

1 Explain the concept of Neural Network & Genetic Learning
→ A Neural Network is a series of algorithms that endeavors to recognise underlying relationship in a set of data through a process that mimics the way the human brain operates. Neural network refers to system of neurons, either organic or artificial. Neural networks can adapt to changing inputs so the network generates the best possible result without needing to redesign the output criteria. The concept of Neural Network which its roots in AI is swiftly gaining popularity in the development of Trading Systems. A neural network contains layers of interconnected nodes.

* Each node is a perceptron & is similar to multiple linear regression.

* The perceptron feeds the signal produced by a multiple linear regression into an activation function that may be non-linear.

* Application of Neural Networks:

Business Analytics, Financial Operations, Product Maintenance, Trading & Enterprise planning, Forecasting, Marketing Research Solutions, Fraud detection, Risk Assessment.

Genetic Algorithms (GA) are adaptive heuristic search algorithms that belong to larger part of evolutionary algorithms.

- * GAs are based on ideas of natural selection & genetics which are intelligent exploitation of random search provided with historical data to direct the search into the region of better performance.
- * Commonly used to generate high quality solutions for optimisation problems & search problems.
- * GAs are based on this analogy-
 - 1) Individual in population compete for resources & mate.
 - 2) Individuals who are successful mate to create offspring
 - 3) Genes from fittest parent propagate throughout the generation.
 - 4) Each successive generation is more suited for environment.

Summary of Algorithm

- 1) Randomly initialise populations P
- 2) Determine fitness of population
- 3) Until convergence repeats :
 - Select parents from population
 - Cross Over & generate new population
 - Perform mutation & calculate fitness

Q Explain the role of Expert System in Real world with features.
→ * An expert system is a interactive and reliable computer based decision making system which uses both facts & heuristics to solve complex decision making problems.

* Its considered at the highest level of human intelligence & expertise.

Examples in Real World

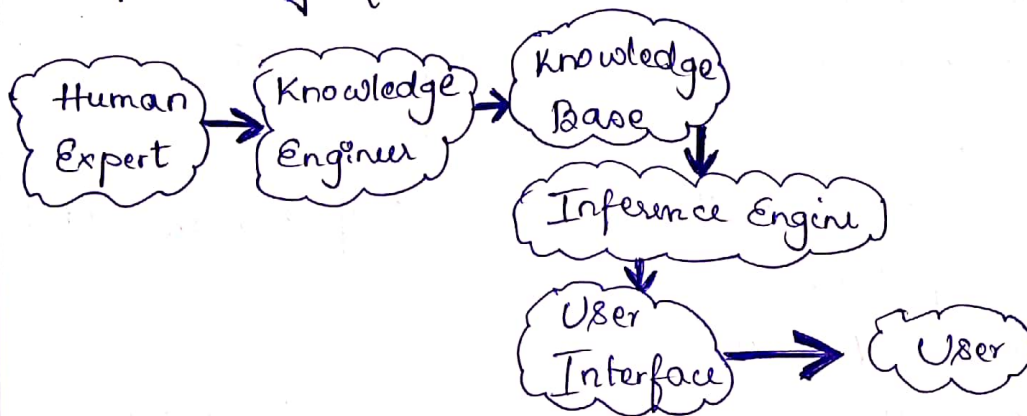
- MYCIN : It was based on backward chaining and could identify various bacteria that could cause acute infections. It could also recommend drugs based on patient's weight.
- DENDRAL : It was based on chemical analysis to determine molecular structure.
- PXDES : It was used to find the degree & type of lung cancer.
- CaDet : To predict cancer at early stages.

Features of Expert System

1. Highest level of Expertise - provides more efficiency, accuracy.
2. Right on Time Reaction - interacts in a reasonable period of time with user.
3. Good Reliability - more reliable, less mistakes.
4. Effective mechanism - effective administration of knowledge.

4. Capable of handling challenging decisions & problems.

Components of Good Expert System -



3 What is learning & explain forms of learning.

→ * Learning in AI is a process that improves the knowledge of an AI program by making observations about its environment.

