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AI Exam
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① Answer:-

- Informed search provide some additional information for finding the goal. which can help to efficiently find the goal or solve the problem.
- but uninformed search doesn't provide any additional information except then the problem definition
- informed search methods use the given knowledge (information) about the problem, which can efficiently
- ~~Uninformed search method. There is no addi~~
- informed search find the solution more quickly regard to the given heuristics, which can say the efficiency is higher then the uninformed search.
- Uninformed search methods:
  - uniform cost method:
  - BFS
  - DFS
  - Bidirectional search:-
  - Depth limited seaich
  - selective deepening depth first search
  - ~~Uniform~~

The use open and close two data structures to visit a node put it in the open queue and when to explored put it in the closed structure.

- DFS: if the graph or tree hight is big and the goal is in the oposite side of exploration of the graph, or the or tree has infinite search space, then it is not an optimal search algo.

so, we can say that if the search space is finite then the algorithm is optimal. $O(b^m)$

- BFS: if in the tree the nodes have the same cost. then this search algorithm will find the shortest path. $O(b^d)$

- Uniform cost search: is optimal because it check the path whether its least cost path or not, and it will choose the ote only least cost path

- bi-Bi-directional search: search simultaneously from both sides. it is complete when we use BFS method for both ends. but may not be complete if we use DFS. $O(b^{d/2})$ or $O(2b^{d/2})$

Iterative Deepening :-

It is optimal for exponential trees to search the goal in.

(2) Answer:

(i) on these variables backtrack:

A B C

(ii) on these variables backtrack:

A, G

(4) Answers

(a)

The optimal path from (3,2) is 100

the optimal path from (2,2) is 50

the optimal path from (1,3) is 12.5

(b) After the above three (given in paper) episode using the Q-learning updates. $\alpha = 0.5$:

Q((3,2), N): 50

Q((1,2), S): 0

Q((2,2), E): 12.5

- A substitution is a finite set of specifications of the form (t/v) in which t is a term and v is a variable.
- substitution are usually written in set notation $\{ t_1/v_1, t_2/v_2 \ldots \}$

Example:

$\{ g(y)/x, h(z)/y, x/z \}$ to $f(x, y, g(z), w)$

is

$f(g(y), h(z), g(x), w)$

Example: $P(A, B, B)$, $P(x, y, z)$

$\{x/A, y/B, z/B\}$

- Unification is done to the terms in FOL to make the terms match which ease the operation of Resolution.

$\theta_1 = Birds(x)$

$\theta_2 = Birds(tweety)$

then $\theta = \{tweety/x\}$

(5) Answer:

To convert propositional formula to CNF:

$= \sim(p \rightarrow (q \wedge r))$

$= (\neg p \rightarrow \neg(q \wedge r))$

$= (\neg p \rightarrow \neg q) \wedge (\neg p \rightarrow \neg r)$

$(\neg(\neg p) \vee \neg q) \wedge (\neg(\neg p) \vee \neg r)$

$(p \vee \neg q) \wedge (p \vee \neg r)$

(5) Answer:

To convert propositional formula to CNF:

$$\equiv \sim(p \rightarrow (q \wedge r))$$
$$\equiv (\neg p \rightarrow \neg(q \wedge r))$$
$$\equiv (\neg p \rightarrow \neg q) \wedge (\neg p \rightarrow \neg r)$$
$$(\neg(\neg p) \vee \neg q) \wedge (\neg(\neg p) \vee \neg r)$$
$$(p \vee \neg q) \wedge (p \vee \neg r)$$

(3)-(i) which of the following variable are independent of $X_{3,1}$ given $X_{1,1}$:

$X_{1,2}$ $X_{1,3}$ $X_{2,1}$ $X_{2,2}$ $X_{2,3}$ $X_{3,2}$ $X_{3,3}$

(ii) they are dependent!

the path from a node down to $X_{3,3}$ and up to another node is an active path