



Supervised ML Workshop

DIT Pimpri



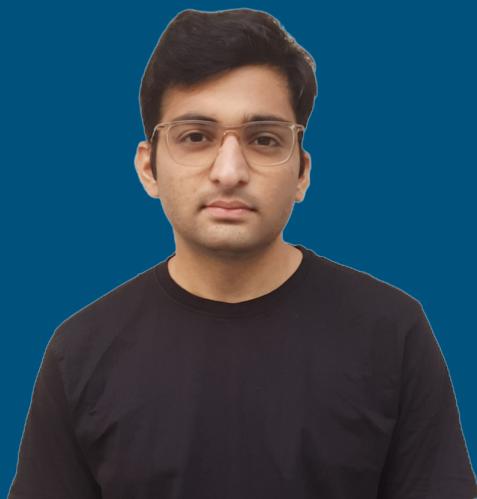
A workshop by Atharv, Ayush, Yash



Agenda for Workshop

Supervised Machine Learning

1. Overview of ML
 2. Linear Regression ←
 3. Logistic Regression
 4. Decision Trees
 5. Ensemble Methods – Part 1:
 - Cascading
 - Stacking
 6. Ensemble Methods – Part 2:
 - Bagging
 - Boosting
-



Atharv

AI/ML Developer

GDG DIT - Machine Learning Lead

Works with the AI team at
ElevateTrust.AI

Always learning, building, and
sharing

Passionate about AI, ML, Generative
AI, EdgeAI



Ayush

AI/ML Developer

GDG DIT - Machine Learning Co-Lead

Turning data into insights with ML & AI, one model at a time.

Building apps where Machine Learning meets real-world impact.

Speedcuber — learned algorithms from cubes, patience (and suffering) from code.



Yash

AI/ML Developer

GDG-DIT Research Lead

Ex CP Member Lead

Ex Intern Accenture

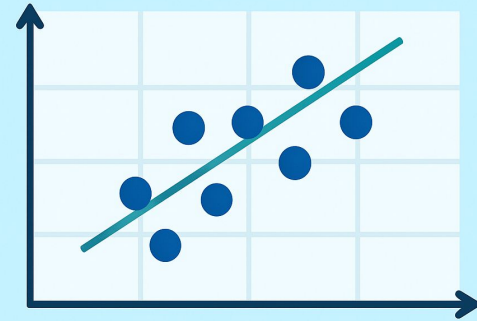
Passionate about innovative tech

Forever Student

Linear regression is a way to predict a continuous number by learning the relationship between your input data and your target number.

Example: Predicting the price of a house based on its size.

WHAT IS LINEAR REGRESSION



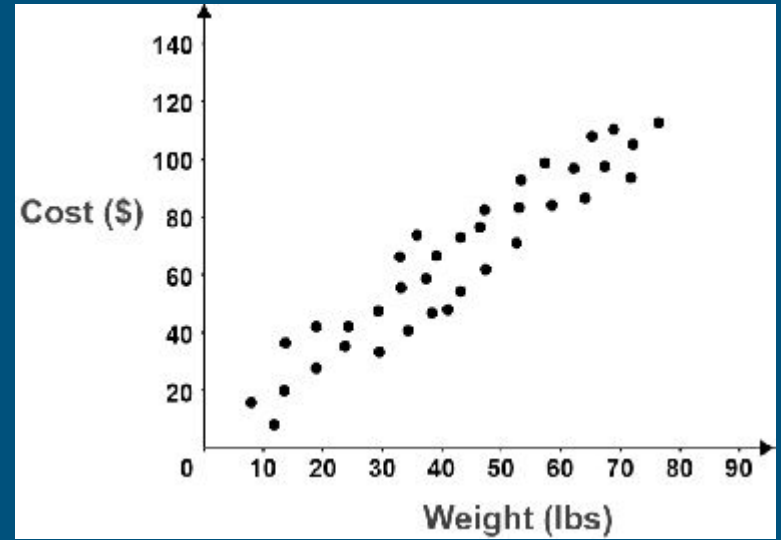
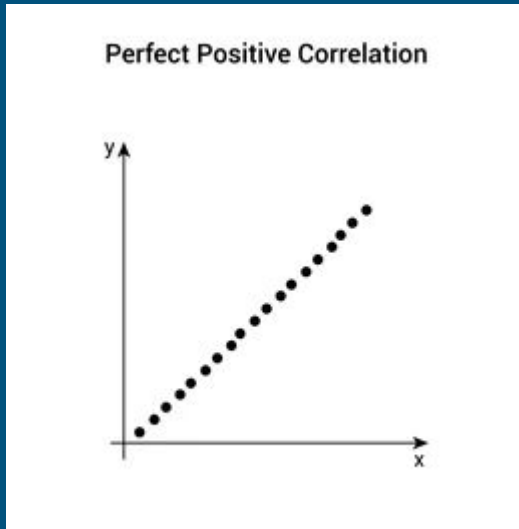
Types of Linear Regression

1. Simple Linear Regression: Predicts an outcome using just one thing (like predicting pizza price based only on its size).

