0 what is AI?

→ Capable perform task like a human being.
→ Tech- ex1 ML, NLP, Robotics & Computer vision.
→ Learn from & Act without them env.

① Broad →
② Technical →
③ Functional

AI → Narrow AI (weak AI)
→ General AI (Strong AI)

Narrow AI:-

① Designed & trained single or limited Task.
② operate within specific Domain & can't perform task outside the area.
③ Analysis → Pattern → Decision

Virtual Assistant:- Siri, Alexa & Google Assistant
Image Recognition:- Facial Reg. & Medical Image Analysis
Recommendation:- Netflix, Youtube & Amazon
Chatbot & Customer Service Bot:- Provide Automated Response.
Self Driving Car

Limitations:- ① Cannot Adapt a task easily.

General AI:- (Strong AI) :- Human level Intelligence.

① Early Beginning:- Turing's Contribution (1940s - 1950s)
Alan Turing "Machine that think"
② 1956 → John McCarthy → "Artical Intelligence"
③ 1960 → ELIZA → Chatbot.
④ AI Winters - 1970s & 1980s
⑤ ML & Neural N/W → 1980s - 1990s
Computational Power (2000s)
⑥ Deep learning & Modern AI (2010s - Present)
⑦ Generative AI & Advanced Application.
⑧

Application of AI:-

Healthcare:- Predict, Personalized Medicine, Diagnosis
... Fraud.

Healthcare:- Predict, Personalized

Finance:- Stock trading, detect Fraud.

Entertainment:- Recommendation, Storytelling, Automated

Transportation:- Traffic Prediction,

Customer Services:- Chatbot & Virtual Assistant

Machine Learning:-

learn from data → Identify Pattern → Decision with minimal human Intervention.

More Data Point ↑ Prediction ↑

Key Concept:-

(1) Learning from Data:- Train with Data → Pattern in Data.

(2) Model:-

(3) Algorithm:-

ML:- → Supervised Learning
→ Unsupervised Learning.
→ Reinforcement Learning

(1) Supervised learning:-

(1) Data Collection & Processing
(2) Model Selection.
(3) Training & Validation.
(4) Evaluation.
(5) Prediction & Deployment.

(1) Data Collection & Processing:-

(1) Start → collect data → Data cleaning
↓
Feature selection. ← Data splitting.

2. Model selection:-

1. Linear Regression.
2. Decision Tree

3. SVM

Task → classification
Task → Regression.

classification - Predicting a class or discrete value.
ex→ Patient is Diabetic or not ← T/F, Y/N

Regression - Predict the Quantity or Continuous value
ex→ salary, Age or Price

ex→ Predict the Price of the Car.

3. Training & Validation:-

Model Training →
Hyperparameter Tuning → Adjust parameters
Cross-Validation → check the consistency of the Model.

4. Evaluation:-

Test Model - Validate/Test
Perform Metrics - Accuracy, Precision.
Iterate if Needed -

5. → Prediction & Deployment:-

Deploy the Model
Monitor the performance.

II. Unsupervised Learning:- Train a Data w/o labelled output.

Uncover hidden pattern, grouping or structure within the data.

1. Data Collection & Preprocessing

Collect Data → Data cleaning → Feature Selection.

2. Model Selection -

Clustering → ex→ K-mean, hierarchical clustering or DBSCAN

Dimensional Reduction → PCA, t-SNE

3. Evaluation. → Evaluate the Model → Metrics.

→ Test & Deploy → Results → Deploy model → Monitor & retrain.

(3) Evaluation.

(4) Interpret & Deploy → Results

(III) Reinforcement Learning:-

Game AI (AlphaGo), Robotics (Navigate) & Autonomous Vechile.

Initialize → Action selection → Interaction with env. → update Policy → Check for Termination → Repeat & optimize.

Reward
- +ve
- -ve

Epsilon Greedy → 0 or 1

- New Action
- ϵ = 0.1 (10%.)
- 90% (0.9) → Best known Action.

