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AI Assignment II

1) Define Unification and Resolution?

Unification: Unification is a process of making two different logical atomic expressions identical by finding a substitution. Unification depends on the substitution process.

- It takes two literals as input and makes them identical using substitution.
- Let Ψ_1 and Ψ_2 be two atomic sentences and σ be a unifer such that, $\Psi_1\sigma = \Psi_2\sigma$, then it can be expressed as UNIFY (Ψ_1, Ψ_2).
- Example: Find the MGU for Unify {King(x), King(John)}

Resolution: Resolution is a theorem proving technique that proceeds by building refutation proofs, i.e, proofs by contradictions. It was invented by a Mathematician John Alan Robinson in the year 1965.

Resolution is used, if there are various statements are given, and we need to prove a conclusion of those statements. Unification is a key concept in proofs by resolutions. Resolution is a single inference rule which can efficiently operate on the conjunctive normal form or clausal form.

2) Explain the knowledge Based Agents in AI?

- An Intelligent agents agent needs knowledge about the real world for taking decisions and reasoning to act efficiently.

- Knowledge-based agents are those agents who have the capability of maintaining an internal state of knowledge, reason over that knowledge, update their knowledge after observations and take actions. These agents can represent the world with some formal representation and act intelligently.

- Knowledge-based agents are composed of two main parts:
  - Knowledge-base and
  - Inference system.

A knowledge-based agent must able to do the following:

- An agent should be able to represent states, actions, etc..
- An agent should be able to incorporate new percepts.

3.) Explain the Wumpus world in AI ?

Wumpus world: The Wumpus world is a simple world example to illustrate the worth of a knowledge-based agent and to represent knowledge representation. It was inspired by a video game Hunt the Wumpus by Gregory Yob in 1973.

The Wumpus world is a cave which has 4/4 rooms connected with passageways. So there are total 16 rooms which are connected with each other. We have a knowledge-based agent who will go forward in this world. The cave has a room with a beast which is called Wumpus, who eats anyone who enters the room. The Wumpus can be

Shot by the agent, but the agent has a single arrow.

4) Explain first order logic and its interferences?

- First-order logic is another way of knowledge representation in artificial intelligence. It is an extension to propositional logic. FOL is sufficiently expressive to represent the natural language statements in a concise way.
- Inference in First-order logic is used to deduce new facts or sentences from existing sentences. Before understanding the FOL interference rules, let's understand some basic terminologies used in FOL.

5.) Compare Forward chaining and Backward chaining?

Forward chaining	Backward chaining
• Forward chaining starts from known facts and applies inference rule to extract more data ~~until~~ unit it reaches to the goal	Backward chaining starts from the goal and works backward through inference rules to find the required facts that support the goal.
• It is a bottom-up approach	It is a top-down approach
• Forward chaining is known as data-driven inference technique as we reach to the goal using the available data	Backward chaining is known as goal-driven technique as we start from the goal and divide into sub-goal to extract the facts.
• Forward chaining reasoning applies a breadth-first search strategy.	Backward chaining reasoning applies a depth-first search strategy.
• Forward chaining tests for all the available rules.	Backward chaining only tests for few required rules.