Size (sq/feet)	Price(lakhs)
500	2500000
400	2000000
450	2300000
650	3800000
800	5000000

2. Multiple Linear Regression: Predicts an outcome using several things together (like predicting pizza price using size, number of toppings, and delivery distance).

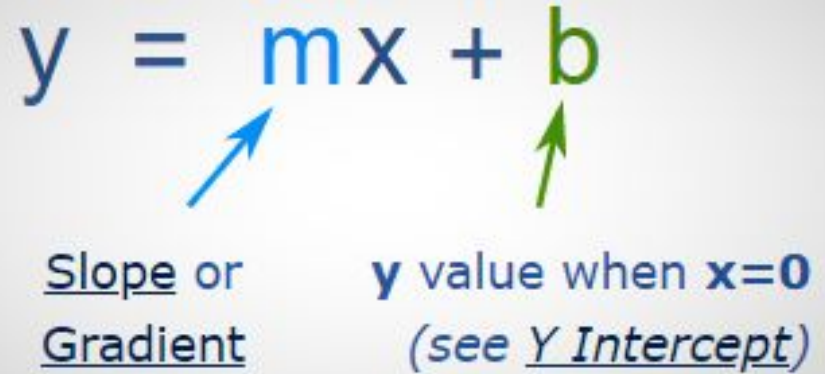
Size	Location	BHK	Types	Price(lakhs)
500	Pune	1	Apartment	2500000
400	Mumbai	1	Apartment	5000000
450	Dubai	2	Bungalow	12500000
650	Palghar	4	Villa	8000000
800	Thane	3	Apartment	5000000



Perfect Linear Data: All points lie exactly on a straight line with no scatter.

Sort-of Linear Data: Points show a general linear trend but with scatter around the best-fit line.

The line needs to pass through the middle of the data, as close as possible to all the points on average.



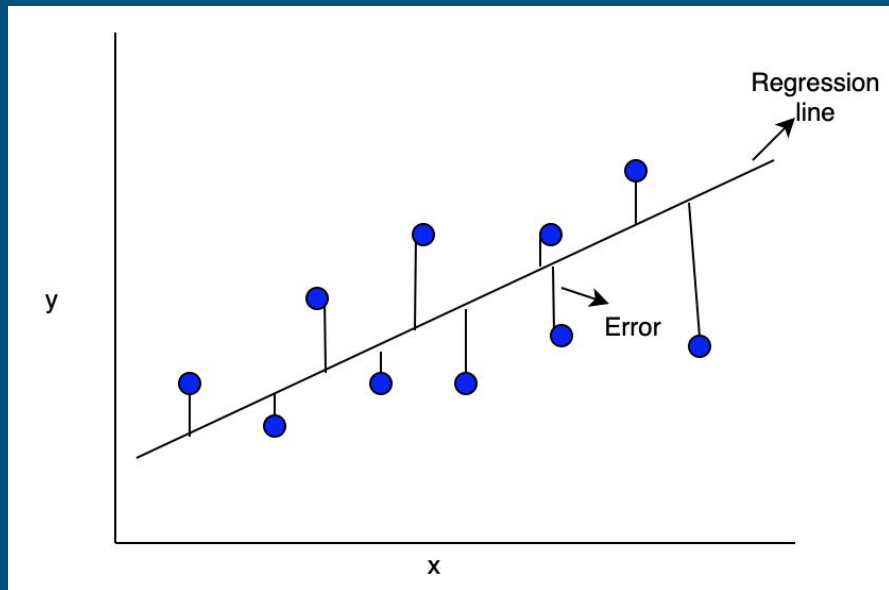
The diagram shows the linear equation $y = mx + b$ on a light gray background. A blue arrow points from the text 'Slope or Gradient' to the coefficient m . A green arrow points from the text 'y value when x=0 (see Y Intercept)' to the constant term b .

$$y = mx + b$$

Slope or
Gradient

y value when **x=0**
(see Y Intercept)