Exploration (Trying New Action) (ϵ)

Exploitation. (choosing the Best-Known Action) ($1-\epsilon$)

(1) Initial Phase :- $\epsilon = 1$

(2) Learning Phase :- $\epsilon = 0.5$

(3) Late Phase :- Low Exploration $\epsilon = 0.1$

Adv.:-
1. Prevent local optima.
2. Gradual Improvement.

Dis:-
1. Randomness
2. Fixed Decay.

(1.) Linear Regression:- One or more Independent (Input) & a dependent (output) by fitting a linear equation to the observed data.

① Dependent Variable (Target) :- y

↓

Price.

② Independent Variable (Input) :- x

age, milage, owner, Transmission, fuel_type

x_0 x_1 x_2 x_3 x_4

Simple :-

$y = b_0 + b_1 x$

↓

$x = 0$

mileage = 0

y = $100K

mileage = 100km, 1000km.

y = ↓

mileage =

y = 0Kms.

b_1 = xc kms.

Multiple :-

$y = b_0 + b_1 \cdot x_1 + b_2 \cdot x_2 + b_3 \cdot x_3 + b_4 \cdot x_4 \cdots$

Car Price :-

① Problem :-

Independent features :-

① Year

② Kms_Driven.

③ Fuel-type.

④ Transmission.

⑤ Owner.

② Collect & Preprocess the Data :-

① Handle Missing Values.

