AI & Automation Exam 1

04/04/2022

Mads Hegewald (EAAMHEG)

# Exercise 1

When exercise1 is run it will automatically start with motion detection. To change to full body detection press ‘p’, for face recognition press ‘f’ and to go back to motion detection press ‘m’. The detection mode can also be seen in the window name at the top left.

Motion detection

Pedestrian detection

cascades

Face detection

cascades

# Exercise 2

## A

## B

## C

## D

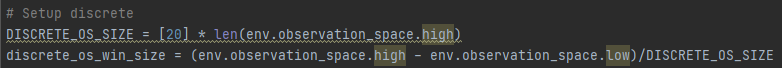
# Exercise 3.a

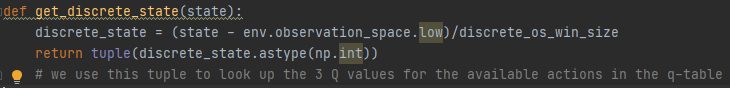
# Exercise 3.b

## A

The “infinite number of states” problem is caused by the number of possible positions existing between -1.2 and 0.06 and the same with velocity our between -0.07 and 0.07. When the state space is infinite we can’t use q-learning to solve the problem. To make it so that the state space is not infinite we can discretize the state space. This means we are basically making categories for the space, where we can choose the best action to take based on the category. When making these categories we don’t want too many or too few.

Basically the following lines:





Returns a tuple with the categories for positioning and velocity. Maybe add snippet om different states that are returned. Based on those it becomes easier to determine the next action to take.

Another way to solve this could be by using a DQN (Deep Q Learning), where we can use a neural network to approximate the q-function. Necessary?

## B

Default:

Chart, line chart, histogram

Description automatically generated



If we try and change the number of states that are used, which as mentioned earlier is discretized, we will get…

Learning rate… missing in 3.a

To make it learn more effectively the epsilon can be implemented dynamically, where at the beginning is a high value making it explore and learn the different actions. Once it reaches higher episodes it can begin lowering the epsilon and taking more greedy actions. maybe

Discount rate…

<https://ikvibhav.medium.com/open-aigym-simple-sarsa-and-q-learning-reinforcement-learning-implementations-7d5ea6f1ff9>

# Exercise 4

# Exercise 5