

State Space:

```
# Wall dangers
danger_wall_left = 1 if self.head.pos[0] == 0 else 0
danger_wall_right = 1 if self.head.pos[0] == ROWS - 1 else 0
danger_wall_up = 1 if self.head.pos[1] == 0 else 0
danger_wall_down = 1 if self.head.pos[1] == ROWS - 1 else 0

# Other snake dangers
danger_snake_left = 1 if any(c.pos == (self.head.pos[0] - 1, self.head.pos[1])
for c in other_snake.body) else 0
danger_snake_right = 1 if any(c.pos == (self.head.pos[0] + 1,
self.head.pos[1]) for c in other_snake.body) else 0
danger_snake_up = 1 if any(c.pos == (self.head.pos[0], self.head.pos[1] - 1)
for c in other_snake.body) else 0
danger_snake_down = 1 if any(c.pos == (self.head.pos[0], self.head.pos[1] + 1)
for c in other_snake.body) else 0

# Snack positions
snack_pos = snack.pos
snack_north = 1 if snack_pos[1] < self.head.pos[1] else 0
snack_south = 1 if snack_pos[1] > self.head.pos[1] else 0
snack_west = 1 if snack_pos[0] < self.head.pos[0] else 0
snack_east = 1 if snack_pos[0] > self.head.pos[0] else 0

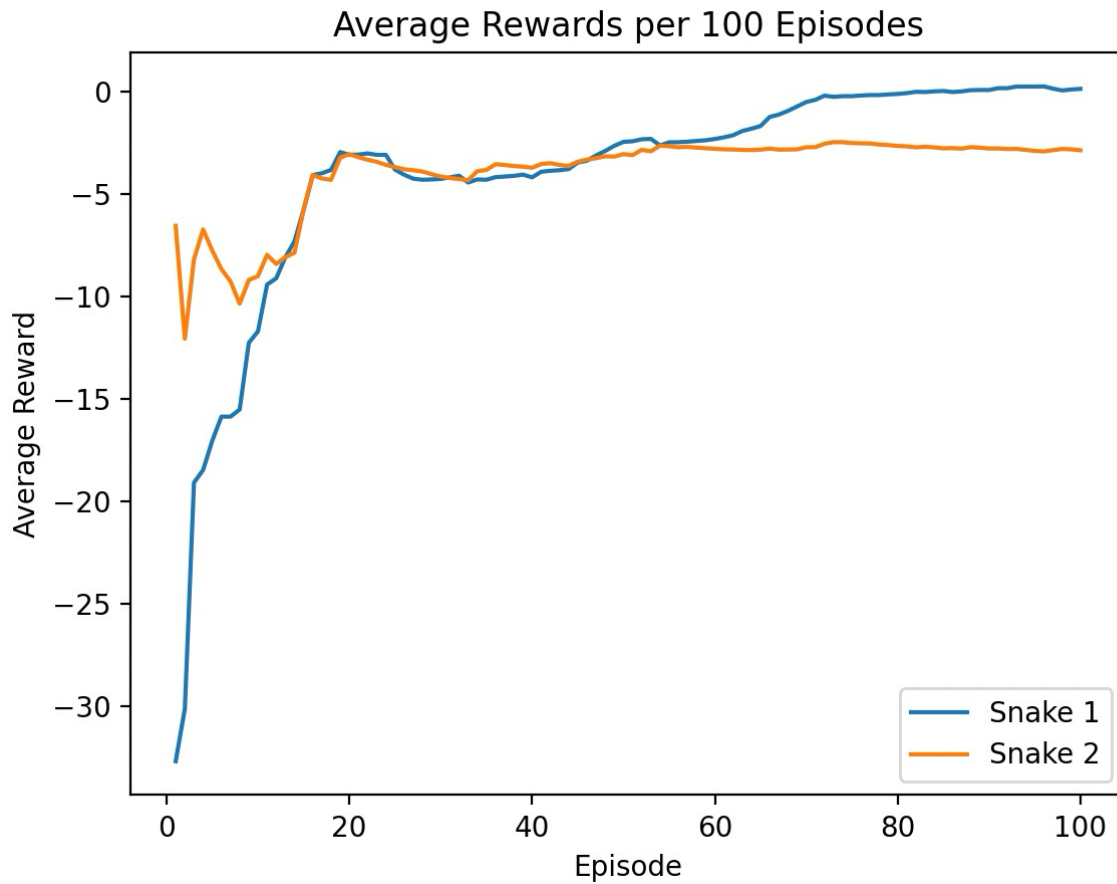
# Current direction
direction_up = 1 if self.dirny == -1 else 0
direction_down = 1 if self.dirny == 1 else 0
direction_left = 1 if self.dirnx == -1 else 0
direction_right = 1 if self.dirnx == 1 else 0

state = (danger_wall_left, danger_wall_right, danger_wall_up,
danger_wall_down,
        danger_snake_left, danger_snake_right, danger_snake_up,
danger_snake_down,
        snack_north, snack_south, snack_west, snack_east,
        direction_up, direction_down, direction_left, direction_right)
```

