COMP9016 Assignment #1

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# 1.1 Building Your World

## Task Environment Description

The 2D world that has been implemented is a grid of configurable height and depth.

There is one Winning block in the grid. If the agent lands on the Winning block, they are awarded 100 points, the game is declared Won, and the game is over.

There is one Penalty block in the game. If the agent lands on the penalty block, they are penalised 50 points.

There is one Obstacle block in the game on to which the agent cannot move.

The agent cannot move outside the boundaries of the grid.

They can move one square per move in any of “up”, “down”, “left” or “right”, provided that the above restrictions are met.

# Here is an example map of the 2D world

# (width 4 by depth 3 grid, obstacle at (1, 1), penalty at (3, 1) and winning block at (3, 0))

┌──────────┬──────────┬──────────┬──────────┐

│(0,0) │(1,0) │(2,0) │(3,0) │

│ │ │ │ │

│ │ │ │ WIN GAME │

┼──────────┼──────────┼──────────┼──────────┤

│(0,1) │(1,1) │(2,1) │(3,1) │

│ │ │ │ │

│ │ OBSTACLE │ │ PENALTY │

┼──────────┼──────────┼──────────┼──────────┤

│(0,2) │(1,2) │(2,2) │(3,2) │

│ │ │ │ │

│ │ │ │ │

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Each move has a cost associated with it, which is the sum of the x and y coordinates of the square.

The game is considered Lost if the agent has not found the Winning block in the number of steps allowed.  
When the game starts, the agent is dropped at a random location.

## Agent Types and PEAS Descriptions

### Agent 1: Random Agent

* **PEAS**:
  + **Performance**: +100 on winning block and Win game, -50 on penalty block, -(x+y) per move, Lose game if Winning block not found in S steps
  + **Environment**: 2D grid of width w and depth d, with winning block, penalty block and obstacle block.
  + **Actuators**: Move (Up, Down, Left, Right)
  + **Sensors**: Current position. Percepts are ignored.

The random agent cannot be said to be rational as it does not base it’s actions on its percepts or performance measure. There is no predictability of results, or attempts to maximise performance. That being said the agent is fast ,as it does not have to perform any complicated computations to determine it’s next action, and it has been observed win a large number of the game implemented in this assignment, when the environment is small.

### Agent 2: Reflex Agent

* **PEAS**:
  + **Performance**: As per Random Agent
  + **Environment**: As per Random agent
  + **Actuators**: As per Random agent
  + **Sensors**: Current position, receives percepts with available directions and associated costs

### Agent 3: Model-Based Reflex Agent

* **PEAS**:
  + **Performance**: As per Random agent
  + **Environment**: As per Random agent
  + **Actuators**: As per Random agent
  + **Sensors**: As per Reflex Agent. Also maintains an internal model of visited blocks, destination locations and obstacles

## Agent Evaluation

* Performance comparison in different world sizes
* Use tables/graphs to show success rates, efficiency
* Discuss underperformance scenarios