Assignment 1

Shashwat Shah
G00U4220126
Div B   C22

1 Planning and acting in non deterministic domain.

In classical AI planning, and deterministic actions, allowing agents to plan beforehand and execute flawlessly. However real-world environments often introduce uncertainty, demanding agents to adapt during execution based on ongoing perceptions. Dealing with incomplete or incorrect information is vital.

Handling uncertainty relies on two factors bounded and unbounded indeterminacy. Bounded cases, like coin flipping with defined outcomes, permit agents to plan for all potential scenarios. Unbounded interdpominacy, found in complex domains like driving or economies, demands continual adaptation due to unknown or vast potential.

AI employes various planning method for indeterminacy sensoreless planning constructs. Sequential plans without real time perception, conditional planning devices contingency plans based on potential scenarios, and exeuton monitoring and replanning dynamically adjust plans as situations onfold

Continuous planning persists across changing environments, adapting goals and actions. Consider a scenario, where furniture needs painting to match colors, revealing how different agents might tackle this based on their planning methods. Classical planners falter due to incomplete initial state knowledge.

2 | Partial order Planning & Hierarchial planning.
So here in POP (Partial Order Planning), ordering of the actions is partial. Also partial ordered planning dont specify which action will come first out of the two action which are placed.

With partial order planning, problem can be decomposed, so it can work well in case the environment is non cooperative. It combines the two action sequences
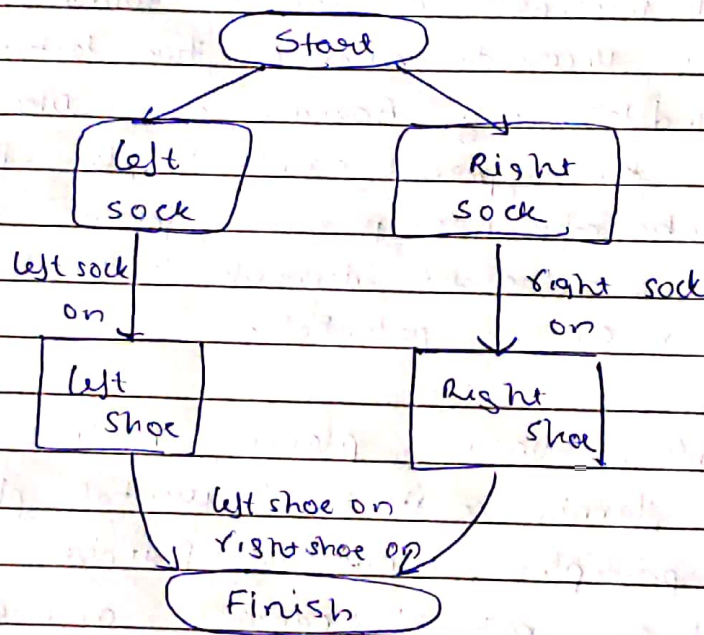
Hierarckial Planning.
It basically refers to a problem solving approach that involves breaking down complex tasks into a hierarchial structure of smaller subtasks or actions that can be excuted by an inteligent agent.

The agent decomposes the overall task into sub-task and generate a plan for each sub-task or actions dependencies, constraints and the goal of the overall task. Each subplan is excuted seauentially, will the results of each steps being used to guide subseaues steps

. Components - High level goals . The overall objectives or tasks that the AI system aims to achieve

Task decomposition - Breaking down high level goals into lower level tasks or subgoals.

Planning hierarchy - The organisation of tasks or subgoals into a hierarchy structure, such as a tree or a directed acyclic graph (DAG)

3 i) RDF (Resource Description Framework) - RDF in AI provides a structured way to represent information on the web, using subject predicate object triples to denote relationships between entities. It enables the creation of semantic connectors between diverse data source, allowing AI sources to understand complex relationships between entities.

ii) OWL - (web Ontology language)

OWL is a part of the semantic web technology stack and provides a formal, standardized language for creating ontologies structures knowledge by defining concepts, their relationships and properties in a domain. It offers different levels of expressiveness.

It allows the creation of hierarchies among classes, permitting classification of entities based on the properties and relationships aiding in categorization and reasoning.

Discuss Dempster - Shafer theory

→ The theory is designed to deal with the distinction between uncertainty and ignorance. Rather than computing the probability of a proposition, it computes the probability that the evidence supports the proposition. This measure of belief is called a belief

function, written $Bel(x)$. Suppose a shady character comes up to you and offers to bet you $10 that his coin will come up heads on the next flip

Shashwat Shah
60004220126
Div B C22

Aim : Answer the questons asked accordingly.

Hierarchial planning.

So basically hierarchial planning refers to a problem solving approach that involves breaking down complex tasks into a hierarchial structure of smaller sub-task or action that can be executed by an intelligent agent The agent decomposes the overall task into sub tasks and generates a plan for each task, taking into account dependencies, constraints, and the goals of the overall task. Each sub-plan is executed sequentially, with the results at each step being used to guide subsequent steps.

Components

High level goals - The overall objective or tasks that the AI system aims to achieve.

Task - decomposition - Breaking down high-level goals into lower-level task or subgoals.

Planning hierarchy - The organisation of tasks or subgoal into a hierarchial structure, such as a tree or a directed acyclic graph (DAG)

Eg. Top-level Goal - Your ultimate goal is to have a fantastic vacation

High level subgoals - Booking flights, arranging acom planning activities

Subtasks - Under booking flights, there maybe subtask like research airline, compare prices and purchase tickets.

3. Goal stack planning.

It is one of the AI technique where goals are organised in a stack. It involves decomposing high level goals a into subgoals and creating a stack structure to manage their execution.

The system works by pursuing goals at the top of the stack and recursively achieving subgoal until the overall objective is met.

This approach helps in organising and prioritising tasks in complex problem solving scenarios.