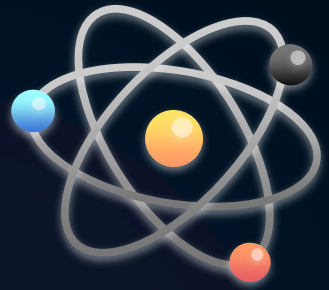
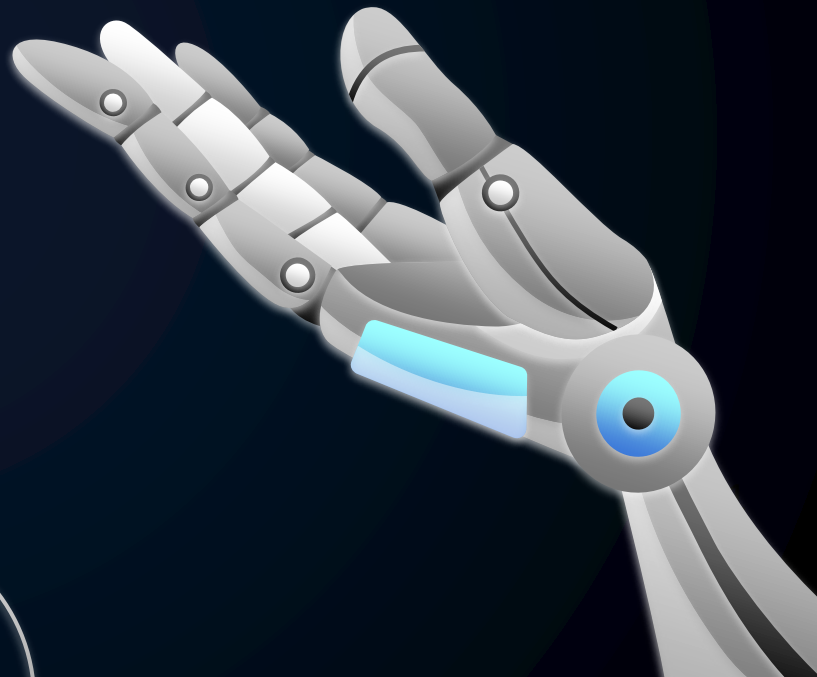
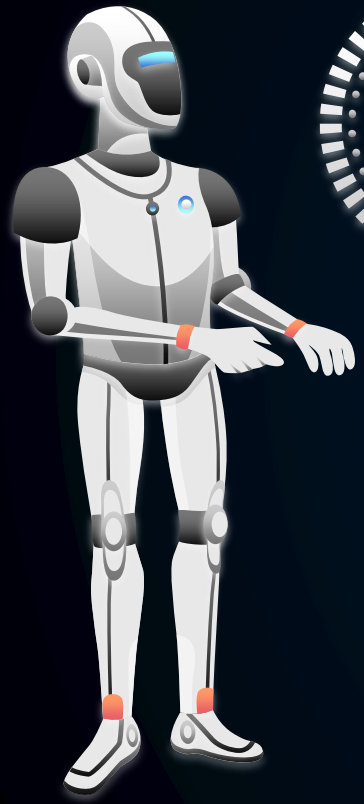
Introduction To Machine Learning





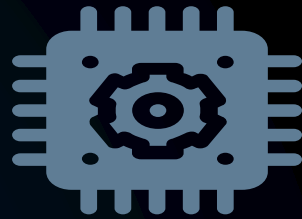
Waleed Alsarhani

Eyad Alqaysi



Introduction

Agenda



1

AI

Definition of AI, examples and false information about it

2

Machine Learning

Definition, examples, idea, disadvantages and advantages

3

Machine Learning Algorithms

Types, definitions, models and examples

4

Linear Regression

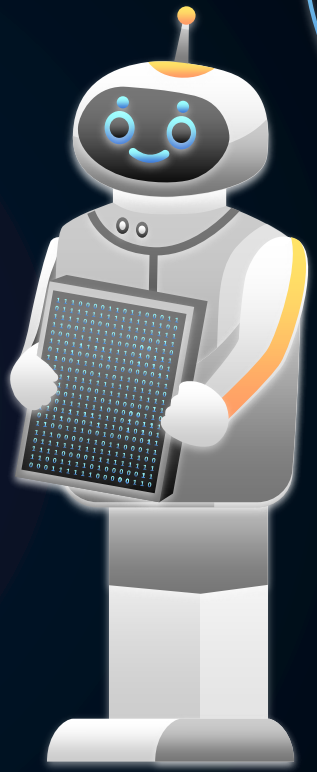
Definition, types, examples, equations, concept of Optimization and Gradient Descent

1

AI

What is AI ?

AI is the Systems or devices that simulate human intelligence to perform tasks.



Examples Of AI

mail

Message classification process

Social media

View content based on interests

False Information

1

Artificial intelligence delivers magical results instantly

AI needs time, money,goal and planning in order to output the excellent results

2

the more data the better

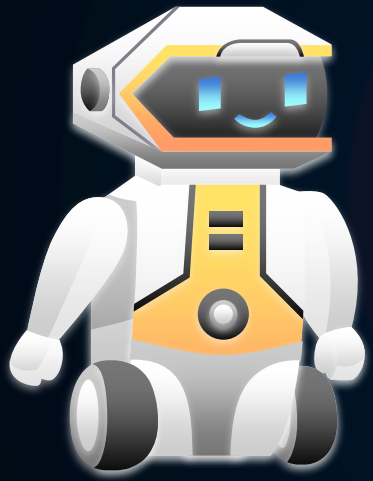
Enterprise AI needs smart data

3

Artificial intelligence does not need humans

AI is not about bots taking over

2



Machine Learning

What is Machine Learning ?

