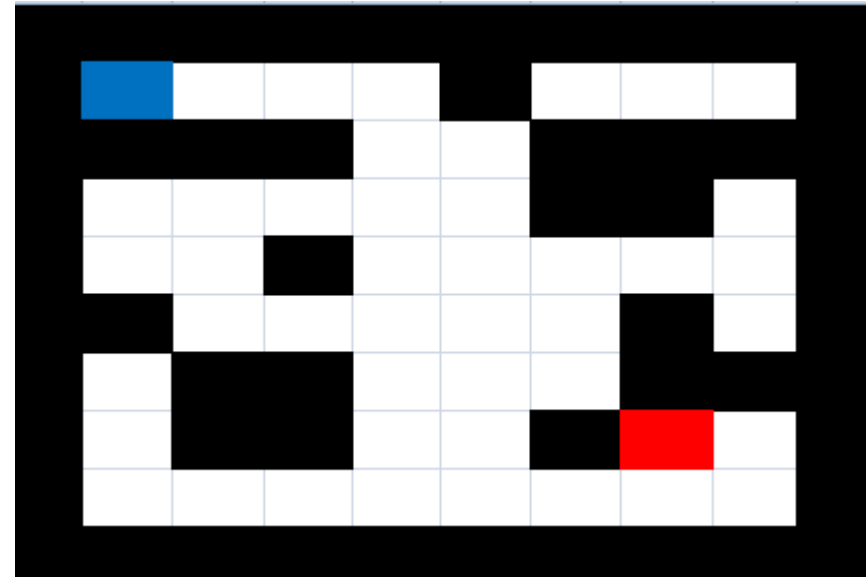


GRID WORLD SIMULATION

GRID WORLD SIMULATION

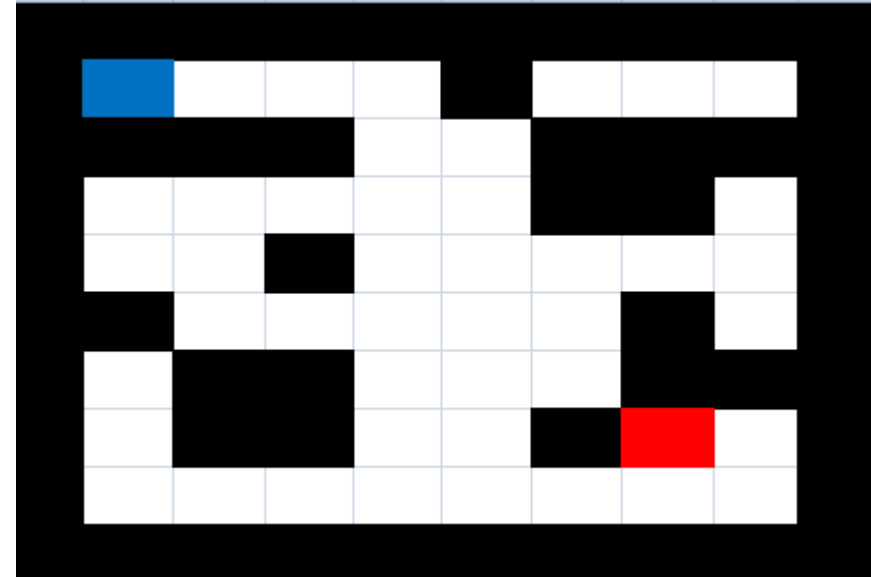
- Agent (blue) in a grid world
- Task: To find a 'goal' (red) located somewhere in a maze

Population Size	10
Genome	Left, Right, Up, Down, Stay
Genome Length	Fixed



GRID WORLD SIMULATION

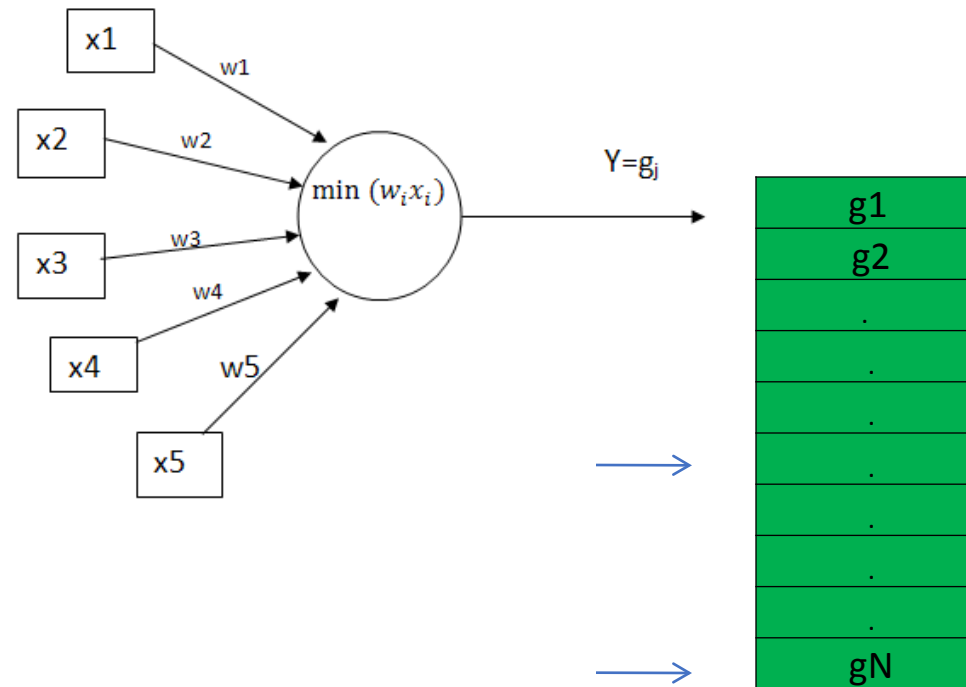
	Fitness Points
Bump	3000
Distance	3000
Not Reaching Goal	1000
Reaching Goal	-10000