The best fit line is the straight line that passes as close as possible to all the points on average.



$$MSE = \frac{1}{N} \sum_{i=1}^N (y_i - \hat{y}_i)^2$$

Multiple Linear Regression (2 Features Example)

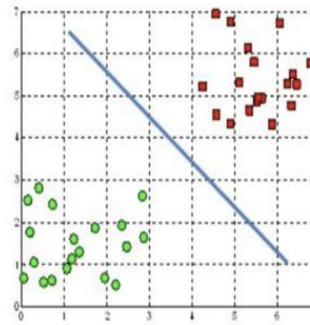
Linear regression predicts a continuous target variable (Y) using two independent variables (X_1 and X_2).

Equation: $Y = b_0 + b_1X_1 + b_2X_2$

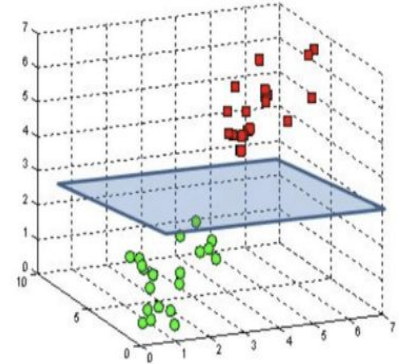
Purpose:

1. To find the best-fitting plane that predicts Y from X_1 and X_2 .
2. The line in 2D becomes a plane in 3D space when we have 2 features.

A hyperplane in \mathbb{R}^2 is a line



A hyperplane in \mathbb{R}^3 is a plane



Graphical Idea:

- 1 feature \rightarrow straight line
- 2 features \rightarrow flat or sloped plane in 3D
- More features \rightarrow hyperplane in higher dimensions



so true

Linear Regression - Equation

Formula

$$Y_i = f(X_i, \beta) + e_i$$

Y_i = dependent variable

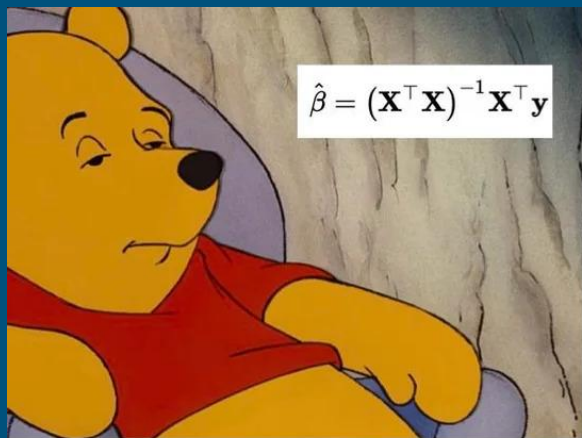
f = function

X_i = independent variable

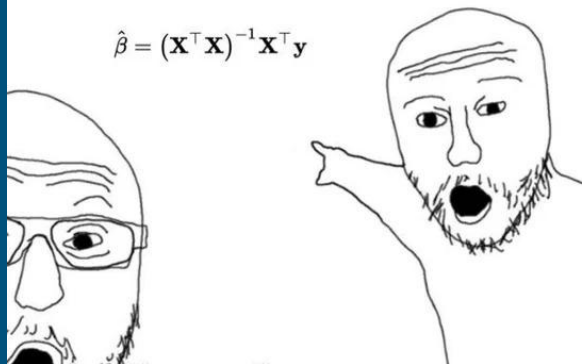
β = unknown parameters

e_i = error terms





Employers
when you tell
them your app
uses linear
regression



Employers
when you tell
them your app
uses “machine
learning and
A.I.”

