Supervised ML Workshop

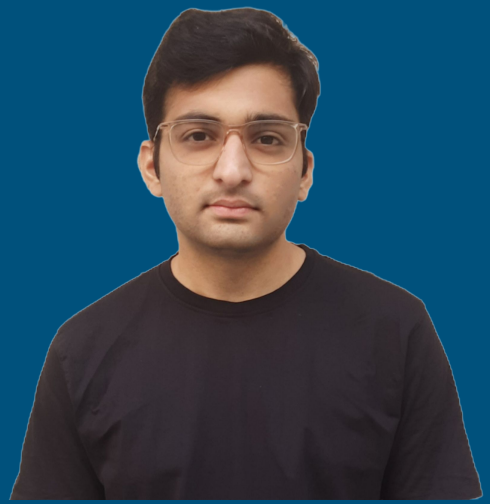
DIT Pimpri

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

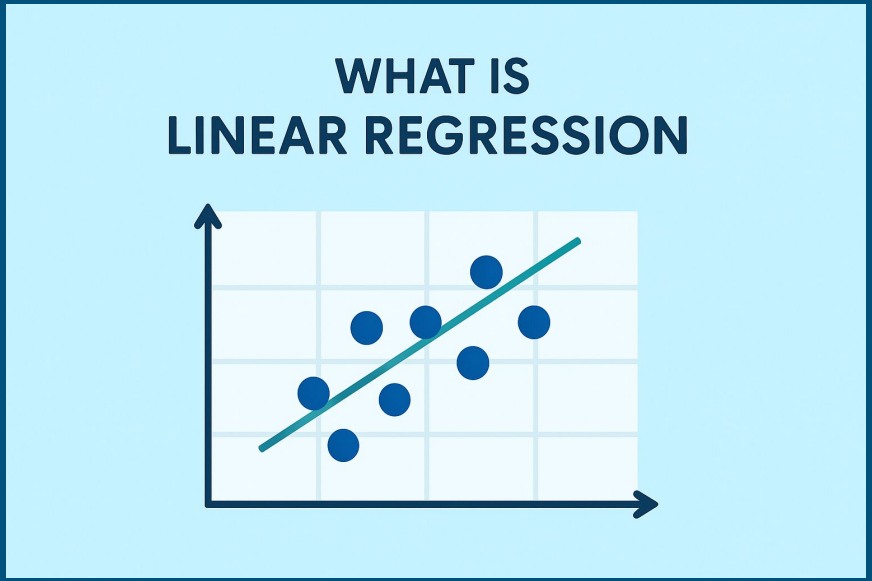
Ex Intern Accenture

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.



