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Unit 2 notes, CS340

State space & Blind search

-issues in search

-knowledge representation

-topology(of state space)

-algorithms

-forward or backward?

Problem in Space Topology

-ex. research in human cognition

- we search for a solution among a set of possible states

-organization of problem space -graphs/trees

-standard data structures including graphs and trees

Königsburg bridge problem

-From Euler:

-not possible to make a circuit if a node has an odd degree

-not possible to make a path unless 0 or 2 of the nodes have an odd degree

Trees vs Graph

- trees are directed, acyclic

-many tree traversal algorithms

-nodes may be repeatedly generated

-can convert trees into graphs

Breadth-first search

-explores level to level

-finds shortest path

-takes up a lot of space if there are many branches

-leads to unusability in some problems

-Time: O(b^depth)

-Space:O(b\*depth)

Depth-first search

-follows each path to conclusion

-may not find the shortest state

-quickly gets deep into problem space

-good when there are (many)deep solutions

-space efficient when there is a high branching factor

-Time:O(b^maxdepth)

-Space:O(b\*maxdepth)

Depth-limited search

-depth first search with depth limit

-doesn’t add/search nodes deeper than limit

-may not find a solution, but it may:

-find a shallower solutiion

-find a solution more quickly

-Time:O(b^limit)

-Space:O(b\*limit)

Iterative Deepening

-depth first search increasing depth limit

-combines depth and breadth first search

-finds shallowest path

-preferred method when search space is large and depth of solution is unknown

-Time:O(b^limit)

-Space:O(b\*limit)

Two Assumptions

-we assume we’re working from start state to goal state

-Searching blindly

Forward search

-necessary when you can identify the goal but can’t state it

-preferred if there are a large number of goals and few branches

Backward search

-preferred if there is a cleary identifiable goal and forward search has many branches

-preferred if you have potential for gaining more information