

**Artificial Intelligence for Robotics
Week 5**

Assignment

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1. Describe an example state space or problem in which iterative deepening search performs much worse than depth-first search.

IDDFS would perform worse than DFS when the branching factor of the state space is very less, for example if the branching factor of the tree is always 1, then in DFS the number of states visited are $O(n)$ whereas the IDDFS will visit $O(n(n+1)^2/2)$ states, which is $O(n^2)$.

2. What is the time and space complexity of IDDFS?

The time complexity of IDDFS is $O(b^d)$ and the space complexity is $O(bd)$, where b is the branching factor and d is the depth of the shallowest node.

3. What are the advantages of using IDDFS?

IDDFS does not go into a loop during visiting and storing nodes. IDDFS does not usually store the states/nodes that have been visited, hence not allowing the algorithm to get into a loop unlike DFS.

IDDFS is better than BFS because of its space complexity. This algorithm has a better worst case performance in comparison to BFS.