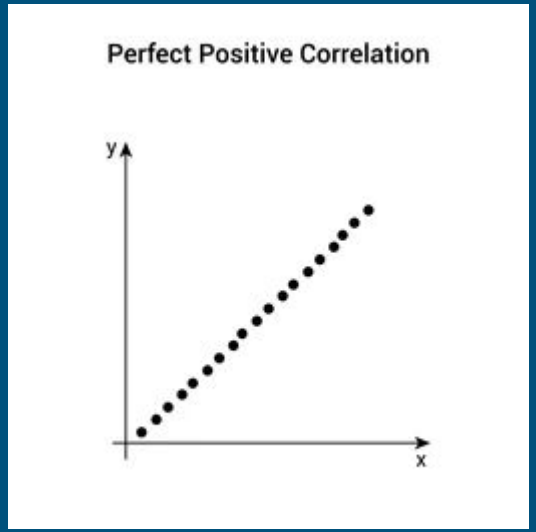
Types of Linear Regression

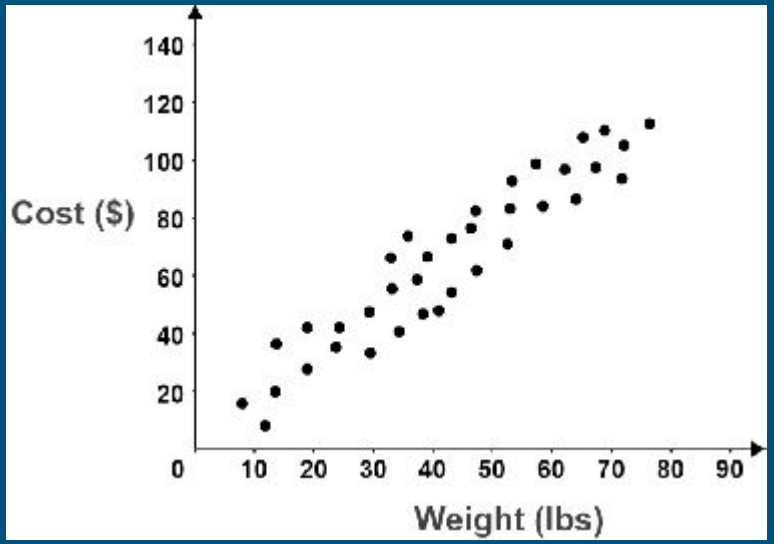
1. Simple Linear Regression: Predicts an outcome using just one thing (like predicting pizza price based only on its size).

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

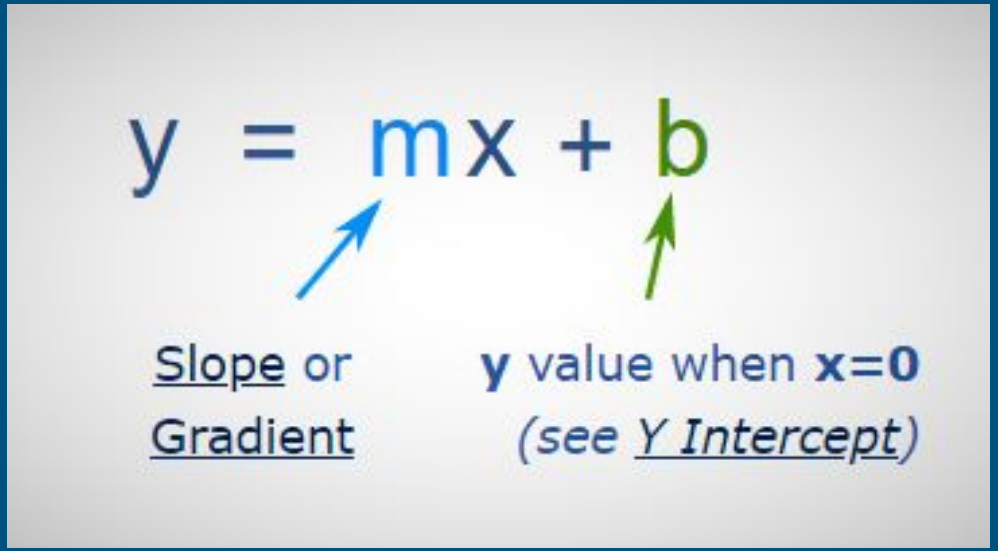




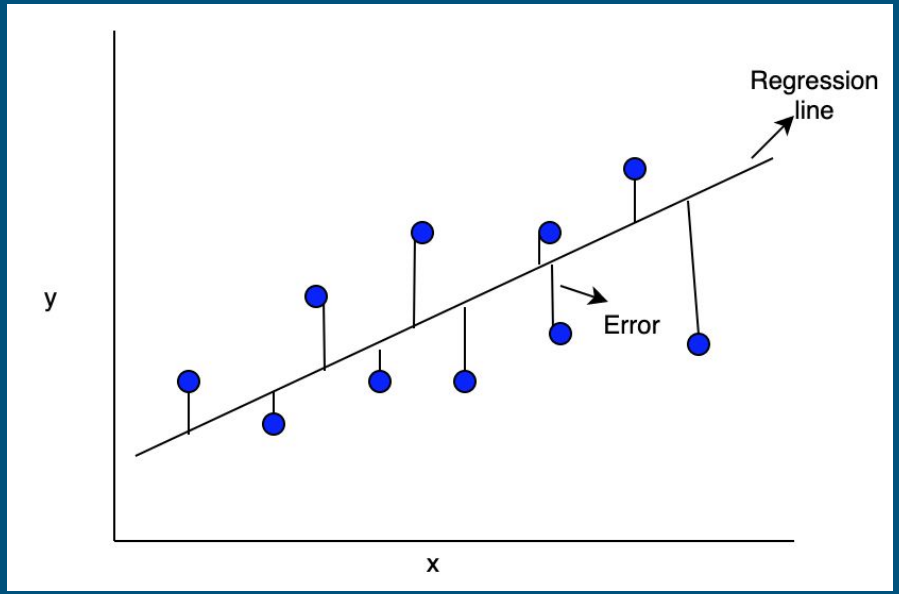
Perfect Linear Data: All points lie exactly on a straight line with no scatter.

