

Oriental Institute of Science and Technology, Bhopal

Roll No. Scholar No.

Assignment - 5

- Q. What is neural network. Explain the application of neural network.
- Structure:** It is a system of layers of artificial neurons (nodes) that are interconnected, much like the neurons in the human brain.
- Function:** These networks are trained on data to learn how to perform tasks without explicit programming.
- Learning process:** The network adjusts the strength of connections between neurons based on the data it receives.

Application:

Image and video analysis

→ Object detection

→ Facial recognition

→ Medical imaging

Natural language processing (NLP)

→ Chatbots and virtual assistants

→ Translation.

→ Sentiment Analysis

Q. What is the role of natural language processing in AI? Explain
Natural Language Processing (NLP) plays a central role in AI by enabling machines to understand, interpret and generate human language, bridging the communication gap between humans and computers.

Ans:
CORE ROLES OF NLP IN AI
language understanding: Helps AI systems comprehend written and spoken inputs, including grammar, meaning and intent.

language generation: Enables AI to produce human-like responses, whether in text or speech.

Contextual Interpretation: Goes beyond literal meaning to grasp content, sentiment and implied meaning.

Data Processing: Transforms vast amounts of unstructured text (from social media, posts, documents) into structured insight for analysis.



- Q. Explain experts system its application and different areas of expert system
- Ans :- An expert system is a computer application designed to provide solution to complex problems that normally require human expertise.
- It works by combining:
 - knowledge base: facts and rules about a specific domain.
 - inference engine: reasoning mechanism that applies rules to known facts to deduce new information.
 - The goal is to simulate human decision making.

Application of experts system

- Healthcare: Assisting in disease diagnosis and treatment recommendation by analyzing patient data and symptoms.
- Finance: Identifying fraudulent transactions.
- Manufacturing: Ensuring quality control by detecting product defects and optimizing production process.

- * Customer service : Avoiding automated telephoning.
- Education : Providing personalized and adaptive learning experiences for students.

Types of expert systems

- Domain-specific : These are the most common type of expert systems, built for a specific field where a human expert system, built for a consulted. Ex

Knowledge representation : These systems focus on how to represent the specialized knowledge needed to solve problems.

Problem solving : These systems are designed to solve specific problems such as a system that can debug complex software.

NLP : System used for tasks like sentiment analysis, text summarization and question answering.

What is learning in AI?

Learning in AI is the process of training a model to patterns in data, make predictions or decisions.

There are three main types are:
Supervised
Unsupervised
Reinforcement learning.

Supervised Learning

- Data : Labeled input & correct output
- Goal : Learn the mapping between inputs and outputs
- Ex : Predicting house prices from features like size and location

Unsupervised learning

- Data : unlabeled
- Goal : Discover hidden patterns or grouping
- Ex : Customer segmentation in marketing

Reinforcement learning

Data : Rewards and penalties from environment

Goal : Minimize cumulative errors through trial and error

Ex 8 Programming robots to walk & play chess

What about neural netw.

Semi-supervised learning:

Semi-supervised learning is a machine learning approach that uses both labeled and unlabeled data for training.

- Labeled data: Input data with correct outputs
- Unlabeled data: Input data without outputs
- Idea: Use the small amount of labeled data to guide the learning process while leveraging the large pool of unlabeled data to improve accuracy and generalization.

Artificial Neural Network

- An Artificial Neural Network (ANN) is a computational model inspired by the way the human brain works.
- It consists of layers of interconnected nodes (neurons)
 - Each neurons process input data applies a mathematical function, and passes the result forward.