A.I.

Assignment - 1

Q1> Write short note on any two :

Ans a) Hierarchical Planning :

It is an Artificial Intelligence problem solving approach for a certain kind of planning problems. the kind focusing problem decomposition, where problems are stepwise refined into smaller and smaller ones until the problem is finally solved. A solution here by is a sequence of actions that's executable in a given initial state (and a refinement of initial compound tasks that needed to be refined). This form of hierarchical planning is usually referred to as Hierarchical Task Network (HTN) planning but many variants and extensions exist. A solution to HTN problem is of primitive tasks that can obtained from initial state by decomposing compound tasks into their set of simpler tasks and by inserting ordering constraints.
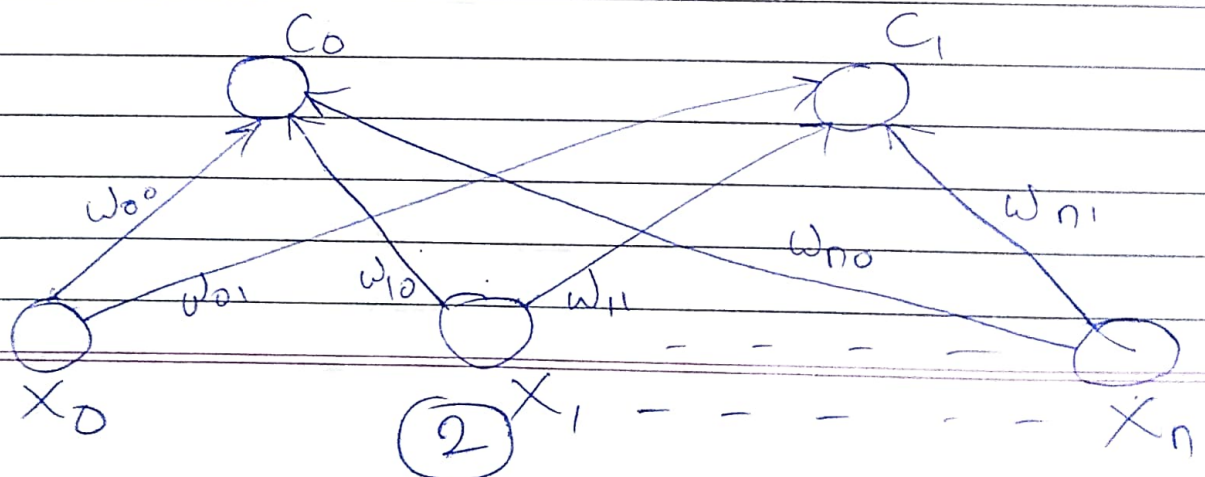
c) Multiagent Planning :

It involves coordinating resources and activities of multi agents NASA says "multi-agent planning is concerned with planning by multiple agents. It can involve agents planning for a common goal an agent coordinating the plans or planning of others

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or agents refining their own plans while neglecting over task or resources. The topic also involves how agents can do this in real time while executing plans. Multiagent scheduling differes from multiagent planning in same way scheduling and planning differ.

Q2) Self Organizing Maps (SOM)

Ans Self Organizing Maps is type of Artificial Neural Network which also inspired by biological models and of neural systems from 1970's. It follows on unsupervised learning approach and trained its network through a competitive learning algorithm. SOM is used for clustering and mapping techniques to map multidimensional data onto lower dimensional which allows people to reduce complex problem for easy interpretation. SOM has 2 layers, one is Input layer and other one is Output layer. The architecture of SOM with 2 clusters and n inputs features of an sample given below

Figure: SOM architecture with nodes C_0, C_1 and inputs X_0, X_1, ..., X_n with weights W_{00}, W_{01}, W_{10}, W_{11}, W_{n0}, W_{n1}

For input data of size (M, n) where m is number of training examples and n is number of features in each example. First it initializes the weights of size (n, c) where c is number of clusers.