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

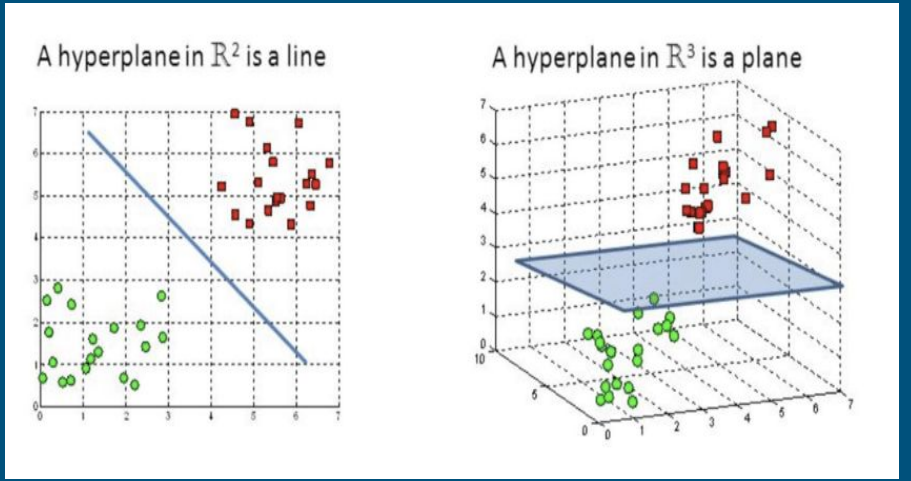


$$MSE = \frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^2$$

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=b0+b1X1+b2X2



Purpose:

1.To find the best-fitting plane that predicts Y from X_1 and X_2.

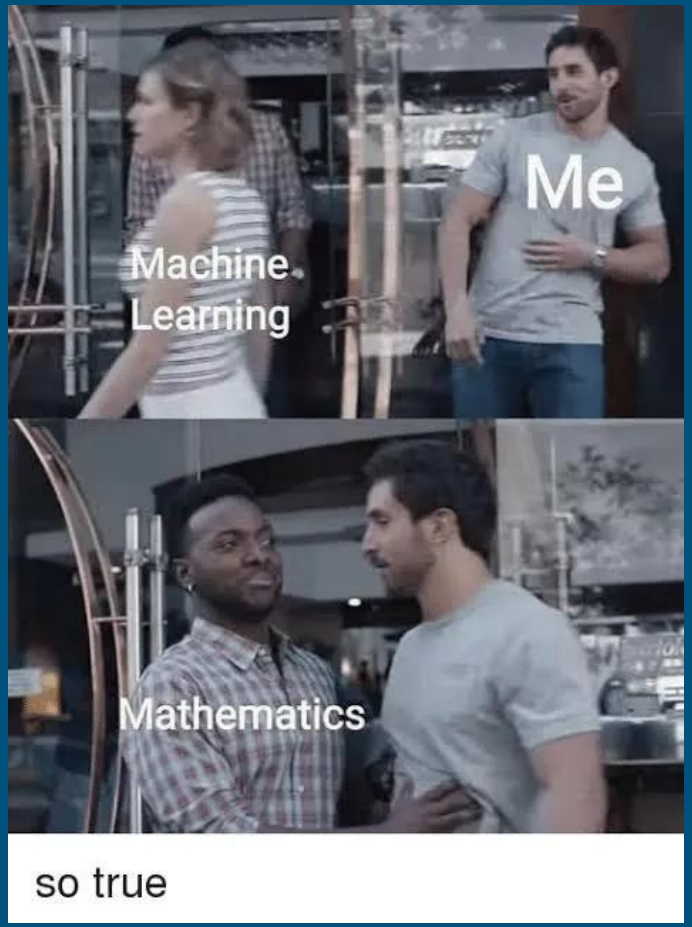
2.The line in 2D becomes a plane in 3D space when we have 2 features.

