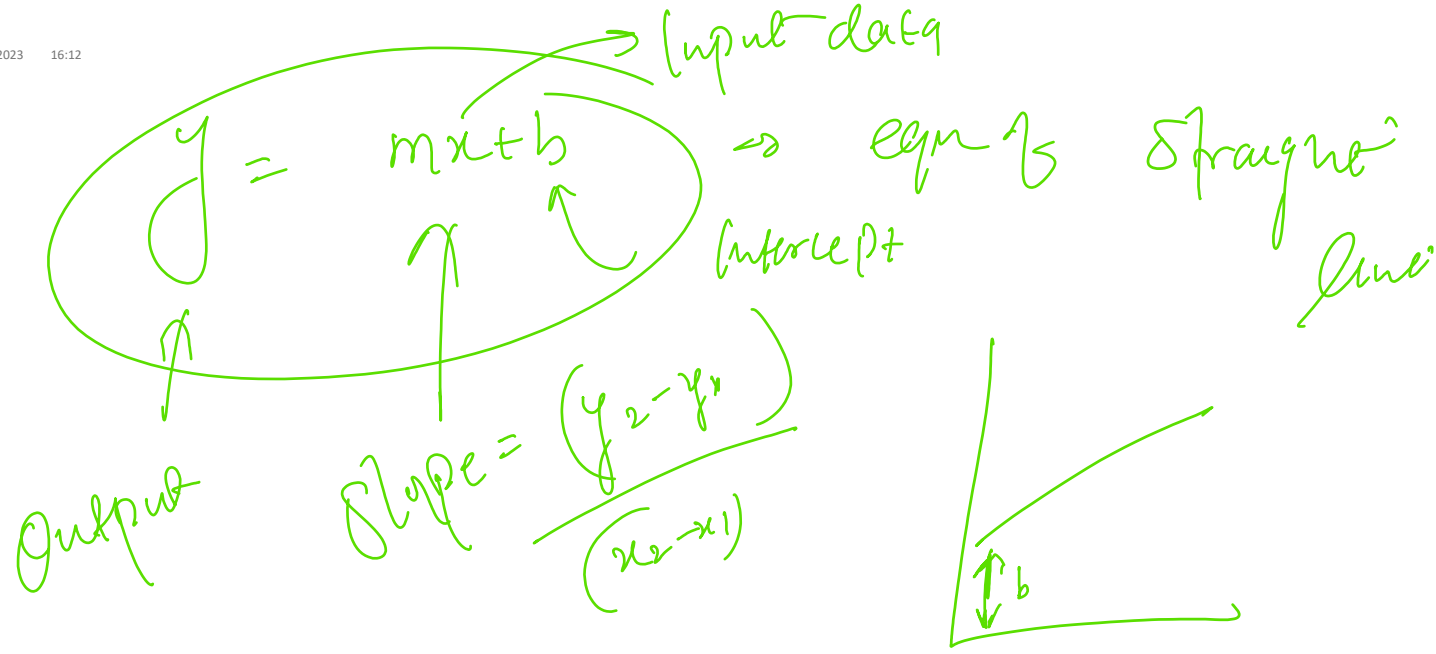
Line 2 > Line 1

Slope: $\frac{(y_2 - y_1)}{(x_2 - x_1)}$



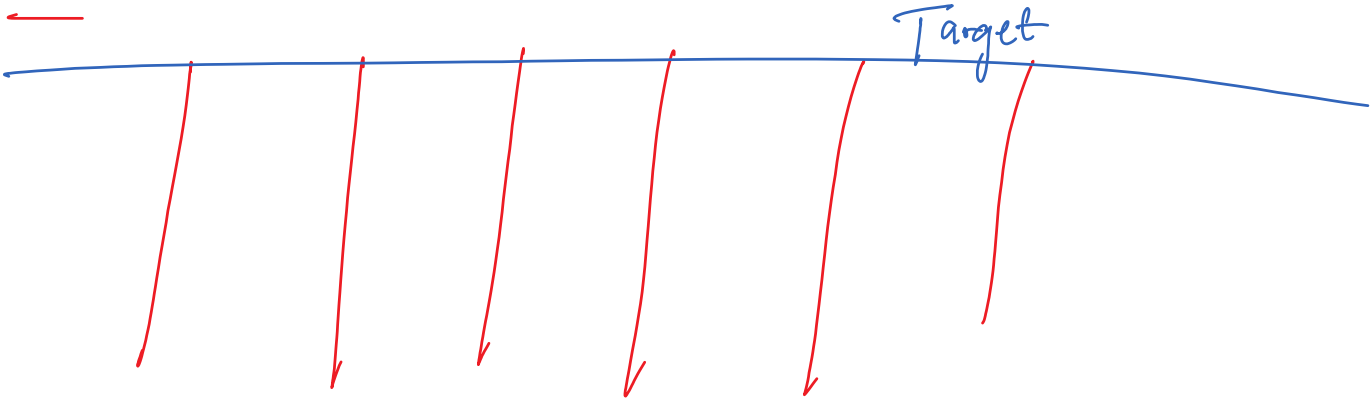


Slope = $\frac{3.2 - 1.5}{3.2 - 1}$



Note: Our linear Regression ML Algorithm is Inspired from equation of a straight line.