Machine learning is a branch of AI that is concerned with the design and development of algorithms and techniques that allow computers to have the "learning" advantage.

Examples Of ML

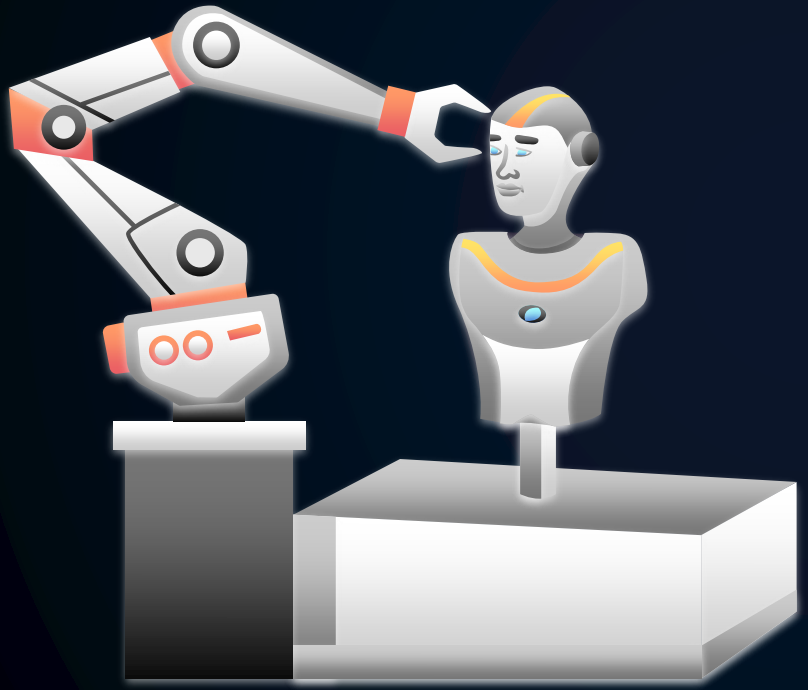
Healthcare

Detection of cancerous tumors

Retail sales

Stock management and sales increase

Idea Of Machine Learning



Child and Machine

Advantages

1

Work without human intervention after setup

2

More accurate results

3

Dealing with different data of different sizes

Disadvantages

1

Expensive and time consuming

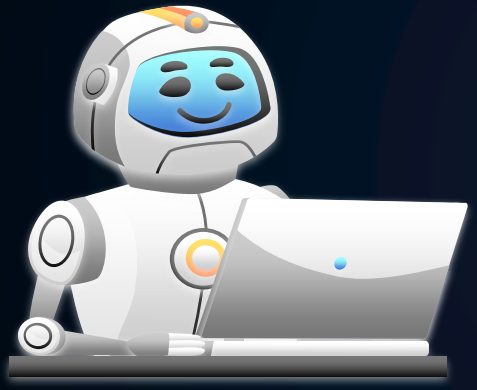
2

It requires a large initial investment if the devices are set up on premises

3

It is difficult to correctly interpret the results without the help of experts

3



Machine Learning Algorithms

What is Machine Learning Algorithms?

A machine learning algorithm is the method by which the AI system performs its task

