

AI = Mimic Human Cognitive Abilities

- Machine → learn, informed decision
- Perception: Ability to Process Sensors input e.g. image
- Reasoning: Drawing local conclusion or making prediction on data
- Learning: Drawing insight from past data & recommendation for future
- Automation: Mimic Human intervention.
ex → Self driving Cars or Autonomous Drones

Key of Artificial Intelligence:-

- ① Machine Learning
- ② Natural Language Processing (NLP)

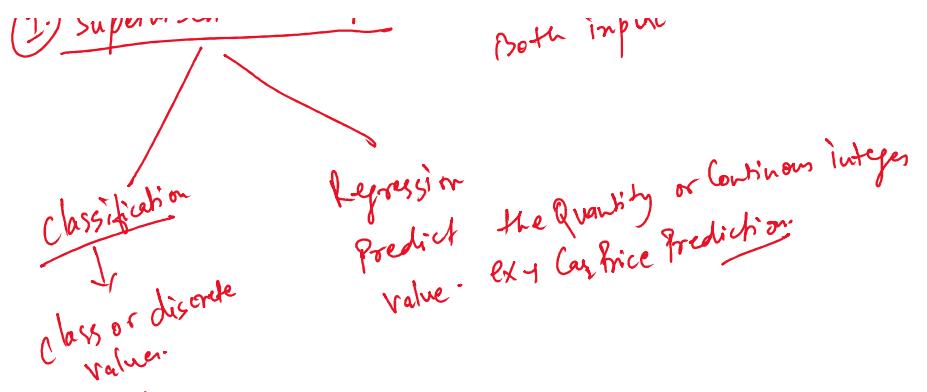
③ Neural Network & Deep learning

- ① Machine learning - Subset of the AI
Pattern & make decision without being explicitly programmed.

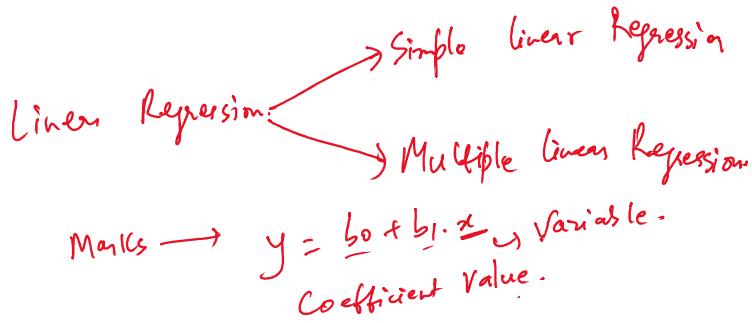
- ① Learn - Data
- ② Predict - Make decision on the basis of learned data
- ③ Improve - Over the time, more the data

- ① Supervised learning
- ② Unsupervised learning
- ③ Reinforcement learning
- ④ Semi supervised learning

- ① Supervised learning - Labeled data.
Both input → output



Regression:



Cost of My House \propto Size of House.

1500 sq. ft

2000 sq ft

2500 sq. ft.

$y = b_0 + b_1 \cdot x$

Sales Prediction \propto Advertisement

Temperature \propto time of Day. $y = b_0 + b_1 \cdot x$

Pros:-

① Easy of implement.

②

Cons:-

① Accuracy will be less.

Multiple linear Regression: Two or more independent Variables.

$y = b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + b_3 \cdot x_3 \dots + b_n \cdot x_n$

x_1, x_2, \dots, x_n \rightarrow independent Variable.

b_0, b_1, b_2, \dots \rightarrow Coefficient Value.

x_1, x_2, \dots, x_n \rightarrow independent Variable.

Cost of House:- ① Size. ② Age of house. ③ Proximity of x_3

④ Built Quality ⑤ No. of Rooms. ⑥ flat/

$y = 6$ factors

Multiple linear Regression

x_1, x_2, \dots, x_n \rightarrow independent Variable.

No. of Owners. \rightarrow independent Variable.

