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AI unit 4:

Q) PDDL: Planning Domain Definition Lang
→ Standard encoding lang for "classical" planning tasks.
→ P " " specified in PDDL are separated into 2 files
• domain file • prbm file
↓ ↓
predicators & actions objects, Initial & goal state
→ Each state is represented as conjuction of ground, function less atom
Eg: At(truck1, melbone) ∧ At(truck2, sydney) → one atom
hire truck 1 is at Melbone and truck 2 is at sydney → 1 state is been performed.
→ Every state is defined using the propositional state.
→ when " " does not have variable we called it as grounded atom
Eg: • Desk lamp is toggled on
• Modelling wampus world in PDDL

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Q] Planning with state space search:

→ Whenever we plan for some prj or game etc. we consider only the start state (Initial) and end state. In b/w these states there are different states to find out these state is called as state space search.

such as: firstly precise & then analyse.

→ S: { S, Action(s), Result(s, a), Cost(s, a) }

Eg:

1	6	2	5
11	13		17
7	4	26	19
20	21	25	18

→ start

1	2	4	5
6	7	11	17
18	19	20	21
25	26	13	

→ GS

we know only the start state and the Goal state

→ To achieve the goal state there are certain ~~set~~ actions we need to perform that is called as actions.

→ To reach Goal state that is the last step we get is called as Result

→ No. of steps taken to reach goal state is called as Cost.

→ ~~It is called~~ There are 2 types of Search

- Uniformed search → i.e Blind Search
- ~~Uniformed~~ Uniformed //

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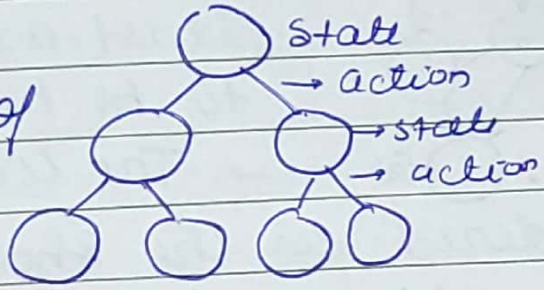
Planning as state space search

Q] Forward state space & Backward state space search.

→ when the prob stmts are complex we need to use above algorithms

→ Forward:

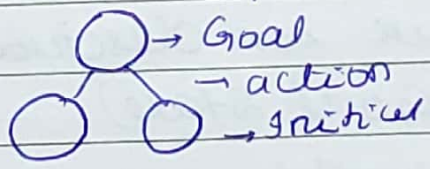
It consists of different states & different actions



- If we want to reach from Initial state to final state we need to perform actions.
- ~~It~~ to reach a particular goal by performing some action is called as forward state space
- We search ~~our~~ Intermediate states

Backward State space:

→



- Reverse way of forward.
- Here from Goal state to Initial state we perform action
- Explain Eg↑.

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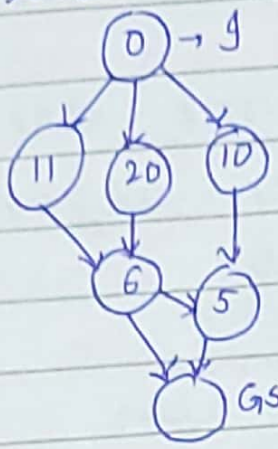
Q] Heuristics State Space Search:

→



→ Starting from Initial state to Goal state we check the least amt of distance to be travelled.

→ The least distance is considered as the shortest distance

→ It reduces time complexity for soln

→ may not give best / optimal solution.

→ It is used to guess the shortest to reach the Gs

Q] STRIPS :- STandford Research Institute Problem Solver.

→ is an automated planning technique that is used to find domain from the Initial state of domain

→ With STRIPS we can describe the world (Initial, and Goal state)

→ To describe world, we use 2 categories

States- Initial & goal state

Action schema - objects, Actions, preconditions & effects

Eg: Action: Buy(x) → its x should appear in (ii) & (iii) bcz it was included in (i)

(ii) Precondition: At(P), Sells(P,x)

(iii) Effect: Have(x)

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unit 5 :

1) ontological Engineering :

→ Representation of general concept such as Events, time, physical objects

→ These occur in different domains

→ Representing these abstract objects sometimes is defined as ontological Engineering

2) categories & objects :

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Q) Mental Event :

→ Any Event that occurs within a mind or a Consious Individual

→ Eg : feelings, decisions, dreams etc

→ Mary feels happy after doing well in her exam & she smiles

→ feels happy → mental event.
Smiles → physical event.