Types of machine learning algorithms

1

Supervised Learning

Give the machine the inputs and outputs

2

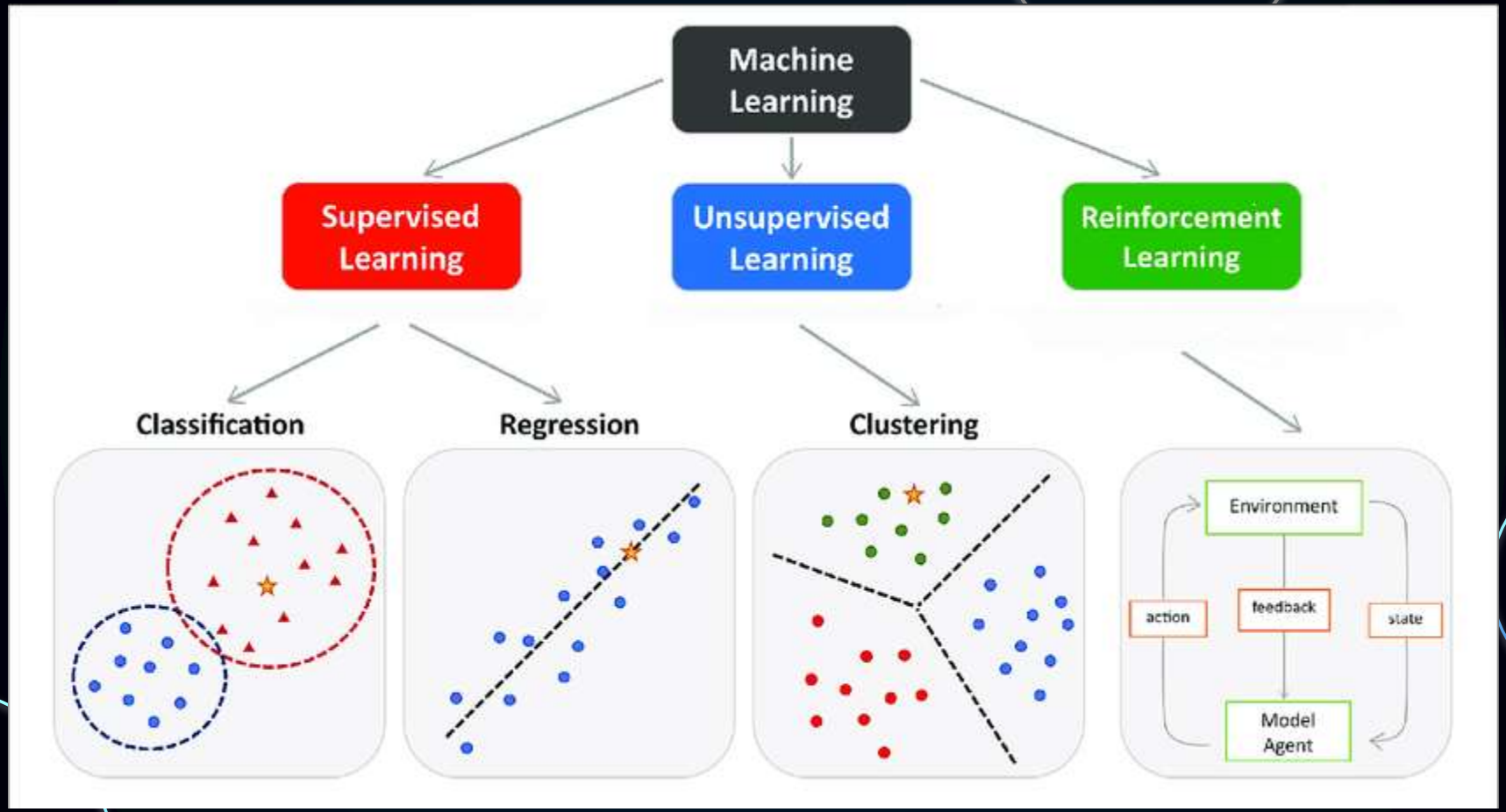
Unsupervised Learning

Give the machine the inputs

3

Reinforcement learning

principle of reward and punishment


Machine Learning
Supervised Learning
Unsupervised Learning
Reinforcement Learning
Classification
Regression
Clustering
Environment
action
feedback
state
Model Agent

Types of machine learning algorithms

Classificatior

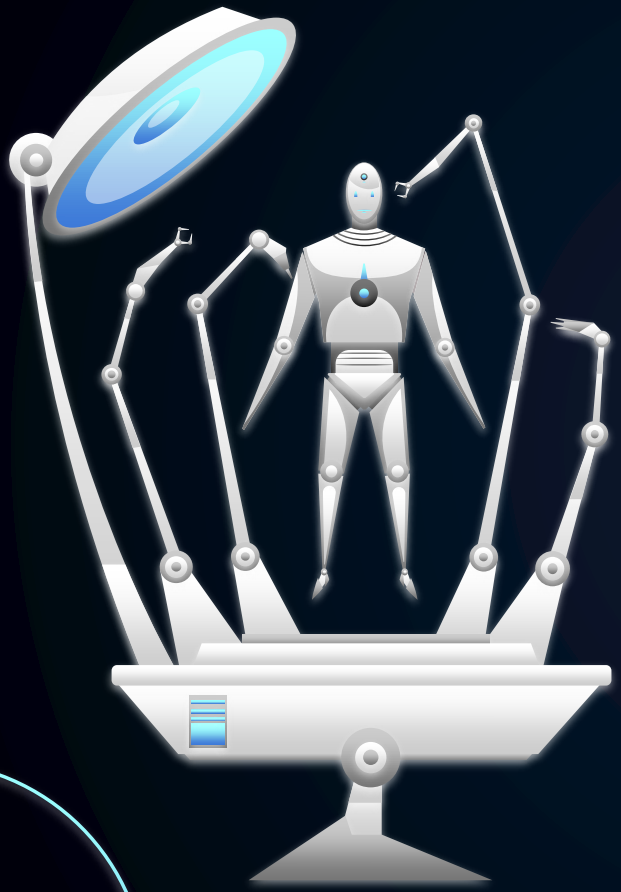
Determining whether the tumor is benign based on the medical image