Brand. \rightarrow independent Variable.

$$y = 6 \text{ factors} \rightarrow \text{Multip.}$$

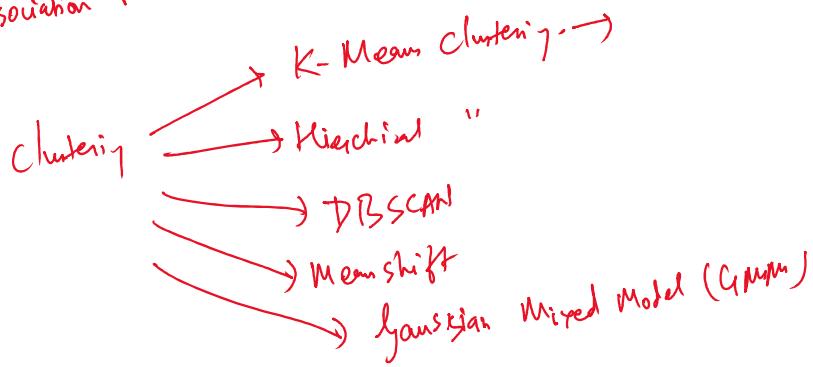
Cost of Car: \downarrow

$$\begin{array}{l} \text{① Miles.} \quad \text{② Old} \quad \text{③ No. of Owners.} \quad \text{④ Brand.} \\ \text{⑤ Engine} \quad \text{⑥ Transmission (Auto/Manual)} \end{array}$$

$$y = b_0 + (b_1 \cdot x_1) + (b_2 \cdot x_2) + (b_3 \cdot x_3) + (b_4 \cdot x_4) + (b_5 \cdot x_5) + b_6 \cdot x_6$$

$$y = \$500,000 - (\$500 \cdot 5000) \quad \dots$$

- ② Unsupervised Learning Unlabeled data.
- Only Input features \rightarrow No Associated output label.
- ① Unlabeled Data: \rightarrow W/o Predefined labels, No target outcome provided during training phase.
- ② Learning Pattern & Relationship: \rightarrow Discover hidden pattern, grouping, relationships.
- Market Basket analysis: \rightarrow Retail store \rightarrow item frequency purchased
 \downarrow
 Improve store layout, promotion & product bundling strategies.
- ① clustering: \rightarrow group data into clusters based on their similarity.
- ② Dimensionality Reduction.
- ③ Association Rule learning.



K-Means clustering: Widely used clustering Algorithm.

K-Means Clustering :- Widely used clustering Algorithm.
Divide Dataset into K clusters.

Customer Segmentation in Marketing
Obj: Group customers \rightarrow Spending Score, Income, Age.
Imp: High value customers, Budget shoppers, Casual Buyers

Help the retailer: Personalize Marketing Campaign

DBSCAN (Density-Based Spatial Clustering of Application with noise) :-

Group points \rightarrow Noise.

