

# ML Models

## 1. Linear Regression:

Fits a straight line to predict continuous values based on input features.

## 2. Logistic Regression:

Models the probability of a binary outcome using a sigmoid function.

## 3. Decision Tree:

Uses a tree-like structure to make decisions by splitting data based on features.

## 4. Random Forest:

An ensemble of decision trees that improves accuracy through majority voting.

## 5. Support Vector Machine:

Finds the optimal hyperplane that separates data points into classes.

## 6. K-Nearest Neighbors (KNN)

(Finds the)

classifies data points based on majority class of their nearest neighbors.



## 7 Naive Bayes:

Applies Bayes' Theorem assuming independence among features.

## 8 Gradient Boosting Machines (GBM):

Builds models sequentially to minimize prediction errors.

## 9 AdaBoost:

Combine weak classifiers to form a strong classifier using weighted majority voting.

## 10 K-Means Clustering:

Partitions data into clusters based on distance metrics.

## 11 XGBoost:

An optimized gradient boosting algorithm for efficiency & accuracy.

## 12 Hierarchical Clustering:

Builds a tree of clusters based on distance metrics.

## 13 Principal Component Analysis (PCA)

Reduces dimensionality by projecting data onto orthogonal axes of maximum variance.



14 Linear Discriminant Analysis

Projects data to maximize class separability.

15 t-Distributed Stochastic

Neighbor Embedding (t-SNE)

Visualizes high-dimensional data by projecting it into a lower-dimensional space.

# Deep Learning Models:

1. Convolutional Neural Networks (CNN):  
Extracts spatial features from images using convolutional layers.

2. Recurrent Neural Network (RNN):  
Processes sequential data using feedback connections for temporal dependencies.

3. Long Short-Term Memory (LSTM)  
A type of RNN that solves the vanishing gradient problem for long sequences.



#### 4. Gated Recurrent Unit (GRU)

A simplified version of LSTM with fewer parameters.

#### 5. Transformer:

Use self-attention mechanisms for parallelized sequence modeling.

#### 6. Generative Adversarial Network (GAN)

Comprise a generator & discriminator for creating realistic synthetic data.

#### 7. Autoencoder:

Encodes input into a latent space and reconstructs it to learn features.

#### 8. Variational Auto encoder:

A probabilistic autoencoder that generates new data samples.

#### 9. Deep belief Network

Stacks Restricted Boltzmann Machines for hierarchical feature learning.



## 10 Deep Q-Network (DQN)

Combine deep learning with reinforcement learning to make decisions.

## 11 Bidirectional LSTM (BiLSTM)

Processes sequences in both forward and backward directions for context.

## 12 U-Net

A CNN architecture tailored for biomedical image segmentation.

## 13 ResNet (Residual Network)

Uses skip connections to enable training of very deep networks.

## 14 BERT

Pre-trained language model for tasks like text classification and question answering.



is YOLO (You Only Look Once)

Real-time object detection  
model that predicts bounding  
boxes and class probabilities