Regression

Forecasting your company's revenue next year , based on many performance metric

Clustering

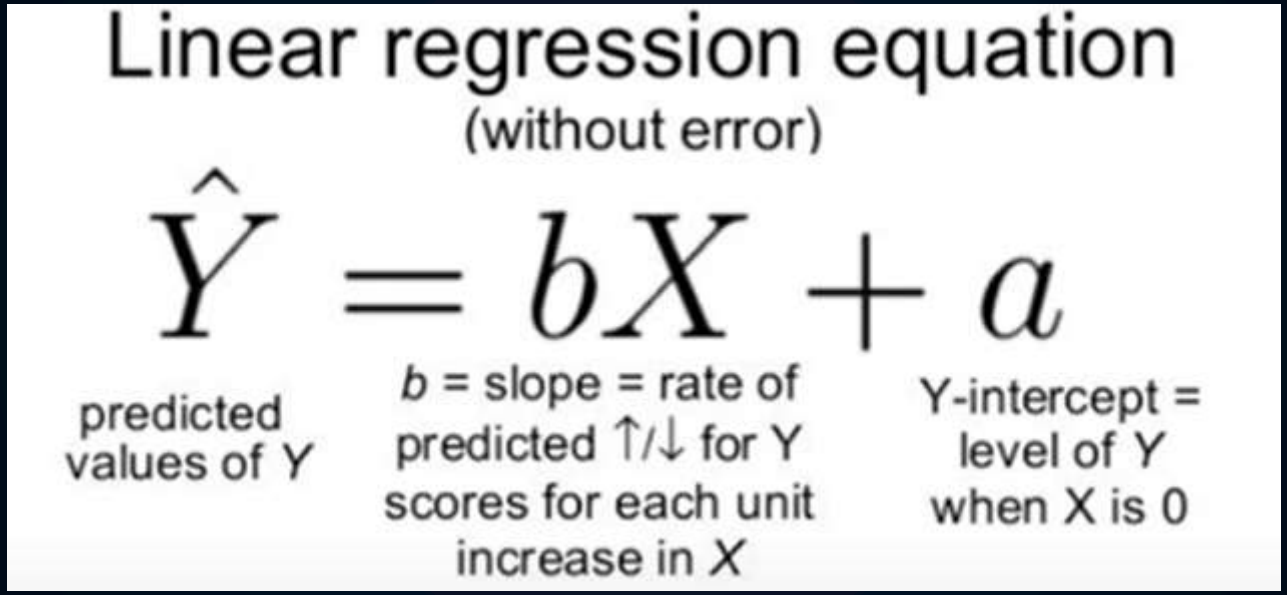
Identifying topics in a set of blog posts



