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Assignment No. 2

Ques. 1

a) Explain Bayes Theorem:

→ ① Bayes theorem is also known as Bayes rule or Bayes law or Bayesian reasoning which determines probability of an event with uncertain knowledge.

② The Bayesian inference is an application of Bayes theorem which is fundamental to Bayesian statistics.

③ Bayes theorem allows updating probability prediction of an event by observing new information of real world.

④ Bayes theorem can be derived using product rule and conditional probability of event A with known event B.

As from product rule we can write:

$$P(A \cap B) = P(A/B)\, P(B) \quad \text{or}$$

Similarly, the probability of event B with known event A.

$$P(A \cap B) = P(B/A)\, P(A)$$

Equating RHS of both the equn, we get

$$\therefore P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)}$$

The above equn is called as Bayes rule or Bayes's theorem. This equn is basic of most modern AI system for probabilities inference.

b) Difference between monotonic and non-monotonic reasoning.

→

Monotonic Reasoning	Non-monotonic Reasoning
① It is process which does not change its direction or can say that moves in the one direction	It is process which change its direction or values as knowledge base increases.

Monotonic Reasoning	Non-monotonic Reasoning
① It deals with very specific type of models, which has valid proofs.	It deals with incomplete or not known facts
② The addition in knowledge won't change the result	The addition in knowledge will invalidate the previous conclusion and change the result
③ The result are always true, therefore set of proposition will only increase	The result and set of propositions will increase and decrease based on condition of added knowledge.
⑤ It is based on true fact	It is based on assumptions
⑥ Deductive reasoning is type of monotonic reasoning	Abductive reasoning and human reasoning is non-monotonic type of reasoning.

Ques. 2

a) Define expert system. Explain the architecture of expert system with block diagram.

→ * Expert System :→

① AI is a piece of SW that simulates the behaviour and judgement of human or organization that has experts in particular domain is known as an expert system.

② An expert system is AI software that use knowledge stored in a knowledge base to solve problems that would usually require a human expert.

③ Architecture of an expert system

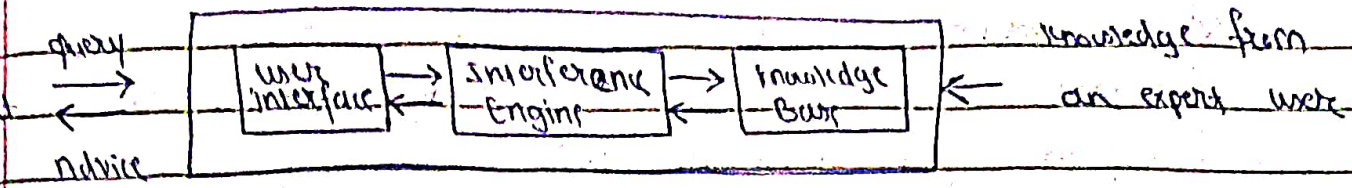


Fig: Architecture of an expert system

- **Knowledge base :—▷**

It consist of knowledge in particular domain as well as rules to solve a problem, procedure and intrinsic data relevant to domain.

- **Inference Engine :—▷**

The inference engine acquires rules from its knowledge base and applies them to the known facts to infer new fact.

- **Knowledge Acquire & learning :—▷**

The function of this component is to allow expert system to acquire more and more knowledge from various sources and store it in knowledge base.

- **User interface :—▷**

This module make it possible for a non-expert user to interact with expert system and find a soln to problem

- **Explanation module :—▷**

This module helps expert system to give user an explanation about how expert system reached a particular conclusion.

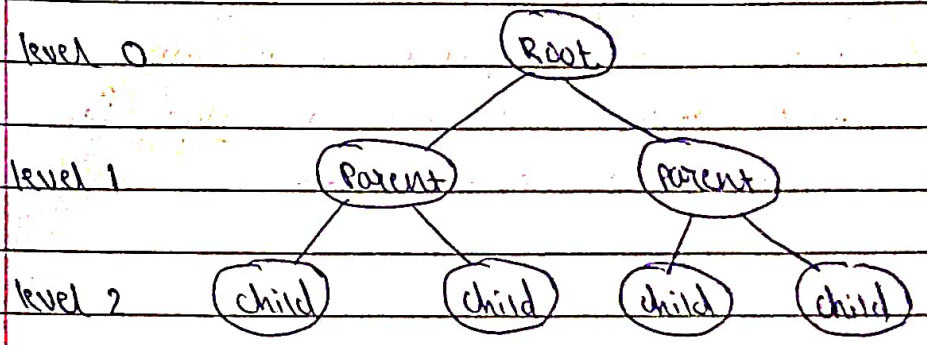
b) Define expert system shell.

→ (1) An expert system shell is a software development environment.
(2) It contain basic component of expert system.
(3) A shell is associated with prescribed method for building application by configuring and instantiating these components.

Ques.3

a) Explain min-max search procedure with example.

