Introduction to ML study jams.

Roadmap:

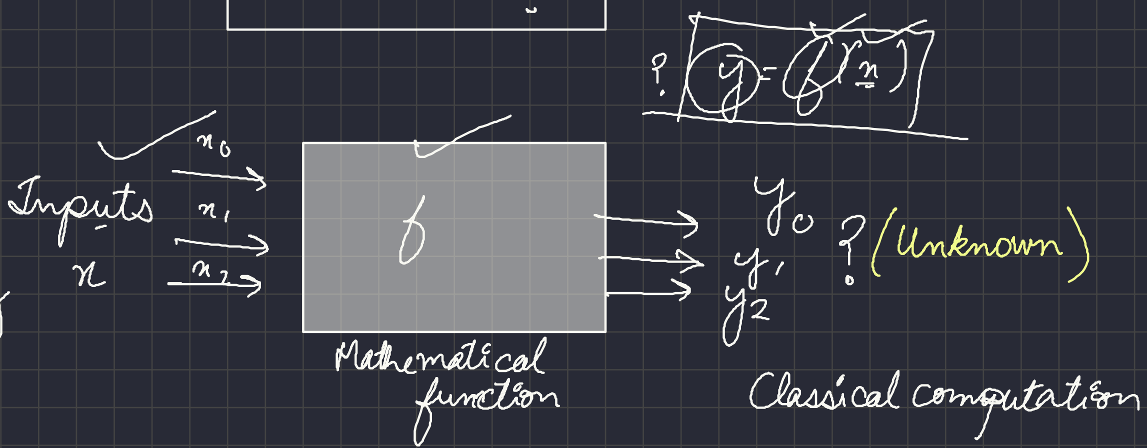
- → Basics of ML.
- → Intermediate ML.
- → Deep Learning and CV. (Tensorflow 2.0)
- → Time Series ; advanced AI.

Machine Learning.

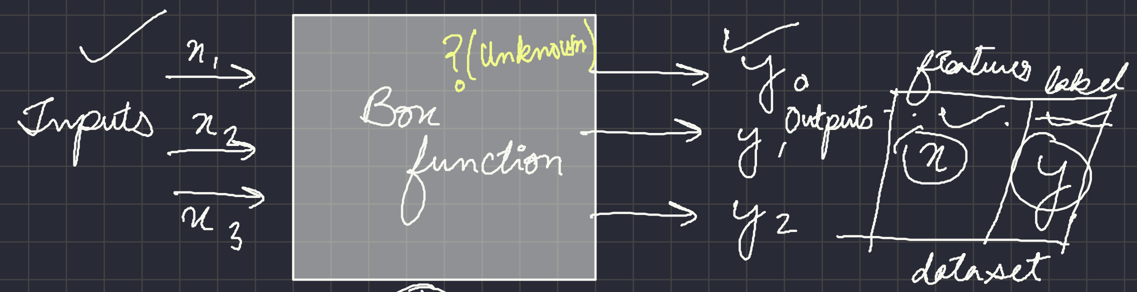
- Supervised Learning (label)
  - ✓ → Classification ✓
  - ✓ → Regression ✓
- Unsupervised Learning (no label)
- Reinforcement Learning.

What is ML?

Traditional programming approach



Machine learning approach



f : Machine Learning ML.

Task of this box is: $\boxed{\text{find optimal parameters to correlate inputs to outputs}}$

General programs ? $y = mx + c$

ML programs $y = f(x.)$?

Box function = (Mathematical model).

eq.

Equation for linear regression

$$y_0 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

$y \Leftrightarrow x$?

$\boxed{x \mid y}$

$[\beta_0, \beta_1, \beta_2]$

$x_1 \quad x_2$

x	y
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16

$m = 2$

$y = mx + c$

Classical Computation (General programming)

find y's correlation to x using co-efficients.

$c \rightarrow$ intercept

Social Media Ads ($) in(000s) ($x_1$)	Newspaper Ad ($) ($x_2$)	Sales (in units) (y)
8.69	2.42	160
4.20	1.61	85

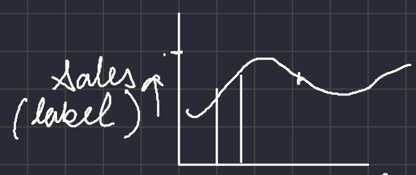
label y.

Advertising.

(x_1, x_2) = feature set

Regression

label = continuous values.

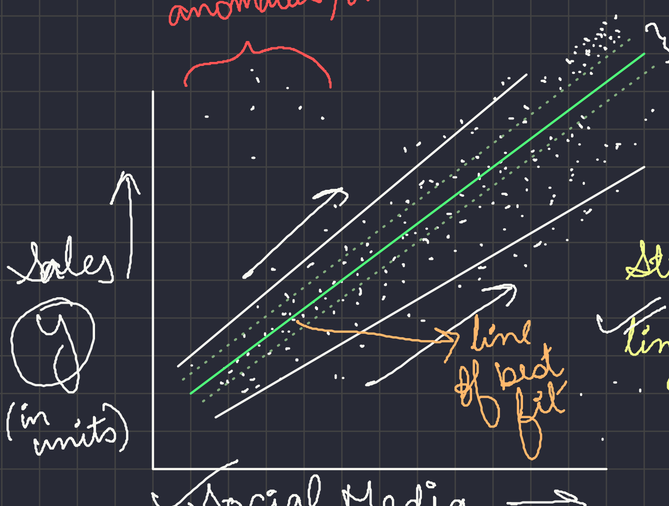


feature 1 (continuous values.)