② Encoding categorical Variable →

Fuel-type — ① Petrol — 0

② Diesel — 1

③ CNG — 2

Seller_type — ① Dealer — 0

Individual — 1

Seller_type – ① Dealer
② Individual – 1

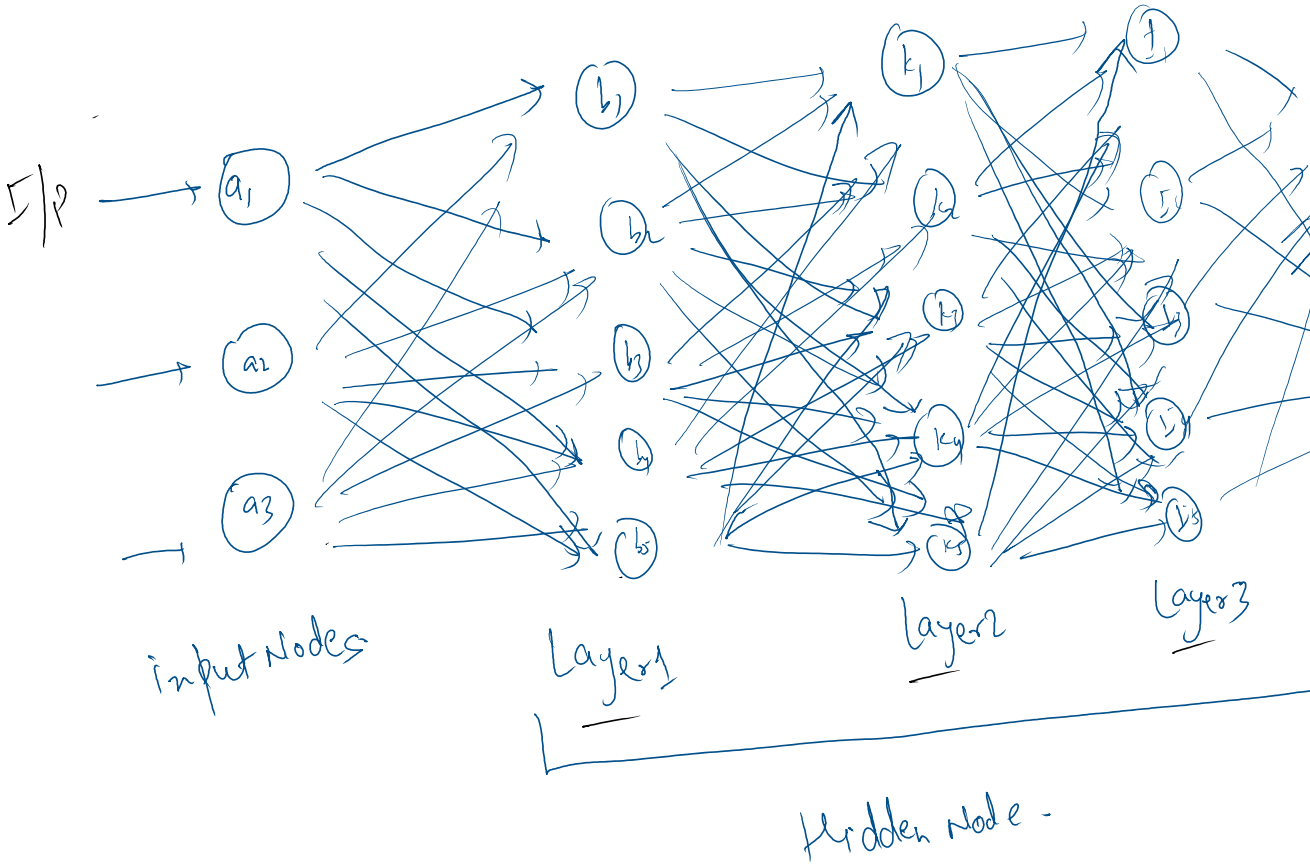
Transmission = Manual = 0
Automatic = 1

③ Outlier Handling :- Remove extreme value
eg - Mileage / price.

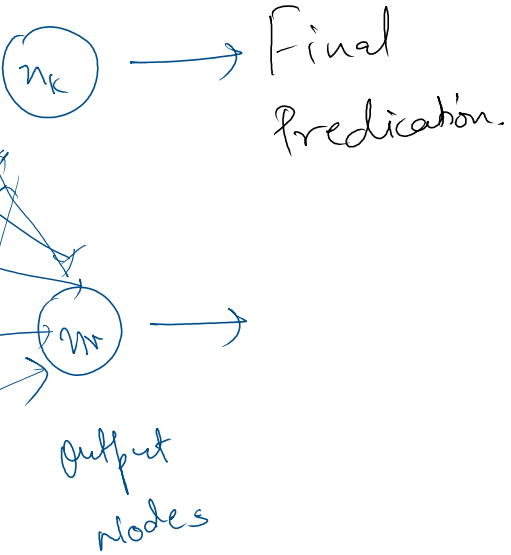
(1) Classification :- Predict a class or discrete values.
ex - M/F, T/F, Y or N.

Ex: Predict that a Patient belongs to Diase

* Neural Network :-



tic T/F



1

Neuron – Node or Unit.
each neuron take inputs → proc

Weight = Parameter that connect one neuron
importance of a particular i/p in prod

Medical Image classification:-

① Pneumonia Detection in chest X-Ray

I Input layer:-

128×128 pixel.

128 * 128 = 16,384 pixel

16,384 → Neuron.