We also used Epsilon decay:

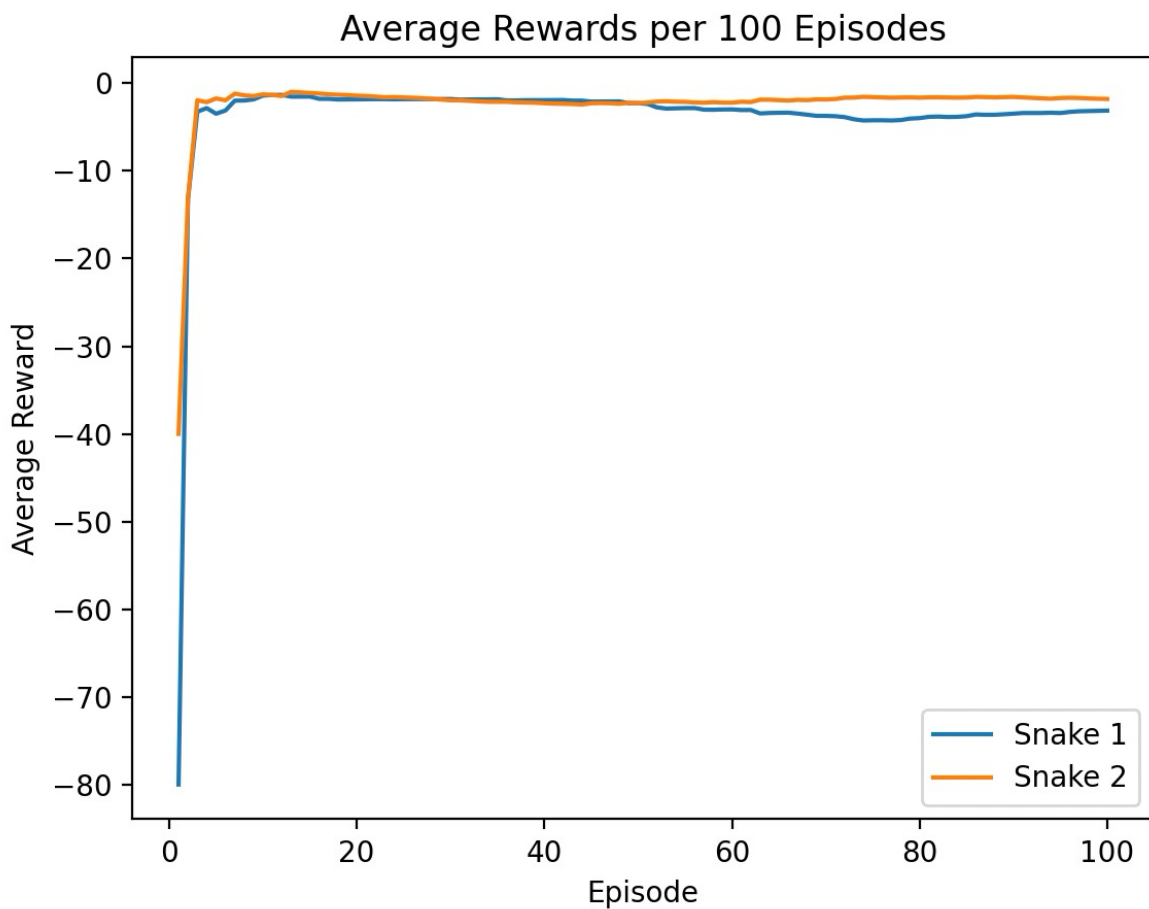
```
if self.epsilon > self.min_epsilon:
    self.epsilon *= self.epsilon_decay
```

