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ENPM 661: Planning for Autonomous Robots

Project 1

Aim:

To generate a path from initial state to goal state using exhaustive search.

Implementation:

We use the breadth first search(bfs) algorithm to achieve our aim. The algorithm moves from one layer to the next until it reaches the goal node. We achieve this by implementing the algorithm using a Queue.

The algorithm is in Python and can be accessed through the Project1_Final.py file. It makes use of NumPy, ast and deepcopy (part of copy) modules for this purpose. Numpy module has to be downloaded while the other two are inbuilt modules in Python.

The program consists of the following functions:

- **BlankTileLocation** to locate the blank tile.
- **ActionMoveLeft**, **ActionMoveRight, ActionMoveUp** and **ActionMoveDown** to move the blank tile accordingly.
- **belongs** to check if a certain node has already been generated or not.
- **Solver** which is the bfs algorithm.

The program takes the initial node as user input as a 2D array. Ex: [[2,3,6],[1,5,0],[4,7,8]]. The goal node is set to: [[1,2,3],[4,5,6],[7,8,0]].

The program generates three output text files. The nodepath.txt gives the optimal path from the initial node to the goal node. The nodeset.txt gives the set of all expanded nodes from initial to goal node. The nodeinfo.txt gives the parent, cost=0 and node number of the particular node.