X, y = data

anomalies / outliers

area is range of best fit. (possible error in co-efficient values.)



Social Media x_0 (in $)

80% of time

$+e \rightarrow$ error (shaded region)

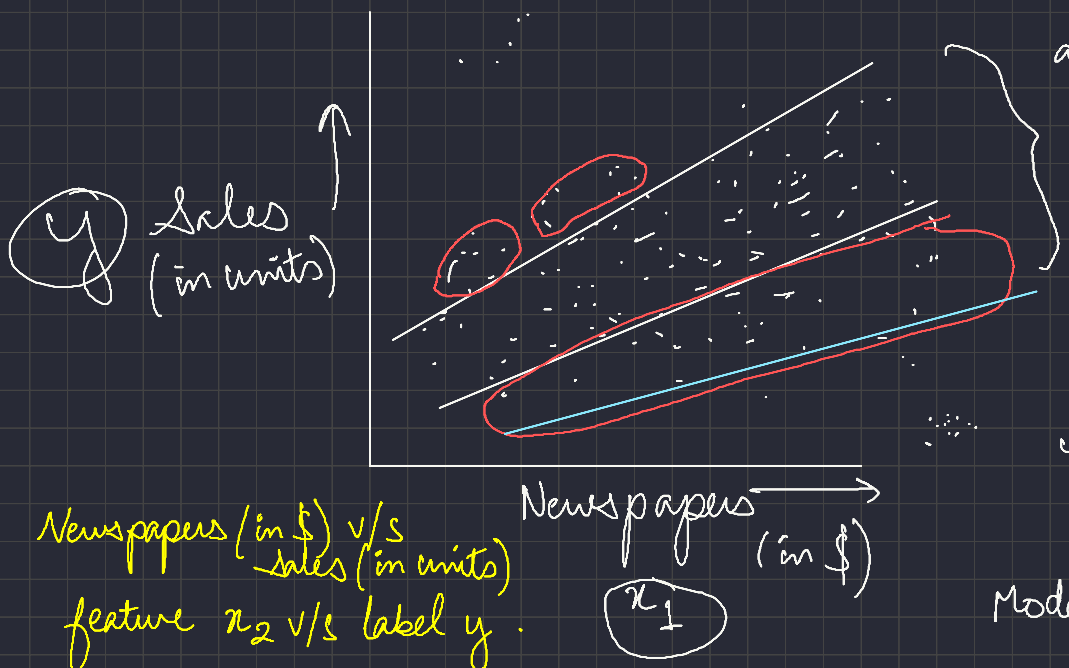
Strong linear correlation

S.M↑ Sales↑

Linear Regression

Social Media Ads (in $) v/s Sales (in units)

OR feature x_1 against label y



approximate range is so wide

$\beta_0, \beta_1, \beta_2$ ⟹ inconsistent

Linear Regression inaccurate

Newspapers (in $) v/s sales (in units)
feature x_2 v/s label y.

Model Selection

This is where we can initially choose linear regression and later move to better machine learning algorithms.

Notes on points to remember:

→ 3 types of ML: Supervised, unsupervised and reinforcement learning.

→ Two subcategories in supervised learning.

1. Classification and
2. Regression.

→ Classification is used when labels of the dataset are discrete values. (next lecture will be on classification).

→ Regression is used when labels of the dataset are continous values.
Example shown: Advertising dataset.

~ In the next two pages, we discuss how regression (linear regression) works on newer data and also see a brief overview of how model predictions help us to analyse our model's accuracy ~

Regression. continued.

Supervised learning. label is continuous.

X	y.
x features	y labels

features — labels

→ Dataset UCI Advertise

Social Media (in 1000's $)	Newspaper (in 1000 $)	Sales in units
2.4	0.8	1200
4.8	5.6	1800
1.2	1.6	800

split into train, test

[S.M., Newspaper] — x_1, x_2 labels [Sales]

Input X_1 ⇒ $[\beta_0, \beta_1, \beta_2]$ → optimum, [c] → optimum $= y$

$y = mx + c$

2.4 S.M. · 0.8 N. ⇒ y (1200)

$y_0 = \beta_0 + \beta_1 x_1 + \beta_2 x_2$ + intercept

new data X' ⇒ $\beta_0, \beta_1, \beta_2$, c ⇒ $y' = 1021$ prediction.

3.5 S.M. 1.8 N = y'? y'?

Division of the dataset into training and testing datasets.

X train	y train
X test	y test

→ Training [0.75] [0-1]

→ Testing 0.25

Dataset

X train, y train → find the optimum co-eff.

X test, y test ground → use optimum co-efficients → y' prediction

1.2, 1.8 → 780 predic 800 ground value

-20

To determine how good or bad our model parameters are → % correct and % wrong → use error formulaes to calculate loss and acc. scores.