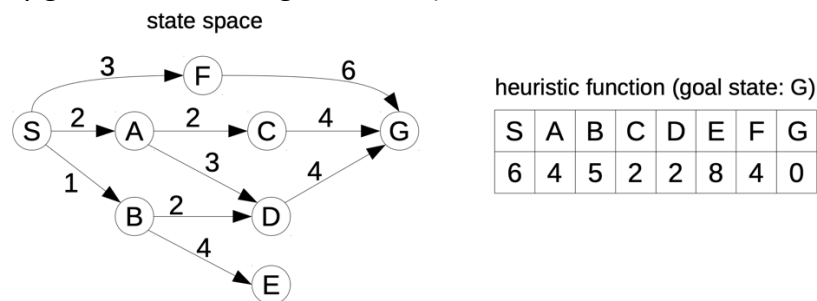


Assignment on Search Algorithms

You can use any programming language.

1. Write a program to implement the following search problem: The graph in the figure below shows the state space of a hypothetical search problem. States are denoted by letters, and the cost of each action is indicated on the corresponding edge. Note that actions are not reversible, since the graph is directed. The table next to the state space shows the value of some admissible heuristic function, considering G as the goal state (it is easy to verify that such a heuristic never overestimates the true, minimum path cost from any given state to the goal state G).



Considering S as the initial state, solve the above search problem using:

- breadth-first search
 - depth-first search
 - A* search with the heuristic above
2. Write a program to compute the following heuristic function values for a state of the 8-puzzle problem given the goal state.
 - i) Number of misplaced tiles
 - ii) Manhattan distance
 3. Write a program to find out the number of pairs of queens attacking each other in a given board position for the 8-queens problem.
 4. Write a program to compute a heuristic function value to indicate whether a given board position in tic-tac-toe game is favourable to the 'x' player.
 5. Write a program to find the maximum value of $f=100*\sin(x)/x$ and the corresponding value of x in the range $10 \leq x \leq 30$ using genetic algorithm.
 6. Write a program to find the minimum value of $f=100*\sin(x)/x$ and the corresponding value of x in the range $0 \leq x \leq 20$ using simulated annealing.
 7. Write a program to find the minimum value of $f=x*(x-4)+y*(y-5)$ and the corresponding values of x and y in the range $-20 \leq x, y \leq 20$ using gradient descent.