Graphical Idea:

1 feature → straight line

2 features → flat or sloped plane in 3D

More features → hyperplane in higher dimensions



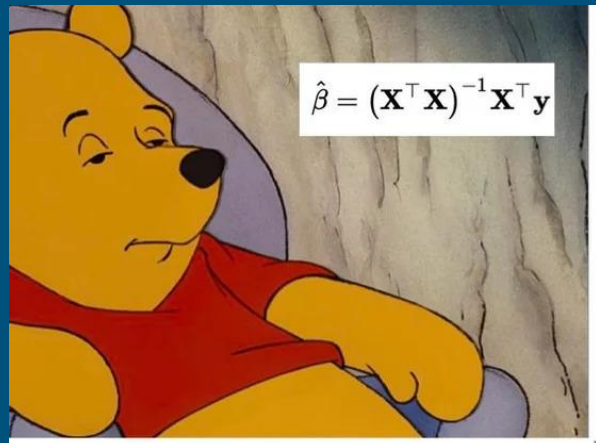
so true

Linear Regression - Equation

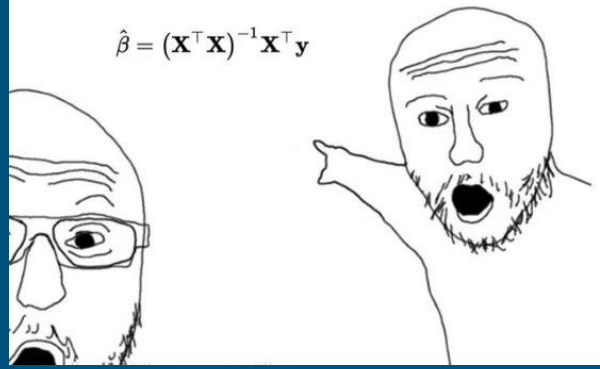
Formula

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

