Artificial Intelligence
Assignment # 1

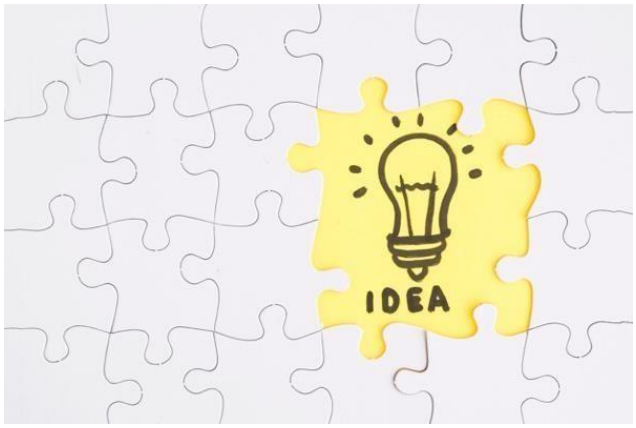
Consider you have an agent for a Jigsaw puzzle. The goal of the agent is to complete the Jigsaw puzzle in fixed number of moves. Your implementation should be modular so that the sensors, actuators, and environment characteristics (size etc.) can be changed easily. You need to implement two variants of intelligent agents and compare their performances.

1) Reflex agent
2) Reflex agent with state (model-based agent)

You can use the provided agents.py file which contains the abstract implementation of agent and environment.

Problem Description:

- Available actions are **Left**, **Right**, **Up**, **Down**, **NoOp**, **Rotate_left** and **Rotate_right**. ○ Rotate_left rotates the cell content by 90-degree counter clockwise ○ Rotate_right rotates the cell content by 90-degree clockwise
  ○ Left, Right, Up, Down and NoOp have the same meaning as discussed in the class
- The termination criterion is that the agent runs out of moves or the puzzle is completed. Environment announces when this criteria is met and stops the execution.
- The performance of an agent is calculated after the termination criteria is met. The performance measure of an agent is the (# of correctly placed items) / (number of steps used). Note that there will be early termination if puzzle is solved before expiry of maximum number of moves.
- The environment is deterministic and partially observable.
- Agent knows the size of puzzle (grid n x n) and the content of the cell they land in, location of the landing cell (coordinates) is not known.
- The perception is given by the environment and includes, cell coordinates and if the current piece in the cell is rightly placed or not.
- Model based agent shall maintain the internal representation of the world and update it after receiving each perception. This state must be used to improve the performance of the agent and make the problem deterministic and fully observable.
- Starting position of the agent is random and not known beforehand plus puzzle contents are randomized at each start.
- Two agents must be placed the in the same randomized environment for fair comparison of performance.



Submission:

- Assignment must be submitted through GCR.
- Submission other than GCR won't not be accepted.
- You are required to submit a python (version 3 compatible) file that is called in the following manner. First argument is puzzle size (50 x x50) and second argument is the maximum number of moves allowed (70).
- Name of the file uses pattern "Rollnumber.py"

  (for example `12345.py`)
- When the program is executed using the statement below
  - `python3 12345.py 10 150`

output should be:

```
Reflex: No of correct pieces = 30, no of moves utilized = 150
Model: No of correct pieces = 100, no of moves utilized = 100
```