## pa2-dqn-cartpole

## March 29, 2023

```
[]: import numpy as np
     import random
     import torch
     import torch.nn as nn
     import torch.nn.functional as F
     from collections import namedtuple, deque
     import torch.optim as optim
     import datetime
     import gym
     from gym.wrappers.record_video import RecordVideo
     import glob
     import io
     import base64
     import matplotlib.pyplot as plt
     from IPython.display import HTML
     from pyvirtualdisplay import Display
     import tensorflow as tf
     from IPython import display as ipythondisplay
     from PIL import Image
     import tensorflow_probability as tfp
[]: env = gym.make('CartPole-v1')
     env.seed(0)
```

```
env = gym.make('CartPole-v1')
env.seed(0)

state_shape = env.observation_space.shape[0]
no_of_actions = env.action_space.n

print(state_shape)
print(no_of_actions)
print(env.action_space.sample())
print("----")

state = env.reset()

print(state)
print("----")
```

```
action = env.action_space.sample()
     print(action)
     print("----")
     next_state, reward, done, info = env.step(action)
     print(next_state)
     print(reward)
     print(done)
     print(info)
    print("----")
    4
    1
    [ 0.01369617 -0.02302133 -0.04590265 -0.04834723]
    [ 0.01323574  0.17272775  -0.04686959  -0.3551522 ]
    1.0
    False
    {}
[]: sweep_config = {
         'method': 'bayes'
     }
[]: metric = {
         'name' : 'num_episodes_tosolve_cartpole',
         'goal' : 'minimize'
     }
     sweep_config['metric'] = metric
[]: '''BATCH_SIZE= 64
     EPS_DECAY= 0.995
     GAMMA= 0.99
     LR= 5e-4
     MAX_TRUNCATION= 1
     NUM_LAYERS= 2
     NUM_NEURONS_EACH_LAYER= 90
     UPDATE EVERY= 20
     a\_TUNE = 0.7
```

```
[]: import math
     parameters_dict.update({
         'LR': {
             'distribution': 'uniform',
             'min': (0.00001),
             'max': (0.0001)
           },
         'BATCH_SIZE': {
             'distribution': 'q_log_uniform_values',
             'q' : 1,
             'min': (64),
             'max': (512),
           },
         'UPDATE_EVERY': {
             'distribution': 'q_log_uniform_values',
             'q' : 1,
             'min': (10),
             'max': (200),
           },
         'GAMMA': {
             'distribution': 'uniform',
             'min': 0.8,
             'max': 1,
         'MAX_TRUNCATION': {
             'distribution': 'uniform',
             'min': (0.5),
             'max': (2),
           },
         'EPS_DECAY': {
```

```
'distribution': 'uniform',
             'min': 0.9,
             'max': 0.995,
           },
         'a_TUNE': {
             'distribution': 'uniform',
             'min': 0,
             'max': 1,
           }
         })
[]: import pprint
     pprint.pprint(sweep_config)
    {'method': 'bayes',
     'metric': {'goal': 'minimize', 'name': 'num_episodes_tosolve_cartpole'},
     'parameters': {'BATCH_SIZE': {'distribution': 'q_log_uniform_values',
                                    'max': 512,
                                    'min': 64,
                                    'q': 1},
                     'EPS_DECAY': {'distribution': 'uniform',
                                   'max': 0.995,
                                   'min': 0.9},
                     'GAMMA': {'distribution': 'uniform', 'max': 1, 'min': 0.8},
                     'LR': {'distribution': 'uniform', 'max': 0.0001, 'min': 1e-05},
                     'MAX_TRUNCATION': {'distribution': 'uniform',
                                        'max': 2,
                                        'min': 0.5},
                     'NUM_LAYERS': {'values': [2, 4, 8, 10]},
                     'NUM_NEURONS_EACH_LAYER': {'values': [64, 90, 128]},
                     'UPDATE_EVERY': {'distribution': 'q_log_uniform_values',
                                      'max': 200,
                                      'min': 10,
                                      'q': 1},
                     'a_TUNE': {'distribution': 'uniform', 'max': 1, 'min': 0}}}
[]: sweep_id = wandb.sweep(sweep_config, project="Hyper parameter tuning Cartpole -__

  v1")
```

Failed to detect the name of this notebook, you can set it manually with the WANDB\_NOTEBOOK\_NAME environment variable to enable code saving.

