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Glossary-4

- **g(n):** It is defined as the function which provides the cost of the path from initial state to the node 'n'. [1]
- **h(n):** It is defined as the heuristic function which provides the estimated cost of the cheapest path from the state at node 'n' to a goal state. [1]
- **F(n):** It is defined as an evaluation function which evaluates a node by combining g(n), the cost to reach the node and h(n), the estimated cost to get from the node to the goal. It is an estimated cost of the cheapest solution through 'n' [1]
- **C*:** It is defined as the cost corresponding to an optimal path. [2]
- **A* search:** It is defined as a form of Best-First search which evaluates nodes by f(n) which combines g(n) and h(n) and estimates the cheapest solution through 'n'. [1]
- **Admissible Heuristic:** It is defined as a heuristic function that never overestimates the cost to reach the goal. [1]
- **Backtracking search:** It is defined as a type of depth-first search that choses values for one variable at a time and then backtracks when no other possible values are left to assign. [1]
- **Belief State:** It is defined as the agent's current belief about the possible physical states it might be in, given the current sequence of actions and percepts. [1]
- **Best first search:** It is defined as a search technique where a node is selected for expansion based on an evaluation function f(n). [1]
- **Bidirectional Search:** It is defined as an uninformed search technique where two simultaneous searches-one from the initial state and the other backward from the goal are started with a hope of meeting in the middle. [1]
- **Blind search:** It is also called as uninformed search because it doesn't contain any additional information regarding the states other than the problem description.
- **Breadth first search:** It is defined as an uninformed search technique where the root node is expanded first, then all the successors of the root node and then their successors and so on until a goal node is obtained. [1]
- **Coercion:** It is defined as several states being merged in to a single state by a series of actions no matter what the initial state may be in a sensor less version of an agent. [1]
- **Consistency:** A heuristic function h(n) is defined as consistent if for every node 'n' and every successor n' of n generated by an action 'a', the estimated cost of reaching the goal from 'n' is no more than the step cost from n to n' and the estimated cost from n' to the goal. [1]
- **Contingency Problem:** It is defined as a problem where an agent is partially observable, non-deterministic and the future actions will depend on future percepts and the

solution to the problem is not an action but a contingency plan is called Contingency problem. The exact prediction is not possible in contingency problems. [1]

- **Contours:** It is defined as the set of nodes which have the same values of a f(n) function. [1]
- **Depth first search:** It is defined as a search technique which always expands the deepest node in the current fringe of the search tree. [1]
- **Depth Limited search:** It is defined as a depth first search technique where a node is expanded until a certain depth limit 'l' and the nodes at depth 'l' are considered as if they have no children. [1]
- **Diameter:** It is defined as the greatest distance between any pair of vertices in a graph 'G'. [2]
- **Domination:** If a heuristic h1 is more efficient in determining the goal state in less number of steps than the other heuristic h2, then we say that h1 dominates h2. [1]
- **Effective branching factor:** It is defined as the branching factor that a uniform tree of depth 'd' would have to have in order to contain N+1 nodes. [1]
- **Exploration problem:** It is defined as a problem where an agent has no idea about the states and actions of its environment and tries to explore the search space to obtain a solution. [1]
- **Greedy algorithm:** It is defined as a search technique which tries to expand the node that is closest to the solution, assuming that it is likely to lead to an optimal solution quickly. [1]
- **Heuristic function:** It is defined as a function which estimates the cost of a solution from a node 'n' and is denoted as h(n). [1]
- **Heuristic search:** It is defined as a search strategy where a problem specific knowledge beyond the definition of the problem is provided to find solutions more effectively. [1]
- **Informed search:** It is defined as a search strategy where a problem specific knowledge beyond the definition of the problem is provided to find solutions more effectively. [1]
- **Iterative deepening search:** It is defined as a search technique which is often used in combination with depth first search, that finds the best depth limit. It does this by gradually increasing the limit from 1,2 and so on until a goal is found. [1]
- **Iterative Lengthening search:** It is defined as a search technique which is often used in combination with uniform cost search, that finds the path cost limit. It does this by gradually increasing the path cost limits until a goal is found. [1]
- **Knowledge acquisition:** It is defined as a process of acquiring knowledge from the experts in a domain. Working with real experts to extract what they know is called knowledge acquisition. [1]
- **Manhattan distance:** It is defined as the sum of distances of the tiles or states from their goal position strictly along horizontal and vertical path. [1]
- **Monotonicity:** It is defined as a condition of a heuristic function, if for every node 'n' and every successor n' of n generated by an action 'a', the estimated cost of reaching

the goal from ‘n’ is no more than the step cost from n to n’ and the estimated cost from n’ to the goal. [1]

- **Optimally efficient:** An algorithm ‘A*’ is defined as optimally efficient if no other optimal algorithm is guaranteed to expand fewer nodes than the ‘A*’ algorithm. An algorithm that extends search paths from root and use the same heuristic information is optimally efficient for any given consistent heuristic. [1]
- **Pathmax equation:** A heuristic can be made consistent using the pathmax equation. If a child node’s total estimated path cost is less than its parent’s then the parent’s total path cost is used called as pathmax equation. [3]
- **Predecessors:** It is defined for a state ‘n’ as the set of all those states which have ‘n’ as a successor. [1]
- **Pruning:** It is defined as eliminating possibilities from consideration without having to examine them. It helps in being on the right path to obtain a solution. [1]
- **Relaxed problem:** It is defined as a problem with a fewer restrictions on actions. [1]
- **Straight line distance:** It is a defined as the distance between the current node and the goal node which is calculated by the Euclidean geometry. [1], [4]
- **Triangle inequality:** It is defined as an inequality which stipulates that each side of a triangle cannot be longer than the sum of other two sides. [1]
- **Uniform-cost Search:** It is defined as a search technique which expands a node ‘n’ with the lowest path cost g(n) in the fringe until a goal node is obtained. [1]
- **Uninformed search:** It is defined as a set of search techniques where the search strategy has no additional information about states beyond what is provided in the problem description. [1]

References:

[1] Artificial Intelligence, A Modern Approach (AIMA), Third Edition, 2010 by Russell & Norvig.

[2] https://stackoverflow.com/questions/3174569/what-is-meant-by-diameter-of-a-network

[3] http://gokererdogan.github.io/2011/02/11/informed-search-methods/

[4] https://en.wikipedia.org/wiki/Distance