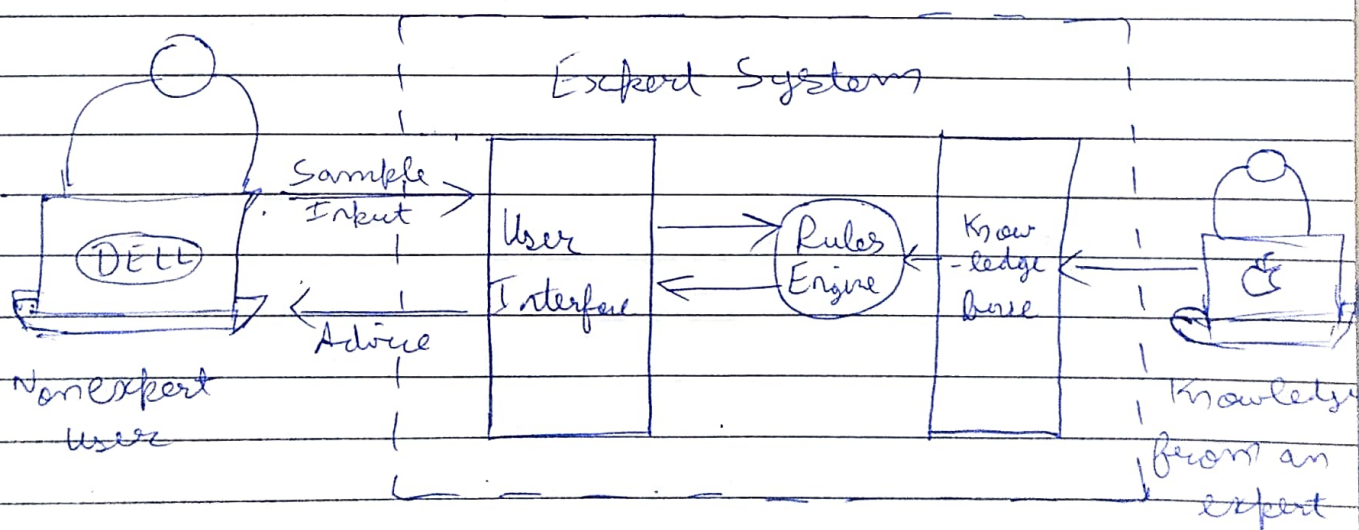$$w_{ij} = w_{ij}(old) + alpha(t) * (x_i^k - v_{ij}(old))$$

where alpha is learning rate at time t, After training SOM network, trained weights are used For clustering new examples.

Q3)

Ans An Expert system is computer program that is designed to solve complex problems and to provide decision making ability like human expert. It performs this by extracting knowledge from its knowledge base using reasoning and inference rules according to user queries.

Block diagram

Expert System

Sample Input

Advice

User Interface

Rules Engine

Know-ledge base

Nonexpert user

Knowledge from an expert

Components of Expert System

- **User Interface:**
  It helps a non expert user to commute with expert system to find a solution.

- **Interface Engine (Rules of engine):**
  It applies interface rules to knowledge base to derive conclusion or deduce new information and thus helps system

- **Knowledge Base:**
  It is type of storage that stores knowledge aquired from different experts of particular domain. The more knowledge base, the more precise will be expert system

Development of expert system.

Taking an example of MYCINES. Some steps to build an MYCIN are

- ES should be fed with expert knowledge. In case of MYCIN, human experts specialized in medical field of bacterial infection, provide information about courses, symptoms and other knowledge in domain.

- The KB of MYCIN is updated successfully. In order to test it, the doctor provides a new problem to it. The problem is to identify presence of bacteria by inputting details of patient including symptoms.

- The ES will need a questionnaire to filled by patient to know general information about patient such as gender, age, etc.

- Now the system has collected all information so it will find solution for problem by applying if then rules using inference engine and using facts stored within the KB

- In the end it will provide a response to patient by using the user interface.

Q4)
Ans: Natural Language Processing (NLP)
NLP is subfield of Linguistic, computer science and artificial intelligence concerned with interaction between computers and human language in particular now to program computers to process and analyse large amounts of natural language data. The goal is computer capable of understand the contents of documents including contextual nuances of language within them. The technology can then accurately extract info and insights contained in the documents as well as categorize and organize the documents themselves.
Challenges in NLP frequently involve speech recognition, natural language understanding and natural language generation.

Advantages of NLP

- NLP helps users to ask questions about any subject and get a direct response within seconds.
- NLP offers exact answers to questions means it does not offer necessary and unwanted information.
- NLP helps computers to communicate with humans in their languages.
- It is very time efficient.
- Most of companies use NLP to improve efficiency of documentation processes accuracy of documentation and identify the information from large database.

Disadvantages of NLP

- NLP may not show context
- NLP is unpredictable
- NLP may require more keystrokes
- NLP is unable to adopt to new domain and it has limited function that's why NLP is built for single and specific task only.

Applications Of NLP

- Question answering :-
  It focuses on building systems that automatically answer question asked by human in natural language.

- Spam detection

  It is used to detect unwanted e-mails getting to a user's inbox

- Sentiment Analyses

  It is used on web to analyse attitude behaviour and emotional state of sender.

- Machine Translation

  Translate text or speech from 1 language to another apart from these same other applications are ·

  - Spelling correction
  - Chatbot
  - Information extraction
  - Natural Language Understanding