Create sweep with ID: pkvb7dv1

Sweep URL: https://wandb.ai/me19b190/Hyper%20parameter%20tuning%20Cartpole%20-%20v1/sweeps/pkvb7dv1

```
[]: import torch
     import torch.nn as nn
     import torch.nn.functional as F
     class QNetwork1(nn.Module): #take state s and outputs Q(s,a)
       def __init__(self,seed, state_size, action_size,_
      onum_layers, neurons_each_layer): #num_layers = number of hidden_
      ⇔layers, neurons_each_layer = number of neurons in hidden layers
         super(QNetwork1,self).__init__()
         self.seed = torch.manual_seed(seed)
         self.input_size = state_size
         self.output_size = action_size
         self.num_layers = num_layers
         self.neurons_each_layer = neurons_each_layer
         self.linears = nn.ModuleList([nn.Linear(self.input size, self.
      →neurons_each_layer[0])])
         self.linears.extend([nn.Linear(self.neurons_each_layer[i-1], self.
      →neurons_each_layer[i]) for i in range(1, self.num_layers)])
         self.linears.append(nn.Linear(self.neurons_each_layer[-1], self.
      →output_size))
       def forward(self,state):
         for i in range(self.num_layers+1):
           if i == 0:
             h = F.relu(self.linears[0](state))
           elif i<(self.num_layers):</pre>
             h = F.relu(self.linears[i](h))
           else:
             return self.linears[self.num_layers](h)
```

## 0.0.1 Replay Buffer:

This is a 'deque' that helps us store experiences. Recall why we use such a technique.

```
[]: import random
import torch
import numpy as np
from collections import deque, namedtuple

device = torch.device("cuda:0" if torch.cuda.is_available() else "cpu")

class ReplayBuffer:
    """Fixed-size buffer to store experience tuples."""
```

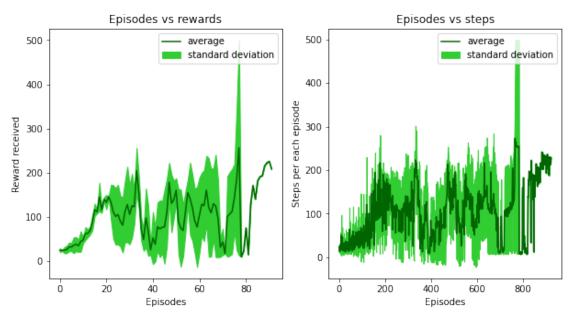
```
def __init__(self, action_size, buffer_size, batch_size, seed):
       """Initialize a ReplayBuffer object.
      Params
       _____
           action_size (int): dimension of each action
           buffer_size (int): maximum size of buffer
           batch_size (int): size of each training batch
           seed (int): random seed
       11 11 11
       self.action_size = action_size
      self.priorities = None #self.experience = namedtuple("Experience", _
field_names=["state", "action", "reward", "next_state", "done"]) #added TD
      self.batch_size = batch_size
      self.buffer_size = buffer_size
      self.curr_mem_counter = 0
      self.start = True
      self.seed = random.seed(seed)
  def add(self, state, action, reward, next_state, done): #added TD
       """Add a new experience to memory."""
      if self.start:
         self.memory = np.array([state, action, reward, next_state, done])
         self.priorities= np.array([1.0])
         self.curr_mem_counter += 1
        self.start = False
      else:
         if self.curr_mem_counter > self.buffer_size:
           self.curr_mem_counter = 0
         if self.curr_mem_counter == 0:
           self.memory[self.curr_mem_counter] = np.array([state, action,__
→reward, next_state, done])
           self.priorities[self.curr_mem_counter] = max(self.priorities,__
\rightarrowdefault = 1.0)
           self.curr_mem_counter += 1
         else:
           self.memory = np.vstack([self.memory , np.array([state, action,_
→reward, next_state, done])])
           self.priorities = np.append(self.priorities,max(self.priorities,_u
\hookrightarrow default = 1.0))
           self.curr_mem_counter += 1
  def modify_priorities(self,indices,TD_errors,offset=0.001):#
      np.put(self.priorities ,indices, np.abs(TD_errors).flatten()+offset)
  def return_probabilities(self, a):#a = priority scale
      arr = np.array(self.priorities)**a #modify a
```

```
probab = arr/arr.sum()
      return probab
  def return_importance_weights(self,probabilities):
       importance_weights = 1/(probabilities*len(self.memory))
      normalized_weights = importance_weights/max(importance_weights)
      return normalized_weights
  def sample(self,batch size=None,a=1.0):
       """Randomly sample a batch of experiences from memory."""
      num samples = self.batch size if batch size ==None else batch size
                 = self.return_probabilities(a)
       #print(probab, len(probab))
       #print(len(self.memory))
      get_sample indxs = np.random.choice(np.arange(len(self.memory)), size = __
→num_samples,replace = False,p = probab)
       importance weights = self.
Greturn_importance_weights(probab[get_sample_indxs])
       experiences = self.memory[get_sample_indxs]
       #print(experiences)
       #print(type(experiences[:,0]))
       states = torch.from_numpy(np.vstack([e[0] for e in experiences if e isu
onot None])).float().to(device)
       actions = torch.from_numpy(np.vstack([e[1] for e in experiences if e isu
→not None])).long().to(device)
      rewards = torch.from_numpy(np.vstack([e[2] for e in experiences if e is_
→not None])).float().to(device)
      next_states = torch.from_numpy(np.vstack([e[3] for e in experiences if__
⇔e is not None])).float().to(device)
       dones = torch.from_numpy(np.vstack([e[4] for e in experiences if e is_
→not None]).astype(np.uint8)).float().to(device)
       \#TDS = torch.from\ numpy(np.vstack([e.TD\ for\ e\ in\ experiences\ if\ e\ is_{11})
⇔not None])).float().to(device) #added TD
      return (states, actions, rewards, next_states,__
dones),importance_weights,get_sample_indxs
  def __len__(self):
       """Return the current size of internal memory."""
      return len(self.memory)
```

```
[]: #performance of cartpole with hyperparameters given in tutorial reward_,error_reward = calculate_mean(rewards_list)
```

```
plt.figure(figsize = (10,5))
plt.subplot(121)
plt.plot(np.arange(len(reward_)),reward_, color = 'darkgreen',label = 'average')
plt.fill_between(np.
 arange(len(reward_)),reward_-error_reward,reward_+error_reward, color =
 plt.legend()
plt.title("Episodes vs rewards")
plt.xlabel("Episodes")
plt.ylabel("Reward received")
steps,error_steps = calculate_mean(steps_list)
plt.subplot(122)
plt.plot(np.arange(len(steps)),steps, color = 'darkgreen',label = 'average')
plt.fill_between(np.arange(len(steps)), steps-error_steps, steps+error_steps,_u

¬color = 'limegreen', label = 'standard deviation')
plt.title("Episodes vs steps")
plt.xlabel("Episodes")
plt.ylabel("Steps per each episode")
plt.legend()
plt.show()
print("Average number of episodes: ", round(np.mean(avg_episodes)))
```