① Density Based - Density Point

② Handle noise - Noise

③ Non-Spherical Clusters - size or shape of the cluster

Detect fraud in your Credit Card transaction

Amount of Payment

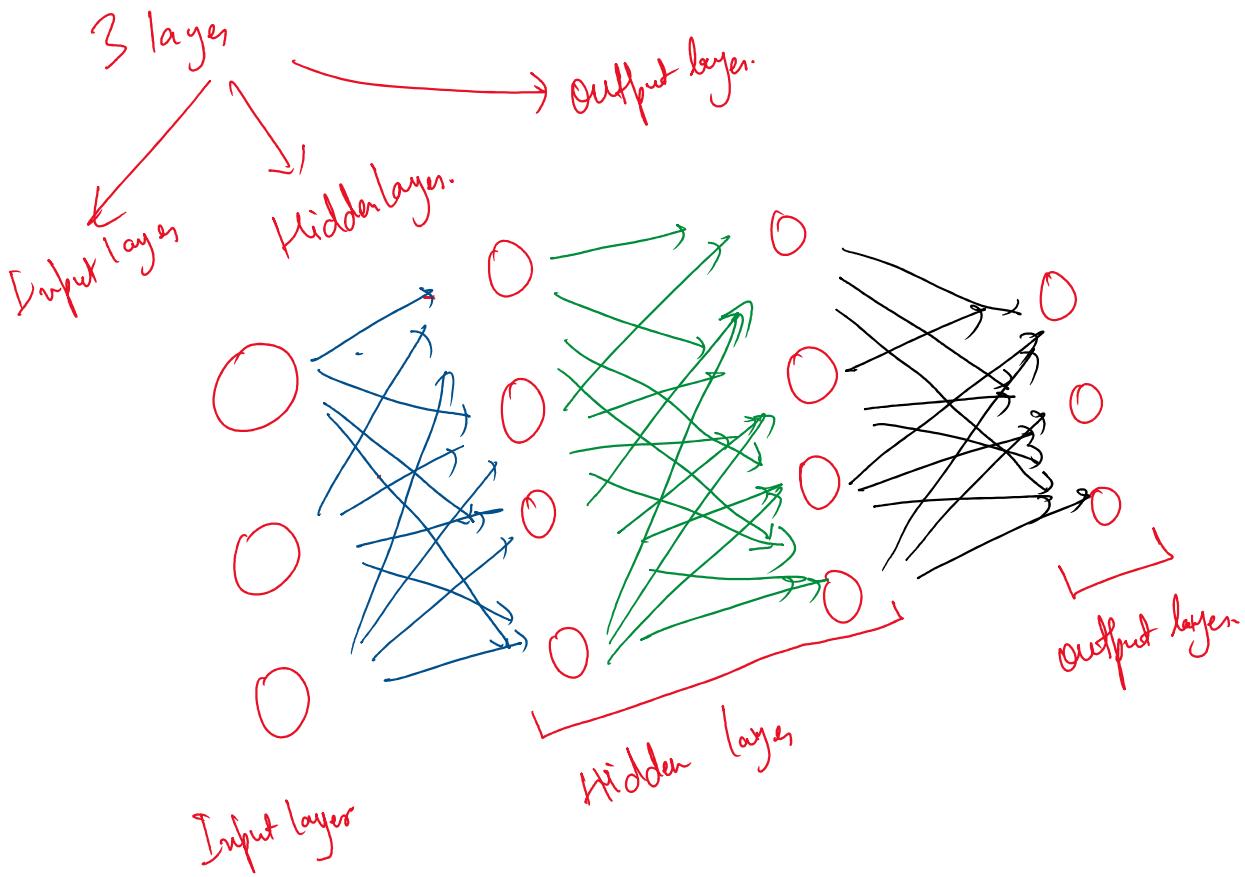
Mean Shift Clustering :- Self driving Car. Sky, road, vehicle, obstacle

Gaussian Mixture Model (GMM) :-

E-commerce

Neural Network :- Model that is inspired by way the human brain works.

Nodes interconnected \rightarrow Neurons.



Input layer - Recieve Input data

Hidden layers - Process data b/w ~~1/p~~ of layers.

Output layers - final output produced.