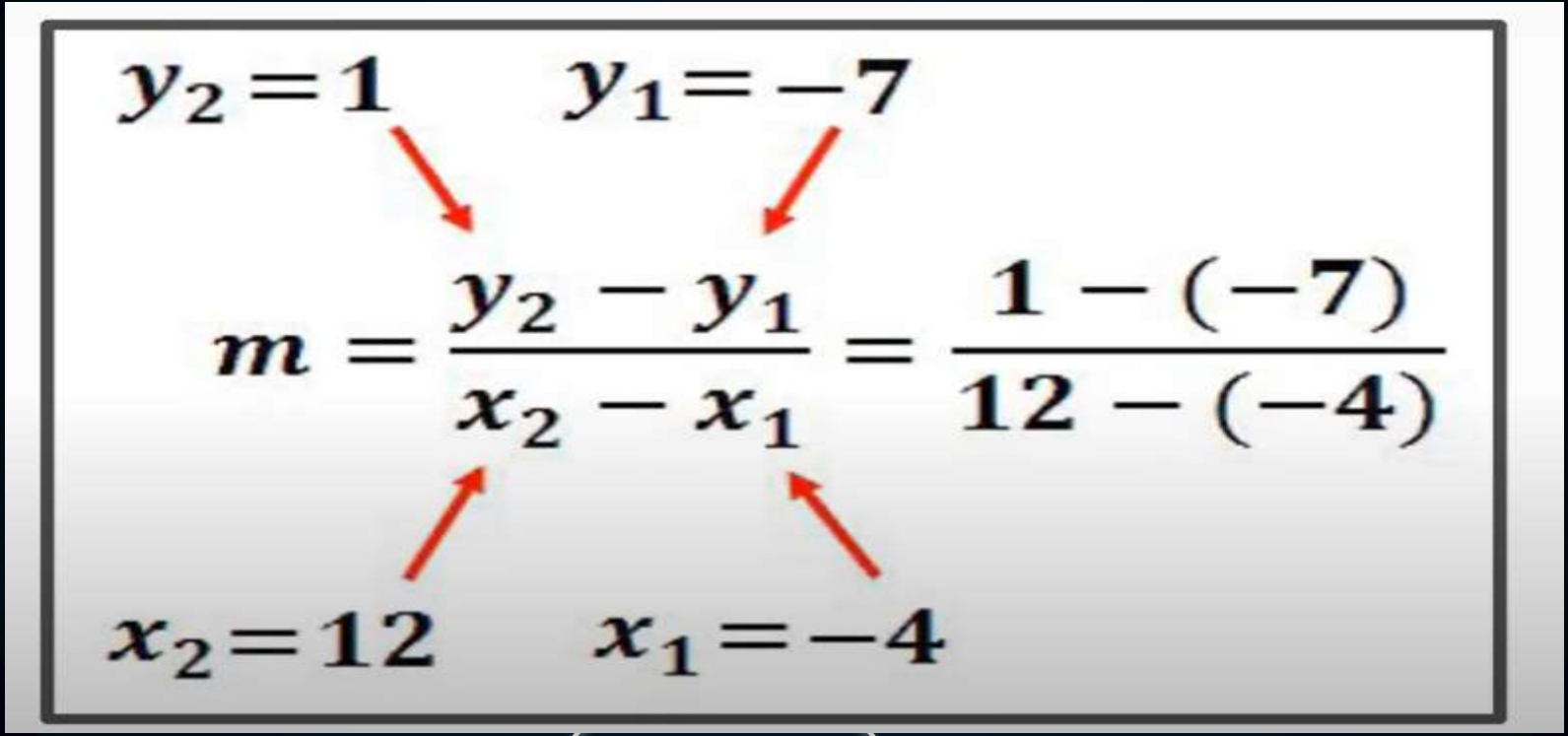
4

Linear Regression

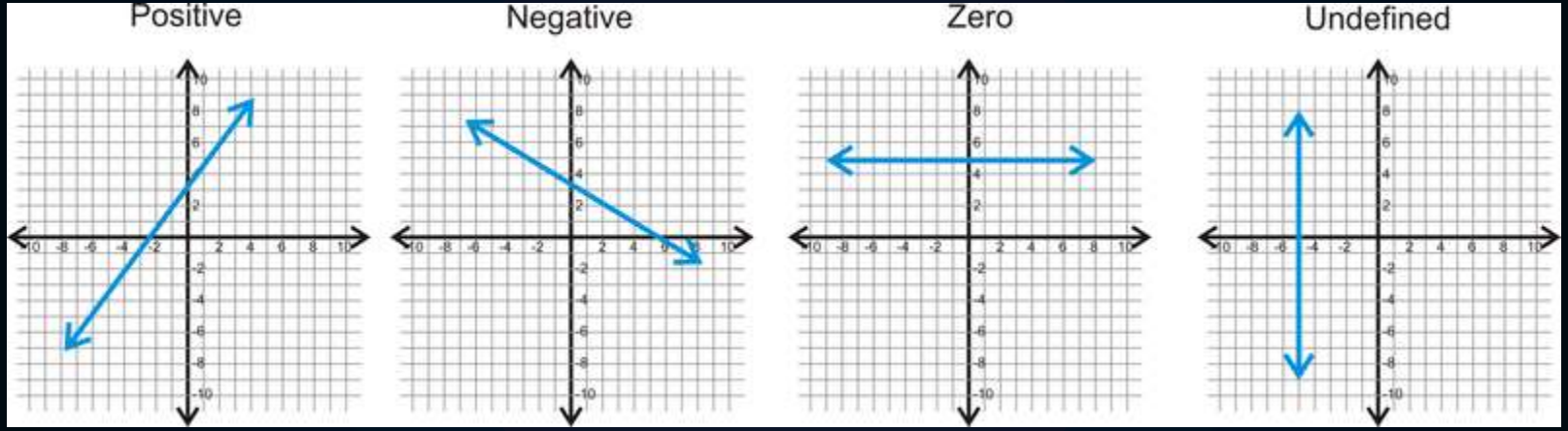
Linear regression equation



Slope

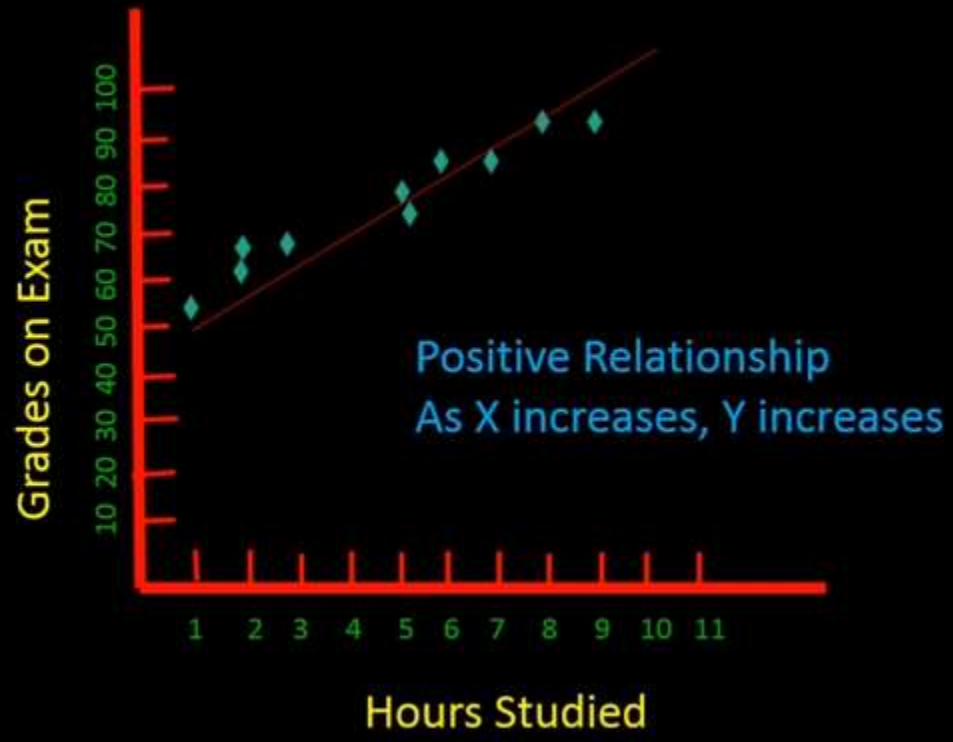


Slope



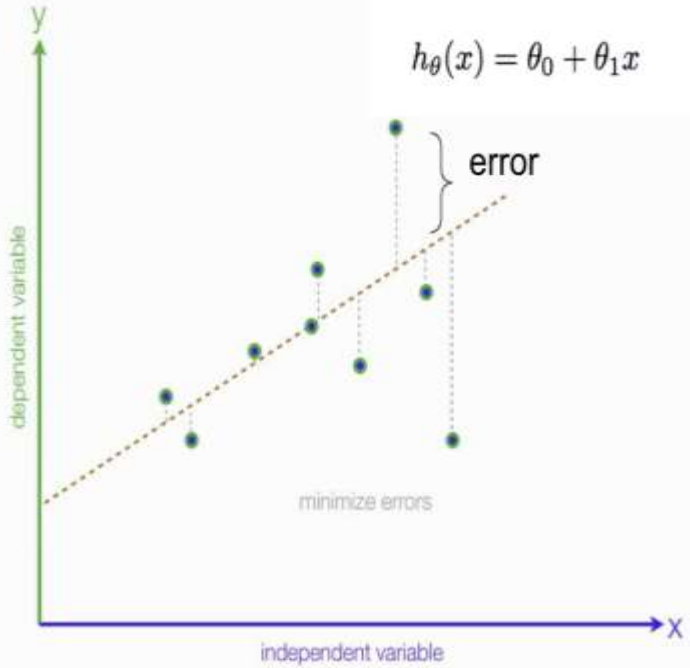
Linear regression

Hours Studied	Grade on Exam
2.00	69.00
9.00	98.00
5.00	82.00
5.00	77.00
3.00	71.00
7.00	84.00
1.00	55.00
8.00	94.00
6.00	84.00
2.00	64.00