0 - 255 → white

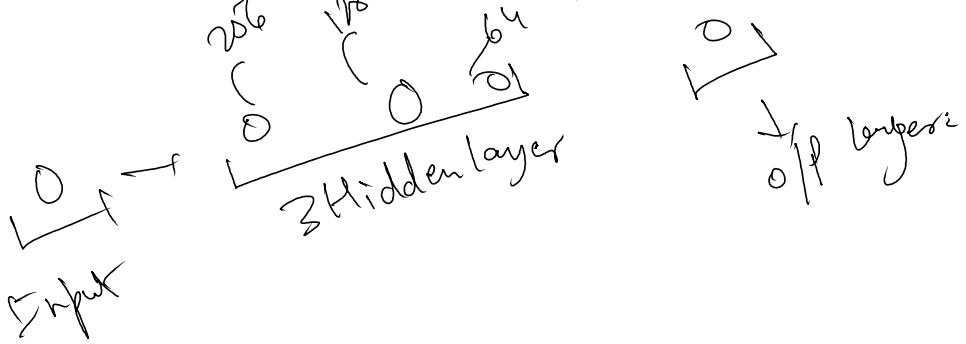
↓

Black

II Hidden layer:-

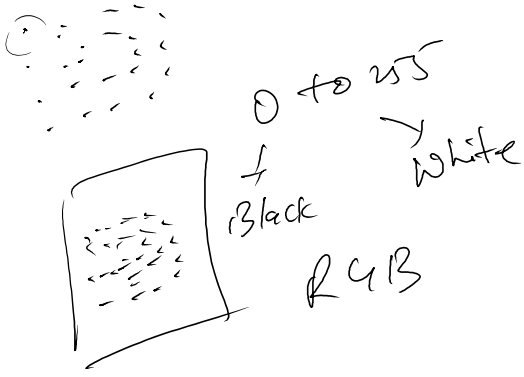
3 hidden layer

256, 128, 64 Neuron.



es → output.

to another & determines the
ucing final output.



Activation function.

Input

(1) output layer:-

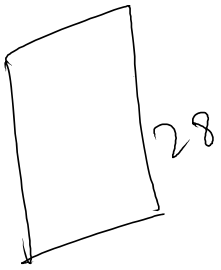
Single Neuron

0 & 1 → Sigmoid

0.9 → High Probabil

0.1 → low Probabil

* Handwritten digit Recognisat



→ I

(2) Hidden layer:-

2 Hidden

128

Neuron:-

(3.) output layer :-

0 - 9

10 N

Activation Function

y of Memoria.

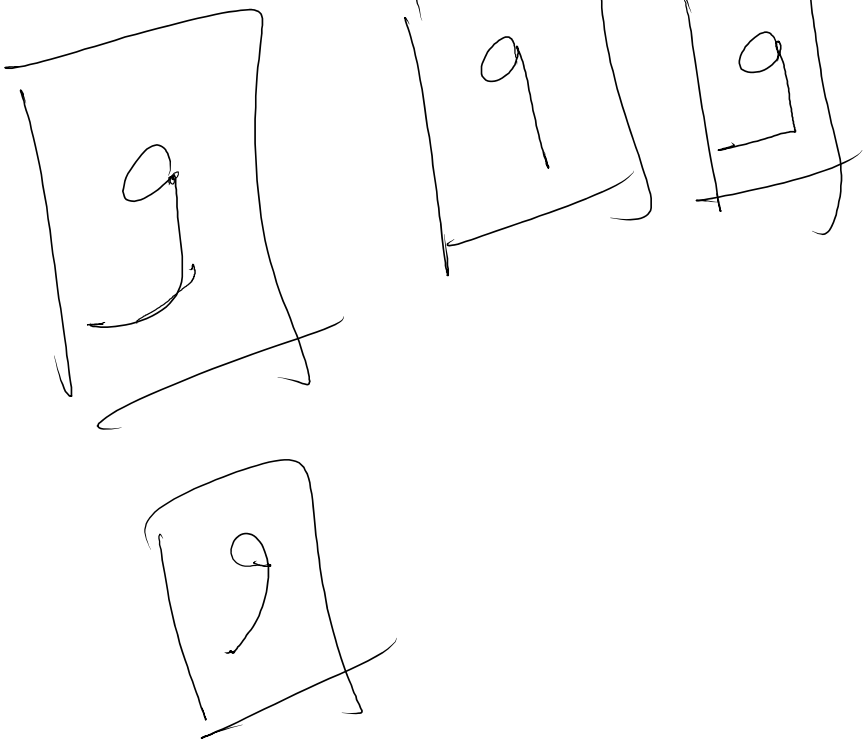
ity of Memoria.