* It focuses on processing a collection of input-output pairs for a specific function & predicts the output for new inputs.

Different forms of learning:

Based on knowledge,

1. Inductive learning - is based on inferring a general rule based on input-output pairs of datasets.

2. Deductive learning - starts with series of rules & infers new rules that are more efficient in the context of a specific algorithm.

Based on Feedback,

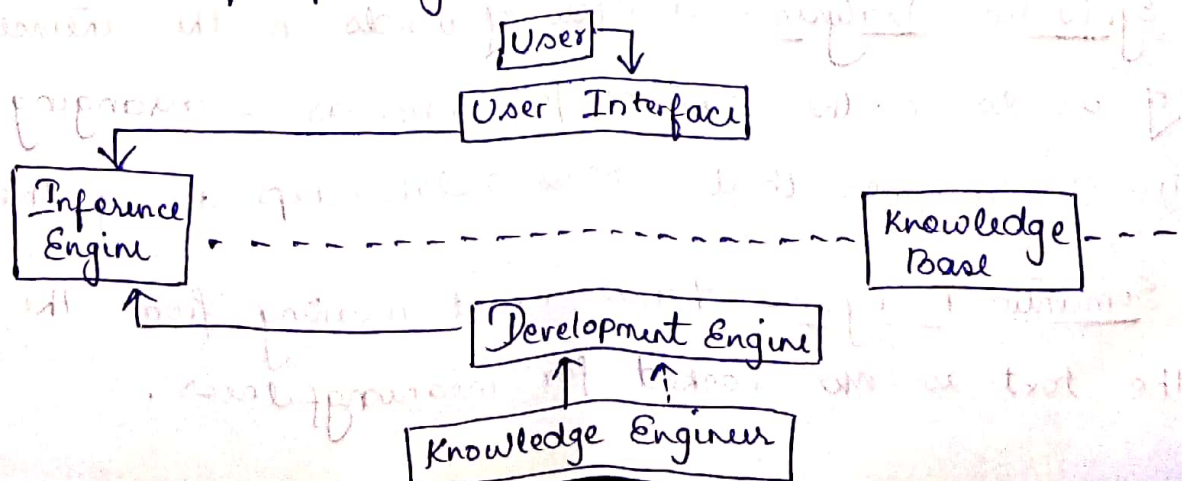
1. Unsupervised learning - focus on learning a pattern in the input data without any external feedback.
Eg. Clustering.
2. Supervised learning - uses external feedback to learning functions that map inputs to output observations.
3. Semi-Supervised learning - uses a set of curated, labeled data & tries to infer new labels on new data sets.
4. Reinforced learning - use opposite dynamics such as rewards & punishment to ~~enter~~ reinforce different types of knowledge.

4 What is an expert system & explain its components.

→ Expert System is a computer system that emulates the decision-making ability of a human, which is designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if-then rules rather than through conventional procedural code.

Advantages of expert system are Fast Response, Low Error Rate, Low Accessibility Cost, etc.

Components of Expert System -



* User Interface - enables the user to enter instruction & information into the expert system & to receive information from it.

* Knowledge Base - contains the facts that describes the problem area & knowledge representation technique that describes manner.

* Inference Engine - is the rule that defines how the expert process ~~is~~ interprets the knowledge in an appropriate manner. It works either in forward / backward chaining.

* Development Engine - is used to create the expert system which involves

→ Programming Approach & → Expert System Shell.

5 Explain the steps involved in Natural Language Processing

→ Steps in NLP

1) Lexical Analysis - identification & analysis of structure of words. It divides the whole chunk of text into paragraphs, words & sentences.

2) Syntactic Analysis - analysis of words in the sentence of words in the sentence for grammar & arranging words in a manner that shows relationship among the words.

3) Semantic Analysis - draws exact meaning from the text. The text is checked for meaningfulness.

It is done by mapping syntactic structures & objects in the task domain.

4) Discourse Integration - depends on the meaning of the sentence just before it. It also brings the meaning of immediately succeeding sentence.

5) Pragmatic Analysis - During this, what was said is re-interpreted on what it actually meant. It involves deriving those language aspects which require real world knowledge.