Weight & Bias - Parameters that define the importance of input to each neuron

Weight

Bias

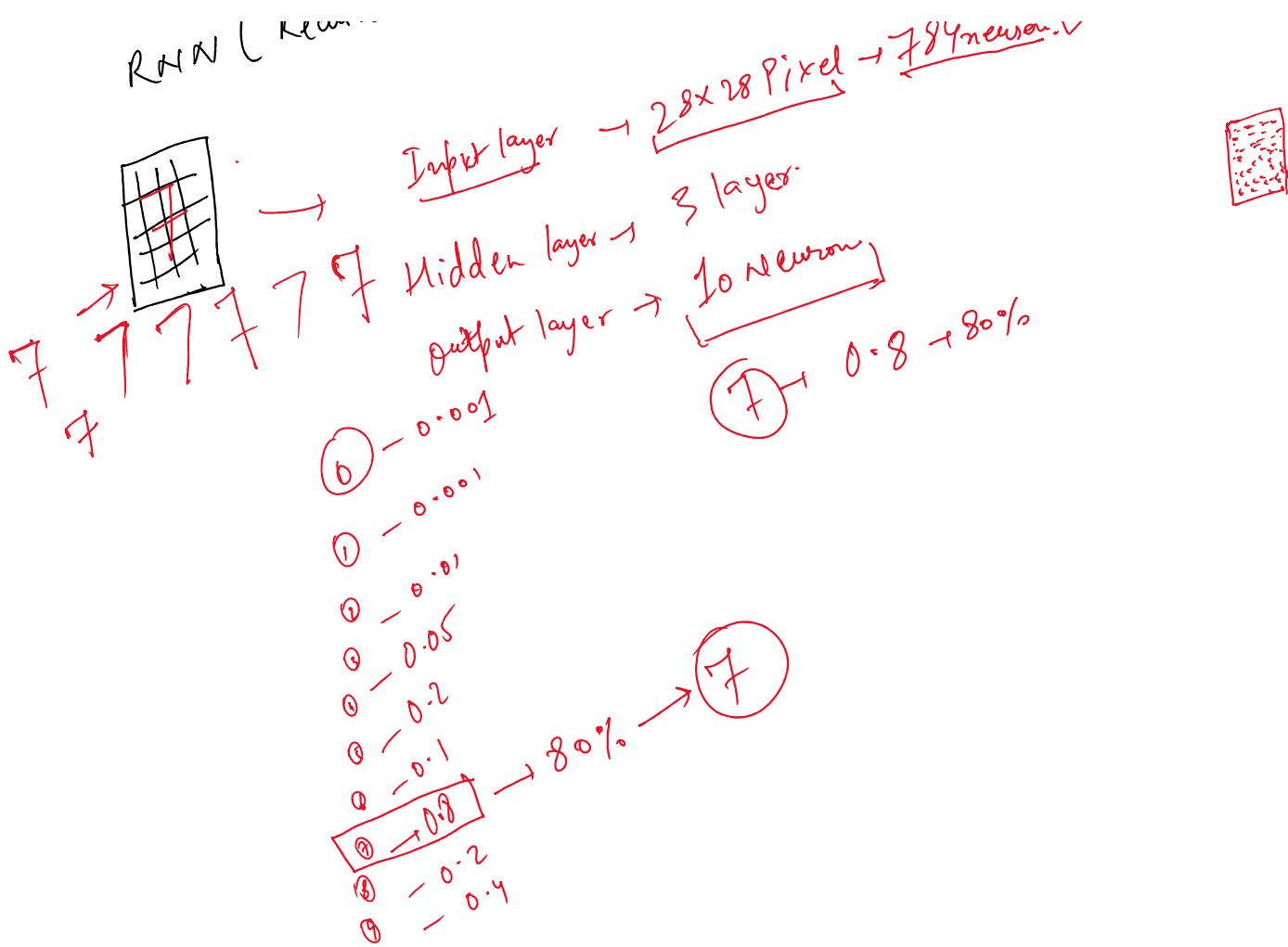
Adjust the output

9

Conv (Convolutional kernel $a[n]$) - 5×5 Images, object Detection

RNN (Recurrent kernel $a[n]$) - $\{Text \rightarrow Audio\}$

$\sim 8 \times 28$ Pixel $\rightarrow 784$ neuron. $[0-9] \rightarrow 10$



Deep Learning:- Artificial Neural Networks

Image Recognition, NLP & Autonomous Vehicle.

Unstructured data (e.g. image, audio & text)

Multiple Hidden layers \rightarrow Deep Neural Net.

Use Case of Deep learning

Face \rightarrow iPhone.

① Facial Recognition - Face \rightarrow Self Driving Car.

② Object Detection - Face \rightarrow Machine Translation - One lang. to Another language.

③ NLP - Machine Translation - One lang. to Another language.