ons - [0-9]

nput layer :- 28×28 = 784 Neuron

layer

64 Neuron



euron

3. Output

Softmax Activation

* Deep learning :-

Multiple Hidden layer

Subset of M

1. Recognize

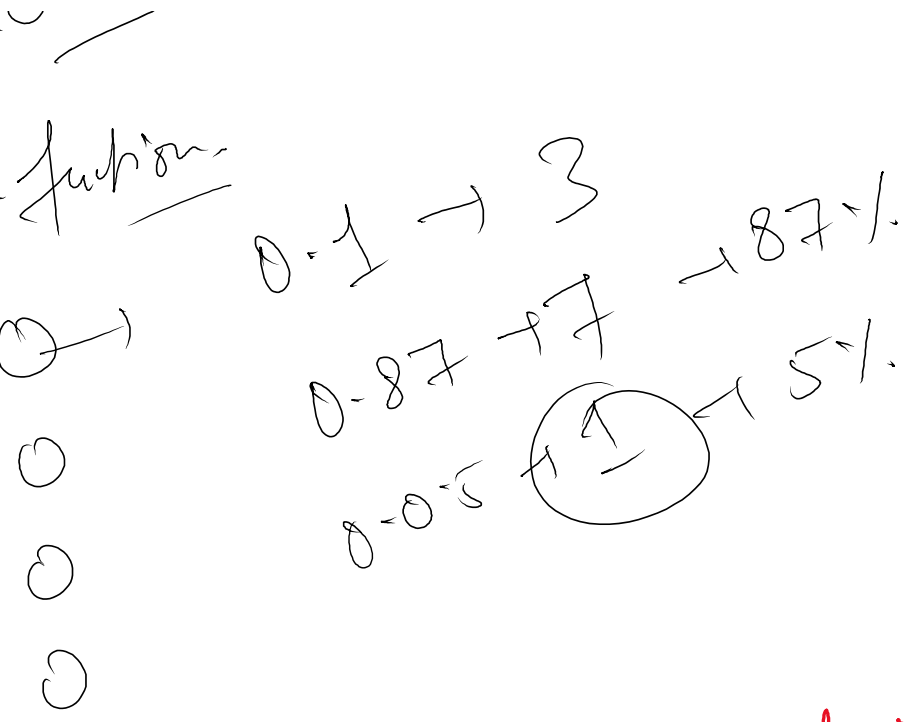
2. Generati

3. Understa

Key feature :-

Vast Amo

Neural Netw



% focussed on Neural Network

Image.

Text.

andig speech.

out of data

work (ANN) :-

1. Convolutional Neural Net

2. Recurrent Neural Network

1. CNN :- Grid like Image

. Facial Recognition

Medical Imag

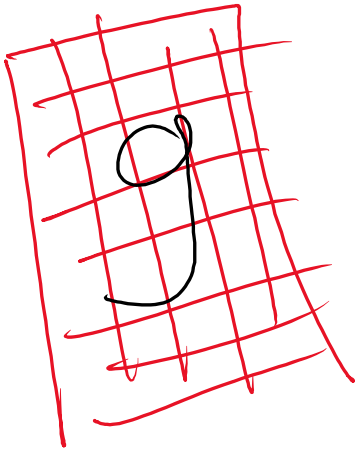
2. Recurrent Neural N/w (RNN

Large Process Tas

Timeseries Predic

Application of Deep learning

(RNN) :-



object Detection. 4

e Analysis-

J;- Sequential data. ex- text, audio,

time-serie data.

Machine translation, Speech Recognition &

ic,

ction.

Application of AI

1. Image Recognition.
2. Speech Recognition
3. Natural Language Proce

1. Image Recognition:- CNNs

Camer

Google De

2. Speech Recognition:-

Convert S

ex:- Alexa, Si

or.

ssing (NLP)

, Grid Method,

edges, texture

ep Mind → eye disease → Retinal Images

RNN. Sequential Info.