Linear Regression - Optimization Problem

$$\operatorname{argmin} ||Y_i - (W^T \cdot X + W_0)||$$

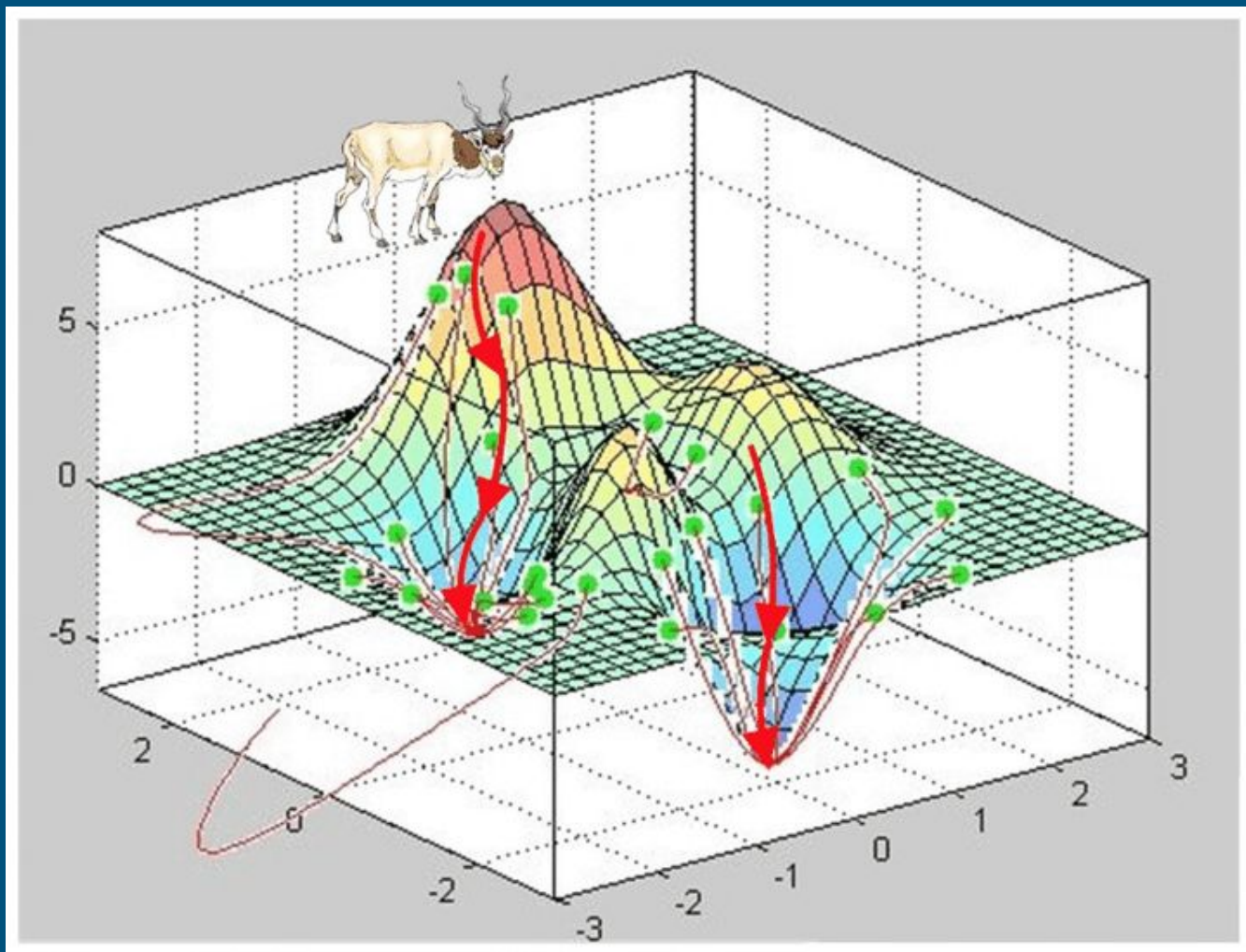
Gradient Descent

Goal: Minimize the loss function by adjusting parameters.

$$\theta_{\text{new}} = \theta_{\text{old}} - \alpha \frac{\partial \text{Loss}}{\partial \theta}$$

In Simpler term:

- Move **opposite** to the gradient (steepest ascent)
- Learning rate α controls step size