- 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

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

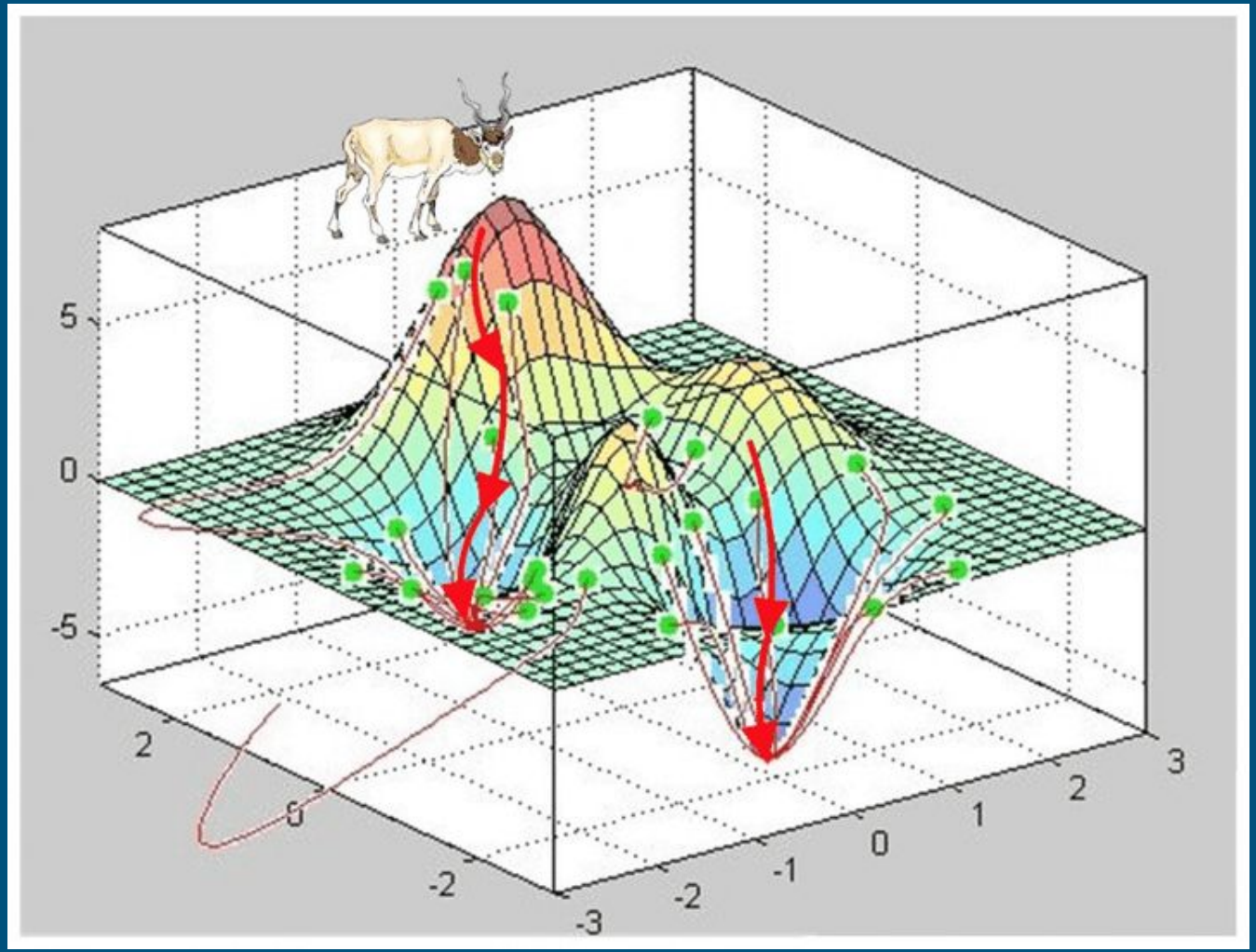
Gradient Descent

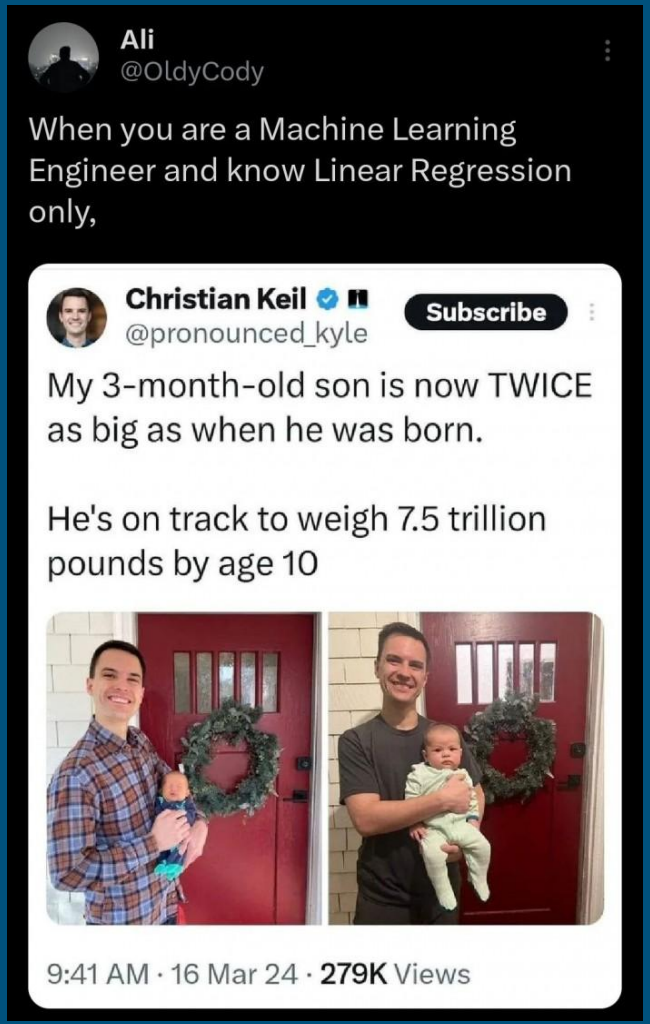
Goal: Minimize the loss function by adjusting parameters.