Average number of episodes: 685

```
[]: def train(config = None):
    with wandb.init(config = config):
```

```
config = wandb.config
  BUFFER_SIZE = int(1e5) # replay buffer size
  BATCH_SIZE = config.BATCH_SIZE ## minibatch size
  UPDATE_EVERY = config.UPDATE_EVERY ## how often to update the network_
→ (When Q target is present)
  NUM_NEURONS_EACH_LAYER = config.NUM_NEURONS_EACH_LAYER
                                                           ##number of
→neurons in each hidden layer
  NUM_LAYERS = config.NUM_LAYERS
                                     ##number of layers for the
\rightarrowneural network
  MAX_TRUNCATION = config.MAX_TRUNCATION
                                                     ##max number of
steps in each episode(needed only for cartpole, acrobot and mountain car
→ these are already defined)
  EPS_DECAY =
                  config.EPS_DECAY
                                               ##epsilon decay for
\hookrightarrow epsilon exploration
  a_TUNE = config.a_TUNE
  steps_over_10_runs = []
  rewards_over_10_runs = []
  episodes = []
  min_len = np.inf
  bad = False
  for run in range(10):
   print("Run: ",run+1,"
 ._____.
    env = gym.make('CartPole-v1')
    seed = run
    env.seed(seed)
    state_shape = env.observation_space.shape[0]
    action_shape = env.action_space.n
    begin_time = datetime.datetime.now()
    agent = TutorialAgent(state_size=state_shape,action_size =_
⇒action_shape, seed =
seed,num_layers=NUM_LAYERS,neurons_each_layer=[NUM_NEURONS_EACH_LAYER]*NUM_LAYERS,lr⊔
→BATCH_SIZE, max_tRUNCATION = MAX_TRUNCATION)
    steps_eps_greedy,reward_eps_greedy, episodes_eps_greedy,bad =_

¬dqn(agent,eps_decay = EPS_DECAY, a = a_TUNE)
    steps_over_10_runs.append(steps_eps_greedy)
    rewards_over_10_runs.append(reward_eps_greedy)
    episodes.append(episodes_eps_greedy)
    if len(reward_eps_greedy) < min_len:</pre>
      min_len = len(reward_eps_greedy)
    time_taken = datetime.datetime.now() - begin_time
```

```
print(time_taken)
  rewards = np.array(rewards_over_10_runs)
  avg_episodes = int(np.array(episodes).mean())
  steps = np.array(steps_over_10_runs)
  y, error = calculate_mean(rewards)
  plt.figure(figsize = (15,8))
  plt.subplot(121)
 # for i in range(len(rewards over 10 runs)):
 # plt.plot(np.
arange(len(rewards over 10 runs[i])), rewards over 10 runs[i], label='run
\hookrightarrow '+str(i))
  plt.plot(np.arange(len(y))+1, y, color='darkblue',label='average')
  plt.fill_between(np.arange(len(y))+1, y-error, y+error,color =__
plt.title("Episodes vs rewards")
  plt.xlabel("Number of episodes(x10)")
  plt.ylabel("Reward per episode")
  plt.legend()
  plt.subplot(122)
  y, error = calculate_mean(steps)
  plt.plot(np.arange(len(y))+1, y, color='darkblue',label='average')
  plt.fill_between(np.arange(len(y))+1, y-error, y+error,color =__
plt.title("Episodes vs steps ")
  plt.xlabel("Number of episodes")
  plt.ylabel("Steps taken per episode")
  plt.legend()
  plt.savefig('run-hyp'+str(LR)+'.jpg', dpi = 250)
  plt.show()
  for i in range(avg_episodes):
    print("Episode: ",i+1, 'Number of steps: ',round(y[i]))
  if bad == False:
    wandb.log({"num_episodes_tosolve_cartpole":avg_episodes-100})
  else:
    wandb.log({"num_episodes_tosolve_cartpole":5000})
```

```
[]: wandb.agent(sweep_id, train, count=12)
```