Input X	Inputs
Output Y	Outputs
Rows m	Rows
Features n	Elements
h(X)	Predicted Value
Cost J	error value
Theta	X Transactions

Cost Function



$$h_\theta(x) = \theta_0 + \theta_1 x$$

Hypothesis:

$$h_\theta(x) = \theta_0 + \theta_1 x$$

Parameters:

$$\theta_0, \theta_1$$

Cost Function:

$$J(\theta_0, \theta_1) = \frac{1}{2m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})^2$$

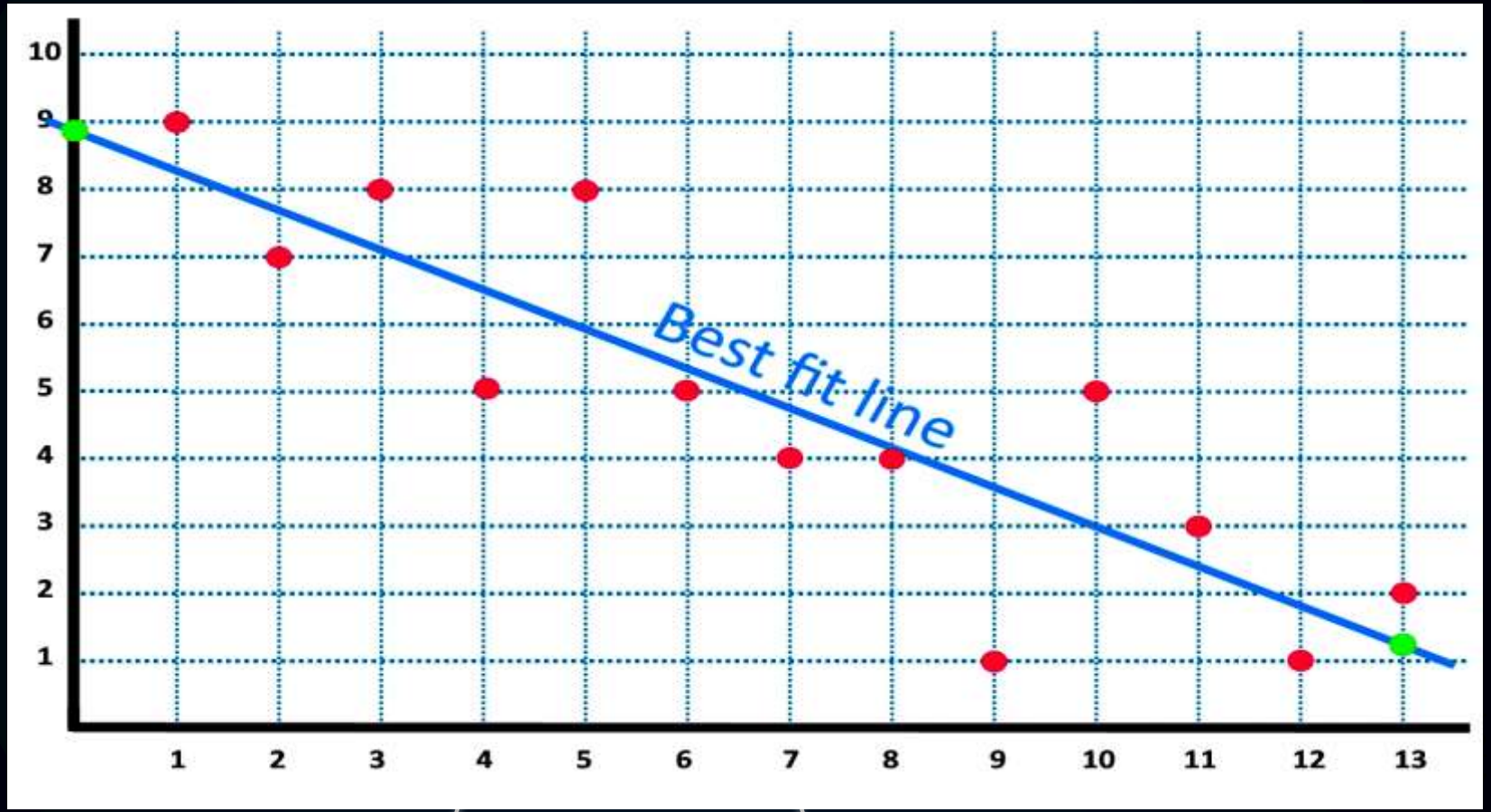
Goal:

$$\underset{\theta_0, \theta_1}{minimize} J(\theta_0, \theta_1)$$

Theta 0 =5 Theta 1 =2 h(x)= 5+2x

X	Y	h(X)	h(X)-y	(h(X)-y)^2
1	7			
2	8			
2	7			

Best Fit Line



Optimization

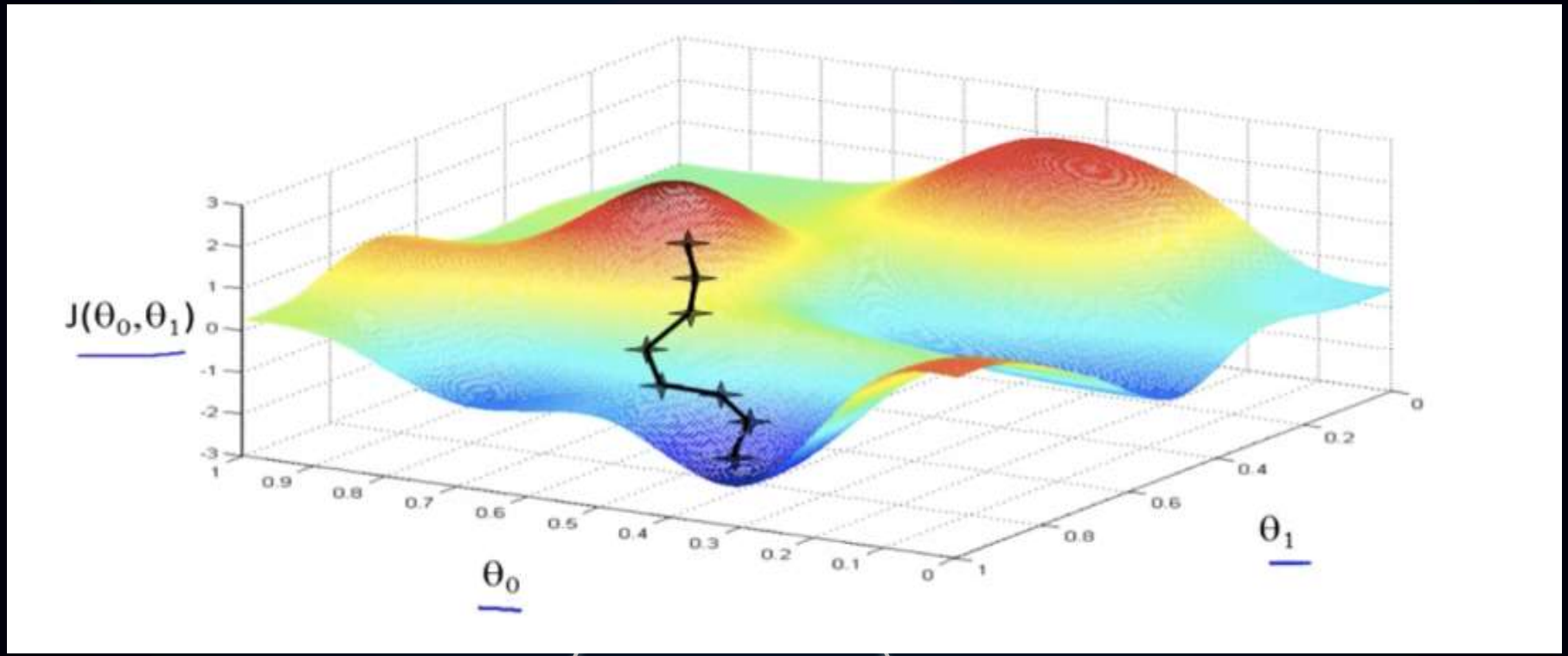
aims to search for the best choices according to (constraints) to get the best results

(maximization) or (minimization).

Gradient Descent

It is an optimization algorithm that aims to reach the lowest point in theta so that the cost function is the lowest

Gradient Descent



Gradient Descent

$$\theta_j := \theta_j - \alpha \frac{\partial}{\partial \theta_j} J(\theta_0, \theta_1)$$

Gradient Descent

repeat until convergence {

$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} \left(h_\theta(x^{(i)}) - y^{(i)} \right)$$

$$\theta_1 := \theta_1 - \alpha \frac{1}{m} \sum_{i=1}^{m} \left(h_\theta(x^{(i)}) - y^{(i)} \right) \cdot x^{(i)}$$

}

Gradient Descent

Correct: Simultaneous update

$\text{temp0} := \theta_0 - \alpha \frac{\partial}{\partial \theta_0} J(\theta_0, \theta_1)$

$\text{temp1} := \theta_1 - \alpha \frac{\partial}{\partial \theta_1} J(\theta_0, \theta_1)$

$\theta_0 := \text{temp0}$

$\theta_1 := \text{temp1}$

Incorrect:

$\text{temp0} := \theta_0 - \alpha \frac{\partial}{\partial \theta_0} J(\theta_0, \theta_1)$