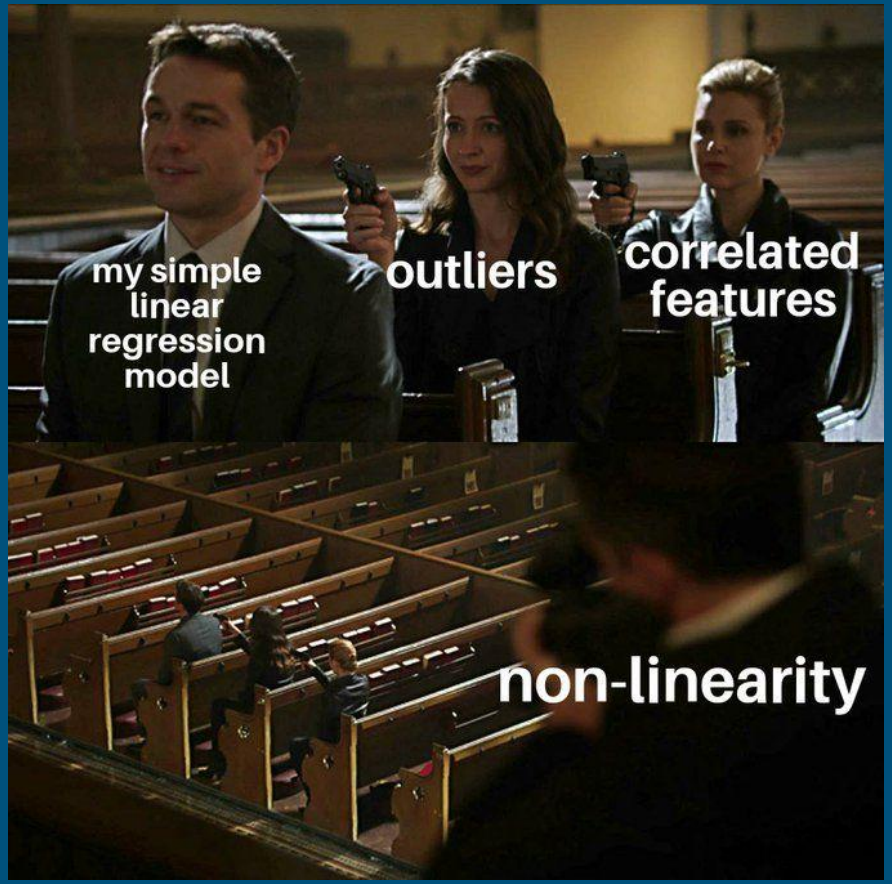
$$\theta_{\text{new}} = \theta_{\text{old}} - \alpha \frac{\partial \text{Loss}}{\partial \theta}$$

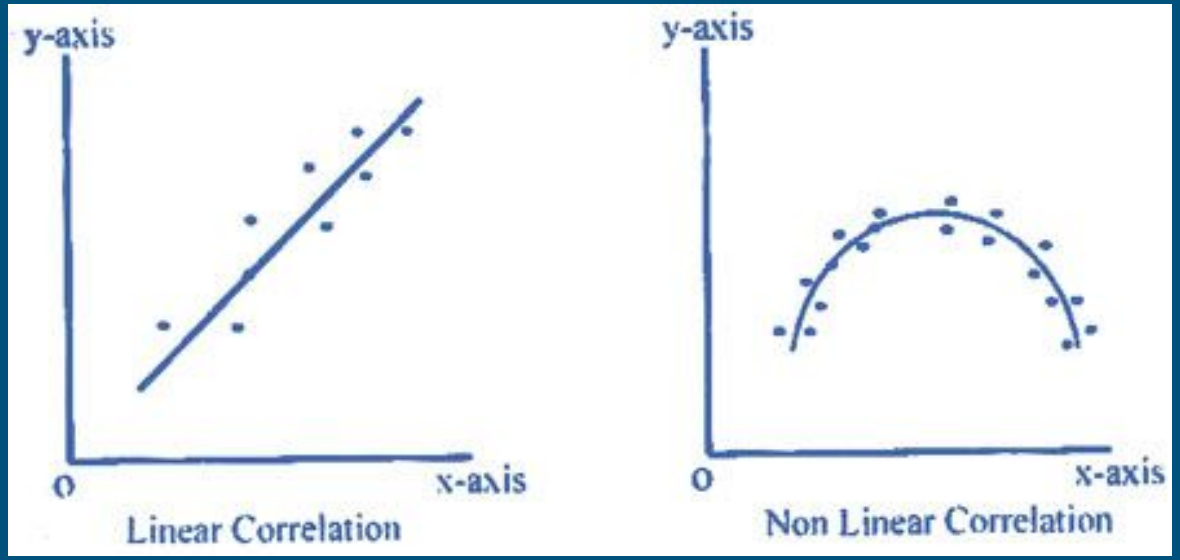
In Simpler term:

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


5
0
-5
2
0
-2
-3
-2
-1
0
1
2
3


Ali
@OldyCody
When you are a Machine Learning Engineer and know Linear Regression only,
Christian Keil
@pronounced_kyle
Subscribe
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