→ Audio / text.

poken language

ri, Google Assistant

③ NLP (Natural language Proce

Processi

Sententi

ex → Open AI, GP

* NLP (Natural Language Processing) :-

① Part of AI

② Text / spoken word

challenges

① Ambuity → W

② Context Understandi

& Tone

generate Human language.

al Analysis; ChatBots

T,

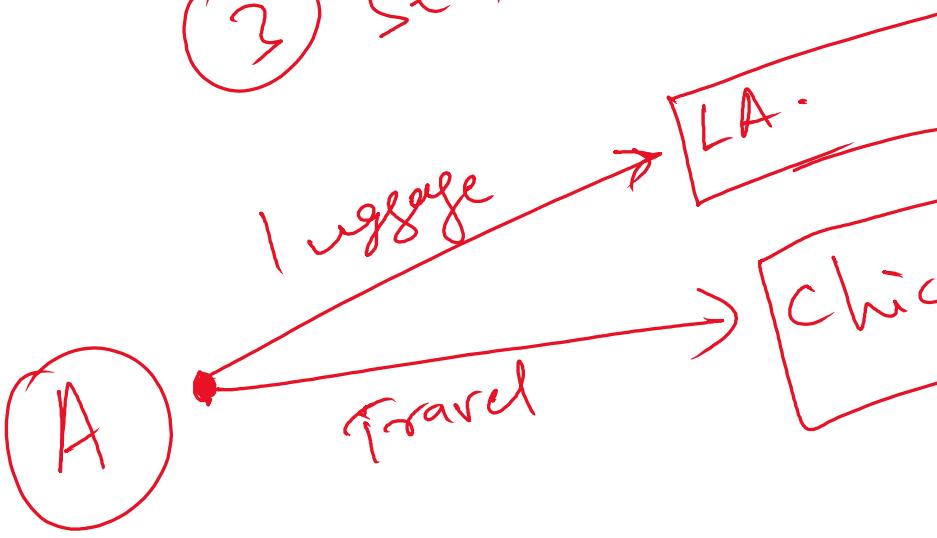
& extract Info.

ords multiple meani

Detection

② Context

③ Sentiment & Tone



Text Processing and Analysis:-

① Tokenization:- Spli

② Stop Word Removal:-

③ Stemming & Lemmatiz

④ Part-of-speech (POS)

Detection -

Twitter:-

t the text into smaller unit-

"the", "is", "are", "and"

Reduce word to root form.

running → run

making → make.

Identify grammetical Parts to

del understand Words.

④ Part-of-speech (POS)

hell

⑤ Named Entity Recognization

Name

⑥ Sentiment Analysis:-

⑦ Text Vectorization:-

Flow:-

Input Text

↓

Tokenization

the model understa
(noun, verb, adjective)

(NER):-

, location, organization in text

Positive, Negative or Neutral

Text → Numerical Representation

Word2Vec, Glove

Tokenization

↓

Stop word Removal

↓

Pos Tagging & NER

↓

Text Vectorization.

* Chatbot & Language Model

- Chat Bot :- Conversation Age

(1) Rule-

(2) Adv

- Language Model :-

GPT (Ge

Pdf to word

Pdf2Word

(eg. GPT Series)

nt that use NLP

Based System.

anced AI - driven System

+openAI

nerative Pretrained Transformer)

GPT2 & GPT3:-

GPT4:- Mo

Language Model

1. Tra

2. AH

Input Query

* Application:-

1. Customes Service
2. Healthcare.

se Accurate & Context - aware text generation.

Work

ing:

ention Mechanism.

→ Encoding → Generation

→ o/p Response:

2. Healthcare.

3. Sentimental Analy

4. Voice Assistant.

5. Content Moderation

6. Translation Service

Case:- spotify

* Ethical & Social Implications of AI

1. Bias in AI

2. AI accountability

sis for Business Intelligence.

→ Siri, Alexa.

→ Google Translation.

1:04.

2. Ac

3. Governance &

1 Ne

2 S

1 European

2 US NIST

* Future of AI & Employ

1 Impact

olicy.

ed for Regulation.

standard

Union AI Act -

framework

gment i-

on Employment-