Dataset:



Two types of linear Regression

1) Simple linear Regression

(2) Multiple linear Regression

(1) Simple linear Regression

⇒ It will have only one input column and one output column.

eg: Input | Output

eg:

	A	B
1	YearsExperience	Salary
2	1.1	39343
3	1.3	46205
4	1.5	37731
5	2	43525
6	2.2	39891
7	2.9	56642
8	3	60150

(2) Multiple linear Regression :-

Here you will be having Multiple input column and Single output column

Target

eg location | area | flat-category | transportation | price, flavour

$y = mx + b$

* In Simple Linear Regression –

eqn $y = \beta_0 + \beta_1 x_1$

$y = mx + b$

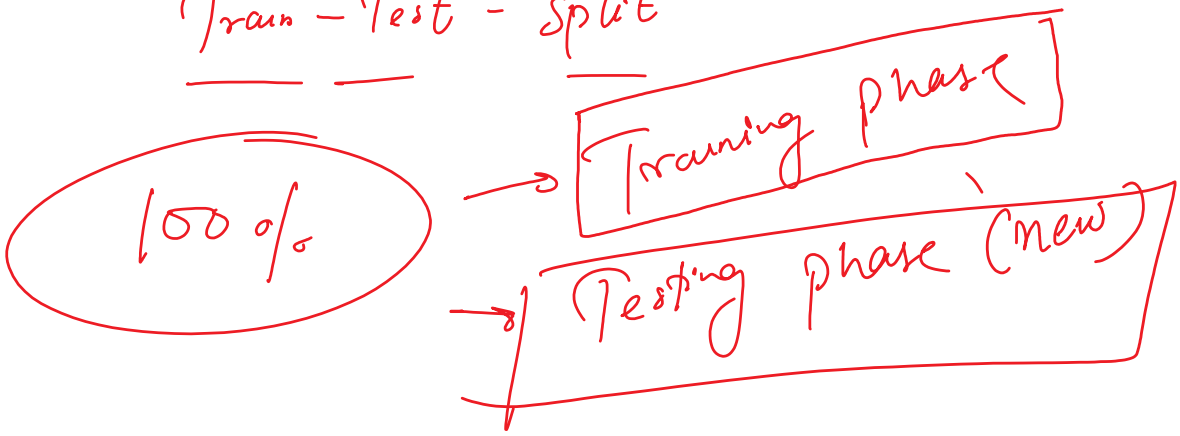
β_0 → Intercept

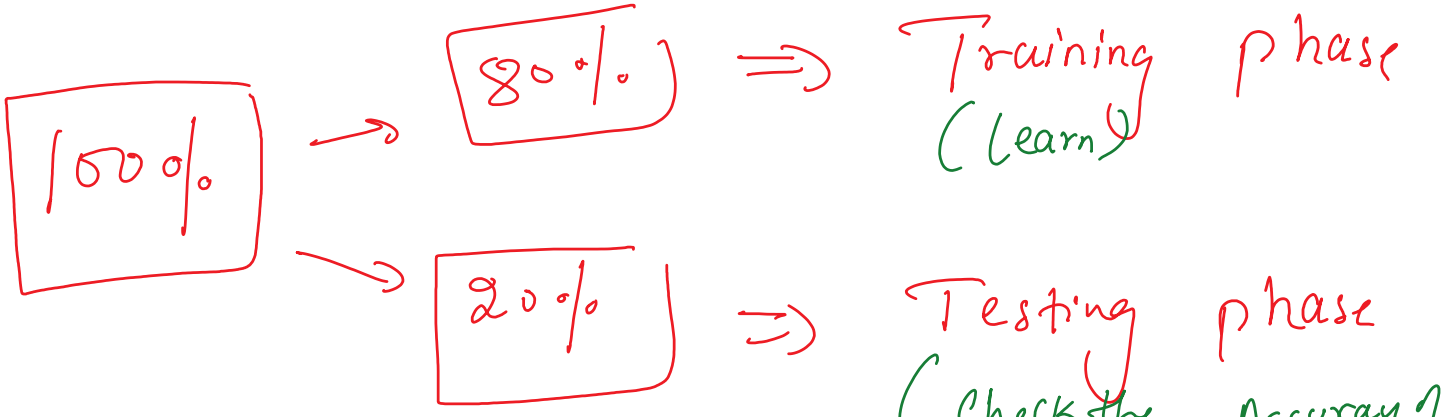
β_1 → slope (Coefficient)

x_1 → input

Note:

Train - Test - split

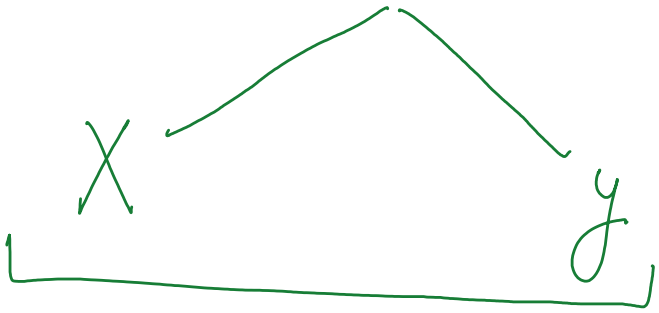




⇒ Python

train_test_split ✓

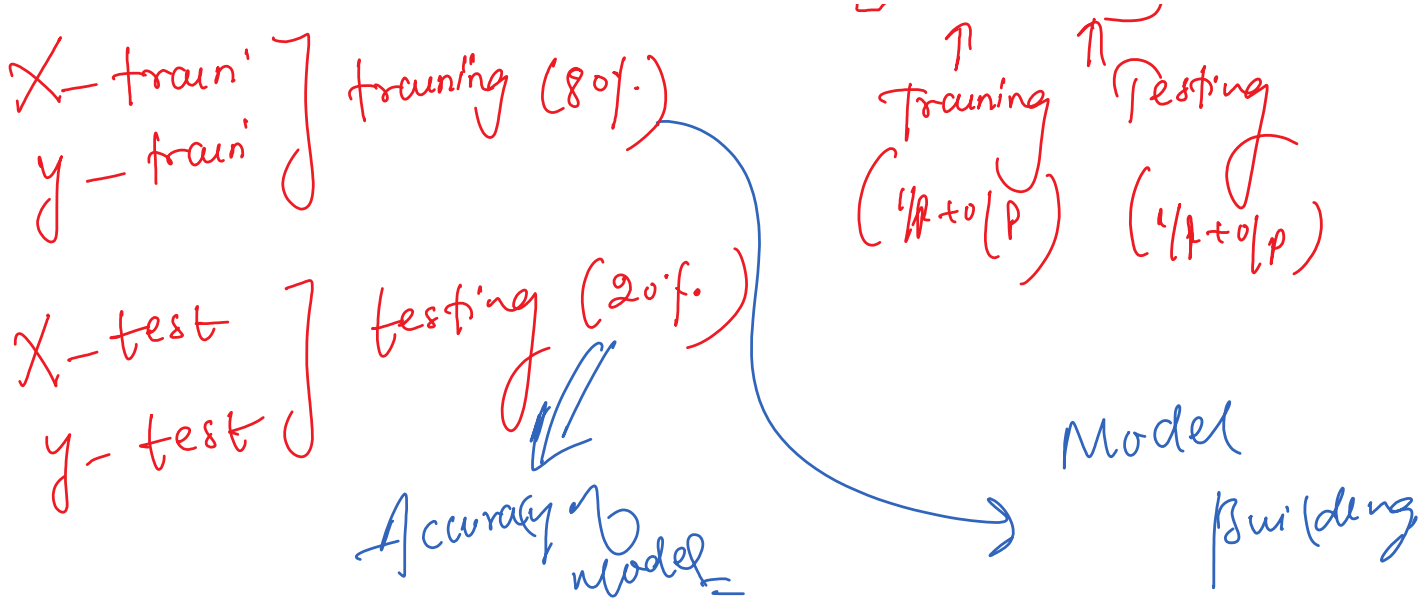
Dataset 1 (100%



(1000%)

train - test - split [80 : 20]

X_train ⌉ training (80%)


X_train
y_train
training (80%)
X_test
y_test
testing (20%)
Accuracy of model
Training
Testing
(I/P + O/P)
(I/P + O/P)
Model
Building

X_train, y_train] - Training phase

X_test ⇒ (new input data) ⇒ Prediction ⇒ y_pred (Predicted Output)

y_test ⇒ (Actual Output)

⇒ X_train, y_train] Training phase (fit())

⇒ X_test (new Input data)