Mental Object :

→ Something that cannot be perceived by senses.

→ If we have knowledge about certain object, how to implement how to apply knowledge to that particular object

Q) Basic probability notation :

→ due to Uncertainity ~~notation~~ we use probability notation

→ To handle uncertainity we use probability.

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→ Conditional probability

$$P(A|B) = \frac{P(A \wedge B)}{P(B)} \quad \& \quad P(B|A) = \frac{P(A \wedge B)}{P(A)}$$

$b > 0$

OR

$$P(a \wedge b) = P(a|b)P(b)$$

→ Inclusion - Exclusion principle:

$$P(a \vee b) = P(a) + P(b) - P(a \wedge b)$$

Q) Bayes Rule:

→ It is like a Conditional probability

→ Eg: $a \to b$ If a occurs we don't know b will occur or on what basis a will occur

→ Bayes Rule is derived from product Rule.

such that: $P(a \wedge B) = P(a|b)\,P(b)$ — (1)

OR $P(a \wedge B) = P(b|a)\,P(a)$ — (2)

comparing (1) & (2) we get.

$$P(b|a) = \frac{P(a|B)\,P(b)}{P(a)}$$

$P(b|a)$ → posterior, $P(a|B)$ → likelihood, $P(b)$ → prior, $P(a)$ → Marginal

$$P(b|a) = \frac{P(a|b) \times P(b)}{P(a)}$$

$P(b|a)$ $P(a)$ 0.16
$P(b)$ 0.000033

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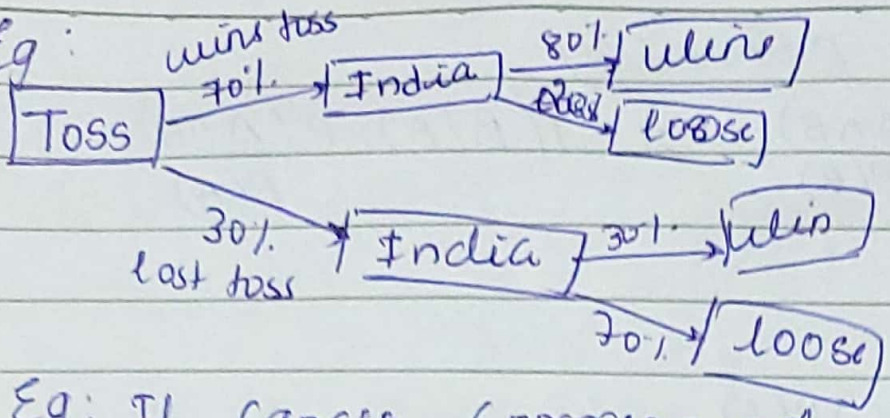
Eg:



Eg: If cancer corresponds to one's age, then by Bayes thm, we can determine the probability of cancer more accurately with the help of age.

Use: → It is used to calculate next step of Robot when already executed step is given.
→ used in weather forecasting.
→ " to solve Monty Hall problem.

Q] Semantics of Bayesian Network
→ It gives the probabilistic relation when multiple events occur.
Eg: cat hides, dog bark when it rains
It has 2 types:
(i) directed cyclic graph
(ii) conditional probability table

0.1827
6.371

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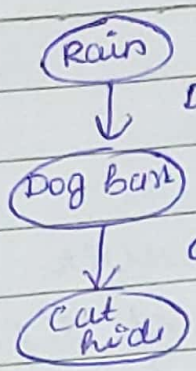
(i) 

Dog bark / Rain

cat hide / Dog bark

'→' is conditional probability

i.e if it Rains then dog barks

& if " " then only cat hides.

(ii) When there are 2 possibilities then we use conditional probability theory.

i.e It may / may not Rain

dog " / " " Bark

	R	~R
B	(9/48) → just observed value	18/48
~B	3/48	18/48