→ (1) The complete game tree is explained with a depth-first search algorithm in min-max algo in AI.
(2) The min-max algo in AI popularly known as minmax, is a backtracking algo used in decision making, game theory and artificial intelligence.
(3) It is used to find optimal move for player, assuming that opponent is also playing optimally.
(4) Popular two-player computer or online game use this algo.



(5) Steps:
a) Create entire game tree
b) Evaluate score for leaf nodes based on evaluation function.
c) Backtrack from leaf to root nodes
d) At root node, choose node with maximum value and select respective move.
(1) For maximizers, choose the node with maximum score
(2) For minimizer, choose the node with minimum score

b) Explain basic parsing techniques.

→ ① parsing can defined as a process of analyzing a text which contains a sequence of tokens, to determine its grammatical structure with respect to a given grammer.

② Depending upon how parse tree is built, parsing technique are classified into three general categories namely universal parsing, top-down parsing and bottom up parsing.

③ The most commonly used parsing technique are top-down parsing and parsing.

④ Universal parsing is not used as it is not an efficient technique

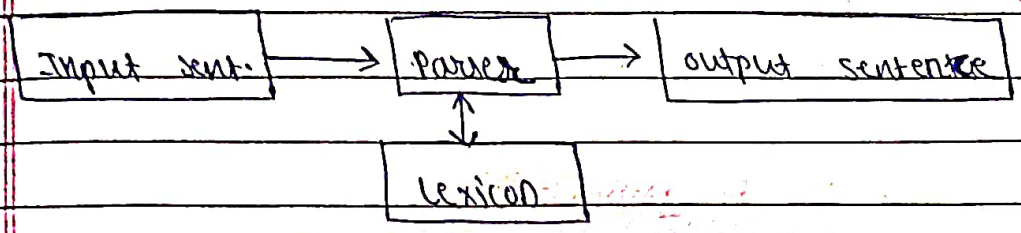


Fig: parsing Technique

⑤ The parsing technique can be categorized into two type such as: a) Top down parsing
b) Bottom up parsing

⑥ Top down parsing starts with starting symbol and proceeds towards the goal.

⑦ Bottom up parsing technique process begins with sentence is replaced by their relevant symbol.

Q4 a) Define ANN

→ ① The term "Artificial neural network" refers to a biologically inspired subfield of AI modeled after the brain.

② An ANN is usually a computational network based on biological neural network that construct structure of human brain.

(3) An ANN in the field of AI where it attempts to mimic the network of neurons makes up a ~~res~~ human brain so that computers will have an option to understand things and make decisions in human life manners.

(4) The ANN is designed by programming computers to behave simply like interconnected brain cell.

b) State various application of Artificial Neural Network.

→ (1) Speech Recognition :→

Earlier it uses statistical model such as hidden model with intro to deep learning, several form of neural network have become the only way to acquire a precise classification.

(2) Handwritten character Recognition :→

ANN are used to recognize handwritten character. It can be in form of letters or digits and neural network have been trained to recognize them.

(3) Signature Verification :→

We employ ANN to recognize signatures and categorizes them according to persons data when developing these authentication system.

(4) Medical :→

It can be used to detect cancer cells and analyze MRI picture in order to provide detailed result.

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Q.5 a) Explain life cycle of genetic algorithm.

→ ① In computing terms, a genetic algorithm implements the models of computation by having arrays of bits or characters binary string to represent the chromosomes.

② The genetic algo. then manipulates most promising chromosomes searching for improved solutions.

③ Genetic algo. are able to address complicated problems with many variables and a large number of possible outcomes by simulating evolutionary process of 'survival of fittest' to reach a predefined goal.

④ A genetic algo. operates through a cycle of three stages:

a) Build and maintain a population of soln to problem.

b) Choose better soln for recombination with each other.

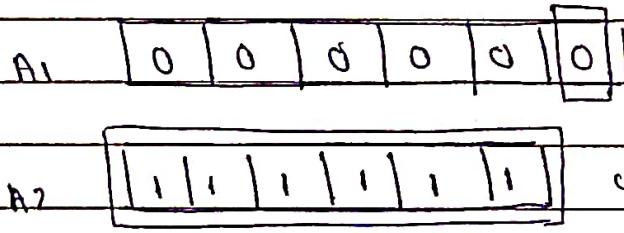
c) use their offspring to replace poorer soln.

⑤ Genetic algo. provide various benefits to existing machine learning technologies such as being able to be used by data mining for field / attribute selection and can be combined with neural networks to determine optimal weight and architecture.

b) ~~Expression~~ Explain the terms.

① Genes :→

An individual is characterized by a set of parameters known as genes. Genes are joined into a string to form a chromosome. In a genetic algo., the set of genes of an individual is represented using a string, in term of an alphabet.



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② Chromosomes :→

Genes are joined into a string to form chromosome. A chromosome is a set of parameters which define a proposed solution to the problem that the genetic diagram algorithm is trying to solve.