Speech Recognition - Siri, Alexa, Google Assistant

Text Generation -

1

2

Text Generation -

- ④ Healthcare - Ex- XRay
- ⑤ Recommendation system - Ex- Netflix, Amazon

History :-

1940s - Alan Turing (Turing Machine) \rightarrow AI
1956 - Dartmouth Conference (John McCarthy)

1956 - ChatBot \rightarrow Joseph \rightarrow Eliza

1960s - Rise of Expert System

1980s - Deep learning

1990s - Decline in progress AI

2000s - ML & Big Data

2006 - Deep learning & Neural Network

2011 - IBM Watson

2012 - ImageNet 1

2019 - GPT-2

2020 - GPT-3

2021 - Vision Transformer

2022 - ChatGPT (GPT 3.5)

2024 - ChatGPT (GPT 4.0)

Animation Game \rightarrow LionPlay

AI Application in Organizations

... . Streamlining, enhancing Medical

* AI Application in Organizations

① Health Care:-

Diagnosis, Personalizing treatment

Research

Ex- IBM Watson Health, Google DeepMind

Virtual Assistant for Patient + ex- Ada Health, Babylon Health.

→ Benevolent AI

Drug Discovery →

② Finance & Banking:-

Credit Scoring -

Ex- Zest AI

Customer Service -

ChatBot Ex- Erica from BOPA -

Fraud Detection -

Mastercard & PayPal

Algorithm Trading -

HFT (High Frequency Trading)

③ Retail:-

① Recommendation system - Amazon & Netflix.

② ChatBot

③ Inventory Management

④ Manufacturing:-

⑤ Transportation & Logistics

ORION

⑥ Telecommunications:-

Network optimization

For Human Resource

HireVue.

- (6) Human Resource HireVue
- (7) Education Skillsoft AT

* Ethical Consideration and AI Governance

(a) Ethical Consideration

- (1) Bias and Fairness
- (2) Privacy & Data Protection
- (3) Transparency & Explainability
- (4) Accountability & Responsibility
- (5) Autonomy & Human Right
- (6) Job Displacement and Economic Impact
- (7) Safety and Security

AI Governance Development of Policies, regulation, standards

- (1) Ethical AI Principle
- (1) Fairness
- (2) Transparency
- (3) Accountability
- (4) Privacy

- (15)

 - ① Privacy
 - ② Safety & Security
 - ③ Ethic AI guidelines
 - ④ OECD AI Principles
Organization for Economic Co-operation & Development
 - ⑤ EU AI Ethics guidelines
↳ Ethic Guideline for Trustworthy AI
 - ⑥ Legal Regulatory framework
① European Union - EU AI Act
 - ② United States
 - ③ AI Audits & Risk Assessment
Algorithm Audit
 - ④ AI governance Bodies & Committees

Strategie:

→ Mitigation

- ✓
- ① Bias Mitigation
 - ② Explainability & Transparency
 - ③ HITL (Human-in-the-loop)
 - ④ Privacy & Data Protection
 - ⑤ Accountability & Responsibility
 - ⑥ Regulation Act
 - ⑦ Stakeholder Engagement

Real time example of Ethical AI failure lesson learned

1. Amazon AI Hiring Tool.
2. Microsoft Tay ChatBot

* Preparing for the future of Organization with AI :-

Strategy approach

Business goal.

- ① Develop an AI strategy Aligned with
 - Identify opportunity
 - Set clear objective
 - Integrate AI into Business processes
 - Integrate AI into Infrastructure & Technologies
- ② Building the necessary Infrastructure & Technologies

- (2) Building the necessary infrastructure
- (3) Building a skilled workforce
 - AI Literacy
 - upskilling & reskilling
 - AI Talent Acquisition
- (4) Fostering an AI Ready culture.
- (5) Ensuring Responsible and Ethical AI Deployment

Steps

 - Establish Ethical guideline
 - Bias & Fairness Assessment
 - Explainable
 - Compliance
- (6) Leverage AI for Decision Making
- (7) Create AI -Driven Products & Services
- (8) Scale AI Across the Organization
- (9) Collaborating with AI Ecosystem Partners
- (10) Addressing challenges & risks

Real World Examples:-

- (1) Amazon - Ex - Amazon GO
- (2) Netflix
- (3) General Electric
- (4) Tesla

- (5) JPMorgan Chase

(CoIN (Contract Intelligence))

Extract legal points from documents

(5.) Uan
(A) Tesla.