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AI 1

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AI1, First Assignment

For the 8-tile puzzle to be solved, we are implementing multiple search algorithms. The search algorithms include breadth first search, depth first search, iterative deepening, and A\*. The code outputs the information for when a node is added and removed from the fringe. For iterative deepening, additional information about when a layer is fully searched and moves onto the next layer is also printed. For the A\* algorithm, the cost associated with each node is presented.

To formulate this problem as a search problem a few definitions need to first be defined. These definitions are as follows.

* Initial State
  + The initial state is defined by the inputs to the program. These inputs come from a predefined python file.
  + An example of the initial state is “187932456\*”
* States
  + The total number of SOLVABLE possible states is 9!/2 = 181,440
  + “\*12345678”, “1\*2345678”, …
* Actions
  + Possible actions are focused on moving the empty “\*” space.
  + The possible actions are up, down, left, and right while being limited to remain within the tiled board. This means remaing within a 3X3 matrix.
* Transition Model
  + The state is indexed as an array in range [0:8]
  + Say position of “\*” is at index E
    - Up: swap tiles [E] and [E-3]
    - Down: swap tiles [E] and [E+3]
    - Left: swap tiles [E] and [E-1]
    - Right: swap tiles [E] and [E+1]
* Successor State
  + Position based on transition model gives the successor state
* Goal:
  + “\*12345678”
* Goal test:
  + If state == goal