Session 1: Basic Search

1. *The farmer, fox, goose and grain.* A farmer has to cross a river with his fox, goose and grain. His boat can only carry himself and one of his possessions, though. Thus he needs to make several crossings in order for all the animals to reach the other bank. However, bear in mind that an unguarded fox will eat the goose and an unguarded goose the grain.

   - Find a good representation.
   - Perform depth-first search. Explicitly write down the queues at each step.
   - Perform breadth-first search. Write down the search tree.

2. Which search strategies other than *breadth-first* can be used in *bidirectional search*?

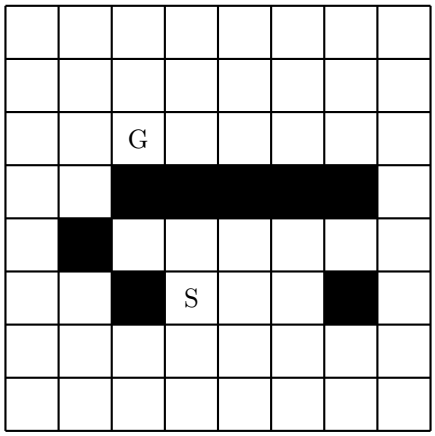
   - Is is possible to replace breadth-first for either or both of the forward and backward directions?
   - Does the method still work if the check for a shared state is replaced by a check for identical end nodes?

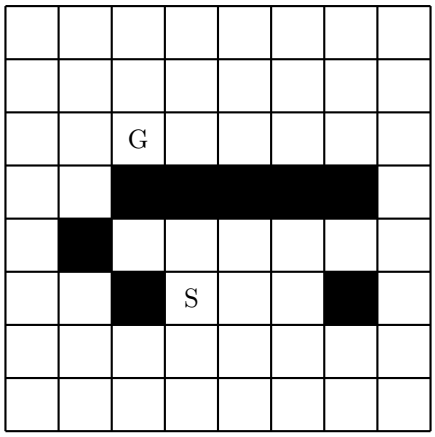
3. Write down the *beam search* algorithm.

4. Given the figure on the next page, *find a path* from the square labeled with 'S' to the square labeled with 'G', without passing through any of the black squares. Legal steps (in order of importance) are: up, left, right, down (each to an adjacent square).

   - Perform depth-first.
   - Perform hill-climbing 1 with a suitable heuristic.
   - Perform greedy search with the same heuristic.

5. *Solve the water jugs problem.* Given two jugs of 4 liter and 3 liter respectively, fill the 4 liter jug with 2 liter of water. Find a good heuristic and perform hill-climbing 2.


G
S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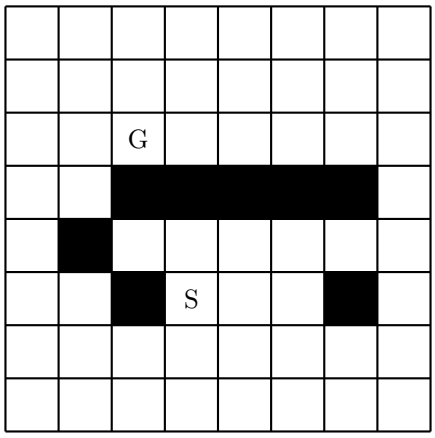
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