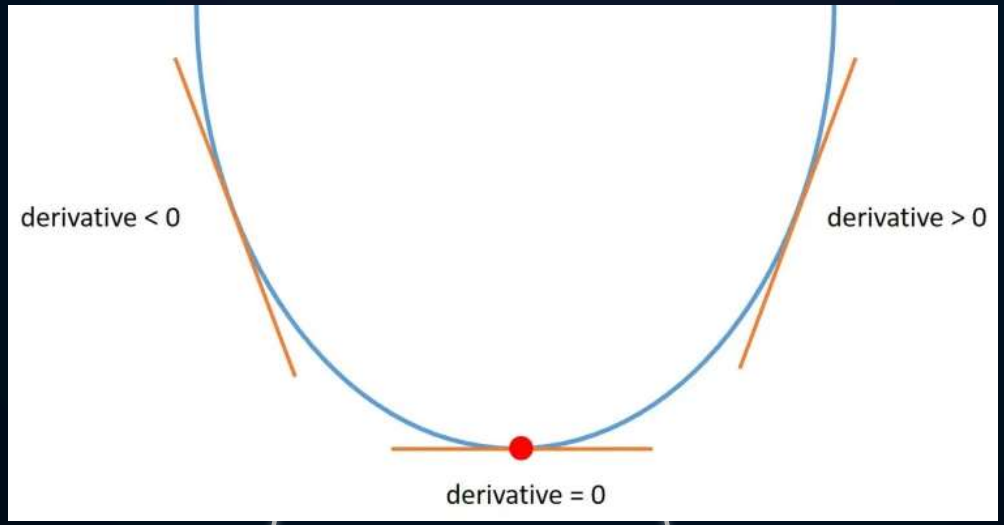
$\theta_0 := \text{temp0}$

$\text{temp1} := \theta_1 - \alpha \frac{\partial}{\partial \theta_1} J(\theta_0, \theta_1)$

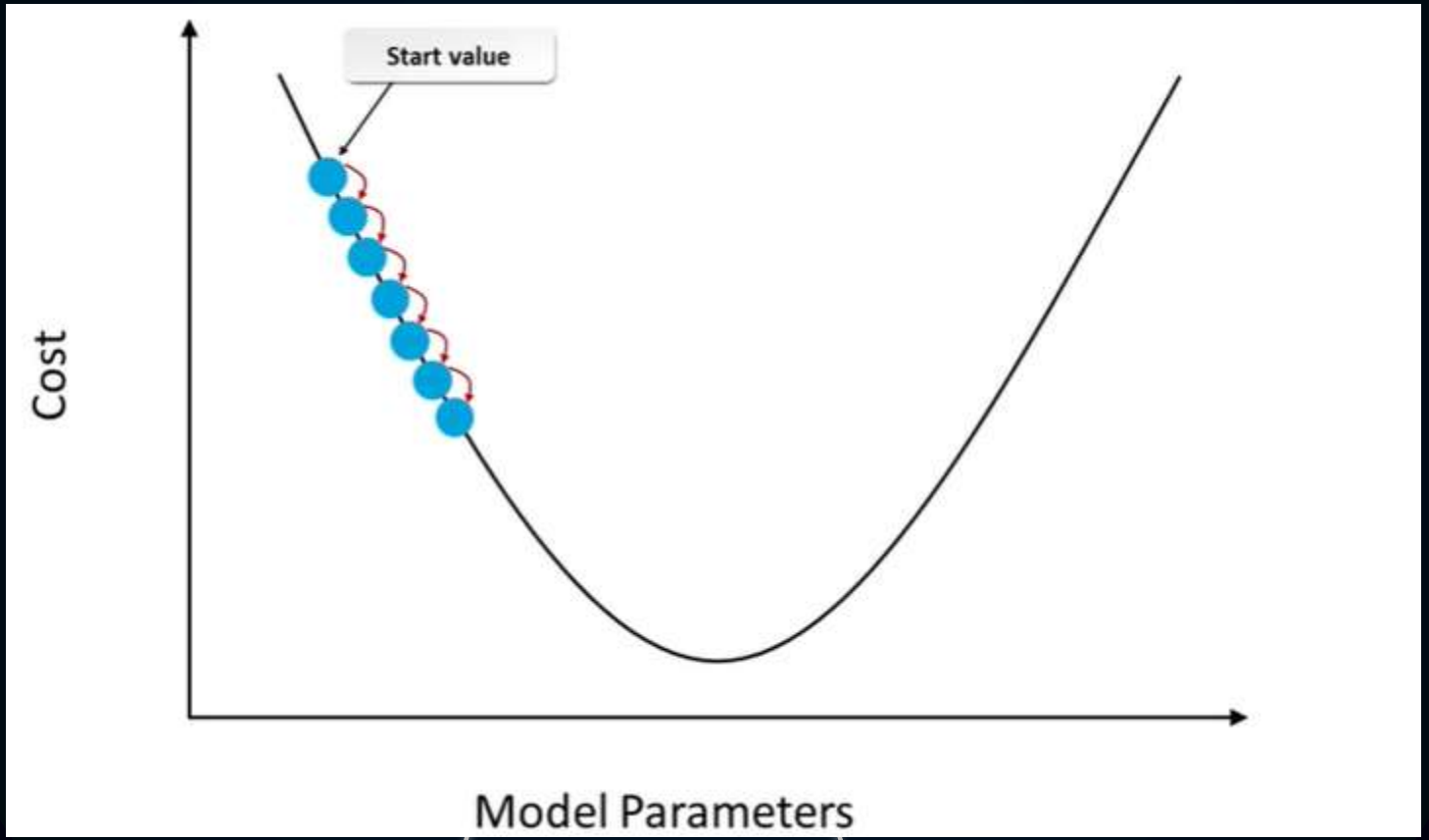
$\theta_1 := \text{temp1}$

Gradient Descent

In the Gradient Descent algorithm, the direction will be directed downward, so if the differential value is positive, then the direction will be to the left (as in the figure), if it is negative, then the direction will be to the right, and it will stop when zero is reached, which means that the bottom will be reached Because there is no change



Gradient Descent



Gradient Descent

$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x_i) - y_i)$$

Theta 0 =1 Theta 1 =3 Alpha=0.002 h(x)= 1+3x

Home	Price	h(X)	h(X)-y
100	300		
95	285		
90	270		