- Fitness function=Reward+Penalties
- Stopping condition: Agent within 2 units of the goal

IMPLEMENTING LEARNING WITH EVOLUTION

- Genome Length fixed
- Value of each gene in the genome decided by a neuron



IMPLEMENTING LEARNING WITH EVOLUTION

- Agent learns at each life step:
 - Weight update rule:

$$w_i = w_i + \eta(y_j)$$

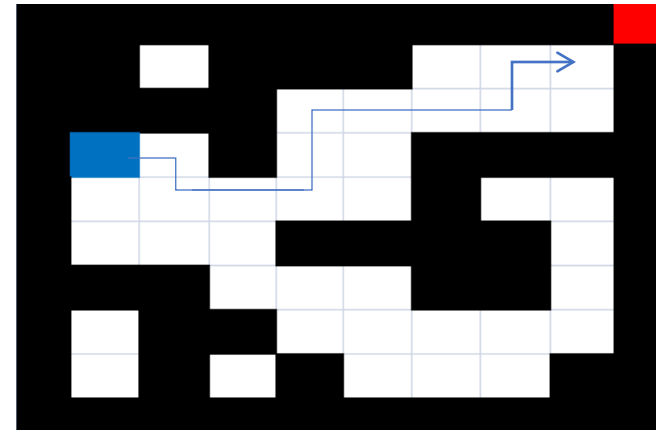
$y_j = 1$ for an obstacle and $= 0$ for a vacant grid

And

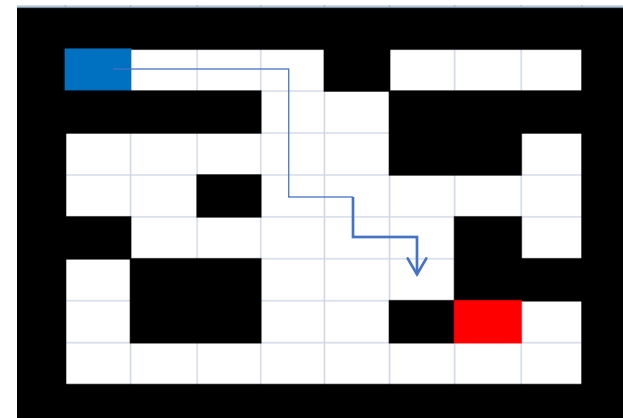
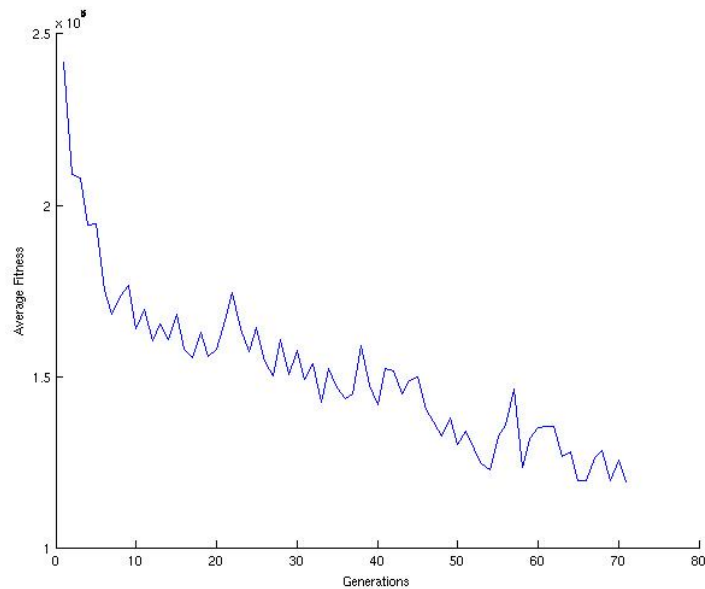
- Agent learns $0 < \eta < 1$ obstacles. Evolution converges faster

COMPARISON BETWEEN APPROACHES

Average No. of Generations		
Approach	GW1	GW2
Without learning	66.7	189.4
With learning	21.2	35.1



Grid World 1



Grid World 2

ENVIRONMENT CHANGES

- Agent can adapt to environment change
- Environment changed after every 60 generations

ENVIRONMENT CHANGES

