Machine Learning models

Following are the machine learning models

Linear Regression

Uses a linear equation to find the relationship between a dependent variable and one or more independent variable.

$$y = ax + b$$

Logistic Regression

Estimates the probability of an event occuring based on a given set of independent variables.

Decision Tree

A flowchart-like structure in which each internal node represents a "test" on an attribute, each branch represents the outcome of the test and each leaf node represents a class label (decision taken after computing all attributes)

Random forest

Combines of the results of multiple decision trees to reach a single outcome

Support Vector Machine (SVM)

Classifies data by finding the best line or hyperplane to separate data points into classes.

K-Nearest Neighbor (KNN)

Uses proximity to make classifications or predictions about the grouping of an individual data point.

Naive bayes

Uses probability to classify data. (often for large datasets)

Gradient Boosting machine

combines multiple weak models to create a single, more accurate predictive model.

XGboost

Uses gradient boosted decision trees to solve problems in regression, classification and ranking.

Artificial neural network (ANN)

Teaches computers to process data in a way that is inspired by the human brain.

K-means clustering

Groups unlabeled data points into clusters based on how similar they are.

Hierarchical clustering

Groups data into a tree of clusters based on similar characteristics.

Principal component analysis (PCA)

Reduces the number of dimensions in a data set while retaining as much of the original information as possible.

Linear discriminant analysis (LDA)

Separates multiple classes by reducing the dimensionality of data.

Deep learning models

Feedforward Neural Network (FNN)

Connections between nodes do not form cycles. Data moves in one direction (input → output). Used for basic classification and regression tasks.

Convolutional Neural network (CNN)

Used for image processing. CNNs utilize convolutional layers to automatically detect features in images.

Effective for tasks like image classification, object detection and segmentation.

Recurrent Neural Network (RNN)

Designed for sequential data, RNNs have connections that loop back, allowing them to maintain a memory of previous inputs.

Long Short-Term Memory (LSTM)

Addresses the vanishing gradient problem by using memory cells and gates to control the flow of information.

Gated Recurrent Unit (GRU)

Combines the forget and input gates into a single update gate.

Generative Adversarial Network (GAN)

Consists of two neural networks: a generator and a discriminator that compete against each other.

Used for generating realistic data.

Variational Autoencoder (VAE)

Learns to encode input data into a latent space and then decode it back to the original space.

Transformer

Relies on self-attention mechanisms to process sequences of data.

Bidirectional encoder Representations from transformers (BERT)

Understands context of words in a sentence by looking at both left and right context.

Generative Pre-trained Transformer (GPT)

Pretrained on a large corpus of text and fine-tuned for specific tasks, making it effective for conversational agents and content creation.

U-Net

Features a contracting path to capture context and symmetric expanding path for precise localization.

ResNet (Residual Network)

Introduces skip connections, allowing gradients to flow through network more effectively.

MobileNet

Uses depthwise separable convolutions to reduce the number of parameters and computational cost.

Attention Mechanism

allows models to focus on specific parts of the input data when making predictions.

Deep Reinforcement Learning

Combines deep learning with reinforcement learning principles, allowing agents to learn optimal policies through trial and error in complex environments.