Ali
@OldyCody

When you are a Machine Learning Engineer and know Linear Regression only,



Christian Keil  
@pronounced_kyle

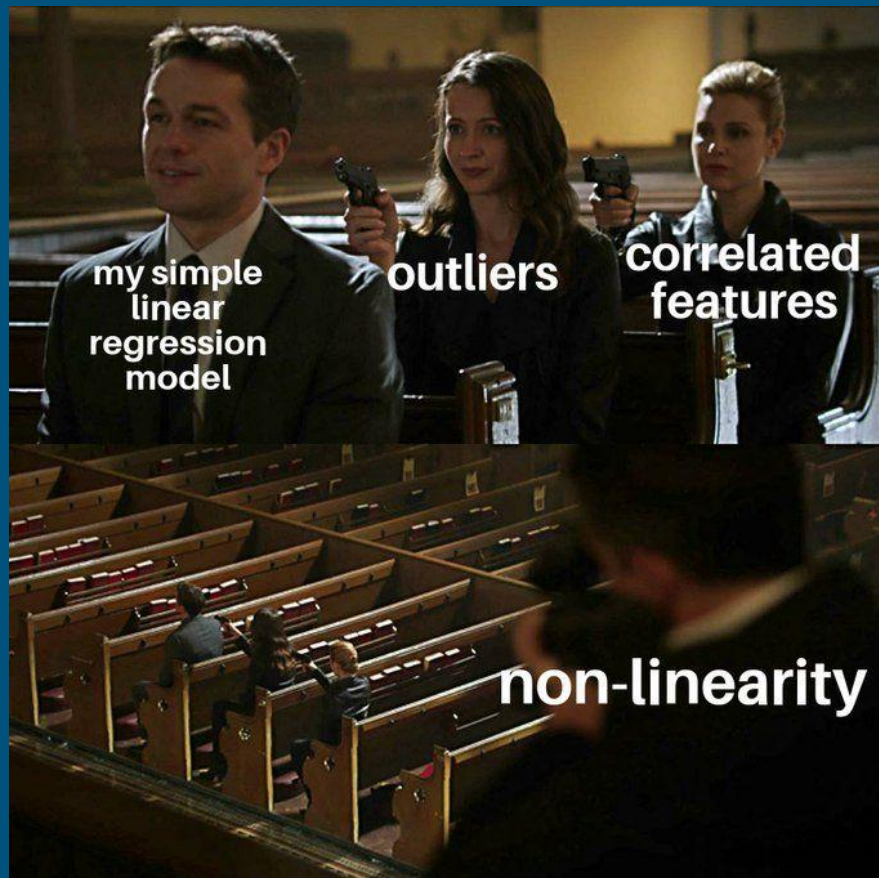
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My 3-month-old son is now TWICE as big as when he was born.

He's on track to weigh 7.5 trillion pounds by age 10



9:41 AM · 16 Mar 24 · **279K** Views

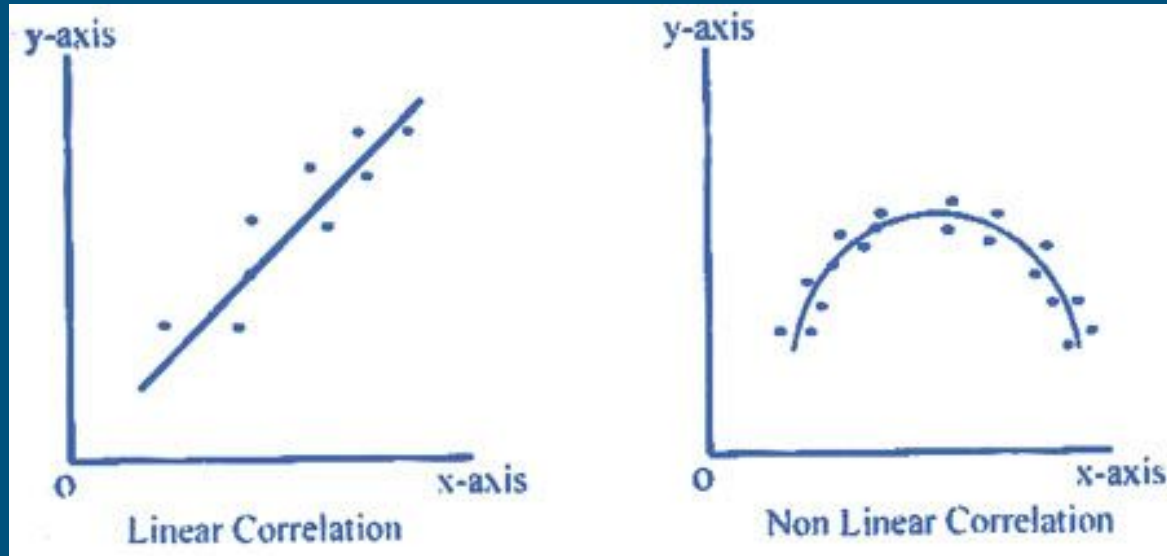


my simple
linear
regression
model

outliers

correlated
features

non-linearity



Linear Data: Points form a pattern that can be fit well with a straight line.

Non-Linear Data: Points follow a curved pattern (like a parabola or wave) where a straight line would be a poor fit.

<https://github.com/atharvsp189/Supervised-ML-Workshop-DIT>

Assignment

1. Explore more on Linear Regression refer this video
<https://youtu.be/ilkJrwVUI1c>
2. Explore Polynomial Regression

Connect with us on LinkedIn



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Thank You