Different models with different hyperparameters:

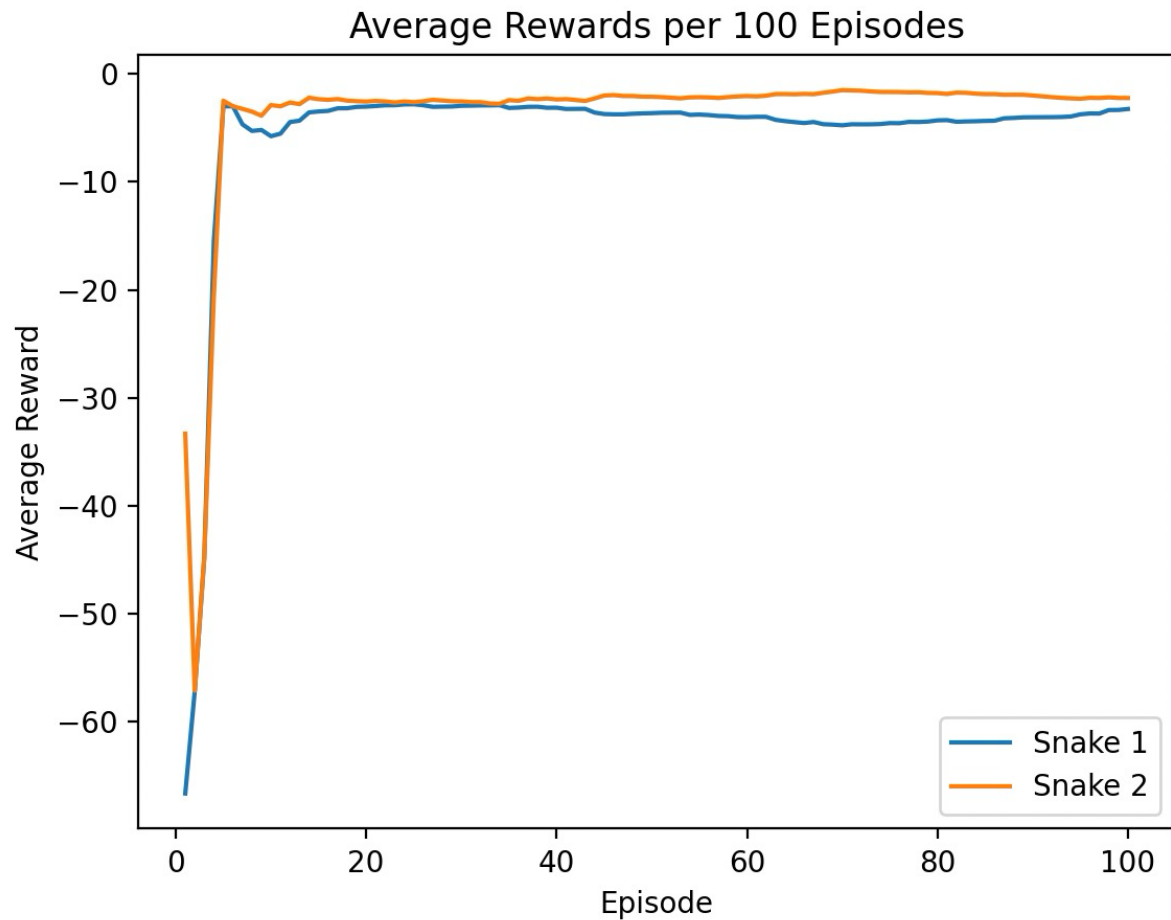


```
self.lr = 0.1 #Learning rate
self.discount_factor = 1 #Discount factor
self.epsilon = 0.9 #Epsilon
self.epsilon_decay = 0.95 # Epsilon decay rate
self.min_epsilon = 0.05
```

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```
self.lr = 0.2 #Learning rate
self.discount_factor = 1 #Discount factor
self.epsilon = 0.9 #Epsilon
self.epsilon_decay = 0.5 # Epsilon decay rate
self.min_epsilon = 0.05
```



```
self.lr = 0.2 #Learning rate
self.discount_factor = 0.8 #Discount factor
self.epsilon = 0.9 #Epsilon
self.epsilon_decay = 0.5 # Epsilon decay rate
self.min_epsilon = 0.05
```