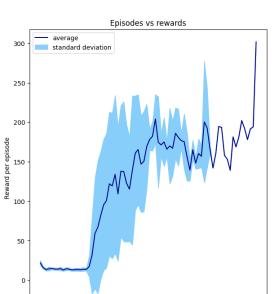
```
wandb: Agent Starting Run: qsd0uop7 with config:
wandb: BATCH_SIZE: 185
wandb: EPS_DECAY: 0.9644579630338428
wandb: GAMMA: 0.9433158694098552
wandb: LR: 9.118256798600293e-05
```

```
wandb:
         MAX_TRUNCATION: 1.0748454901220397
wandb:
        NUM_LAYERS: 10
wandb:
        NUM_NEURONS_EACH_LAYER: 128
        UPDATE_EVERY: 12
wandb:
wandb:
        a TUNE: 0.2463750982411671
Failed to detect the name of this notebook, you can set it manually with the
WANDB NOTEBOOK NAME environment variable to enable code saving.
wandb: Currently logged in as: me19b190. Use `wandb
login --relogin` to force relogin
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
            Average Score: 16.24
Episode 100
Episode 200
             Average Score: 27.63
Episode 300
             Average Score: 187.58
              Average Score: 196.06
Episode 308
Environment solved in 208 episodes! Average Score: 196.06
0:05:21.804678
Run: 2 ------
Episode 100 Average Score: 15.57
Episode 200 Average Score: 28.98
             Average Score: 174.96
Episode 300
Episode 400
            Average Score: 157.92
Episode 500 Average Score: 192.45
Episode 515 Average Score: 195.58
Environment solved in 415 episodes!
                                  Average Score: 195.58
0:14:52.494393
Run: 3 ------
Episode 100
             Average Score: 13.96
Episode 200
             Average Score: 12.66
Episode 299 Average Score: 195.31
Environment solved in 199 episodes! Average Score: 195.31
0:04:37.283560
Run: 4 -----
Episode 100
           Average Score: 15.34
Episode 200
             Average Score: 12.83
             Average Score: 140.19
Episode 300
Episode 355 Average Score: 195.78
Environment solved in 255 episodes! Average Score: 195.78
```

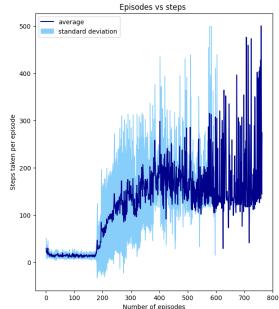
```
0:06:35.743286
Run: 5 -----
Episode 100
             Average Score: 14.44
Episode 200 Average Score: 12.18
Episode 300 Average Score: 11.94
             Average Score: 54.05
Episode 400
Episode 500
            Average Score: 150.78
           Average Score: 139.44
Episode 600
            Average Score: 167.28
Episode 700
Episode 762
             Average Score: 195.12
Environment solved in 662 episodes! Average Score: 195.12
0:20:13.428771
Run: 6 ------
Episode 100 Average Score: 14.84

Average Score: 14.84
Episode 300
            Average Score: 13.68
Episode 400
            Average Score: 116.89
          Average Score: 173.30
Episode 500
Episode 600
            Average Score: 191.82
             Average Score: 196.20
Episode 603
Environment solved in 503 episodes!
                                 Average Score: 196.20
0:15:07.133645
Run: 7 ------
Episode 100
            Average Score: 15.64
Episode 200 Average Score: 53.80
Episode 271
             Average Score: 196.42
Environment solved in 171 episodes! Average Score: 196.42
0:05:22.001649
Run: 8 ------
Episode 100
            Average Score: 15.28
            Average Score: 12.68
Episode 200
Episode 300 Average Score: 49.17
Episode 385 Average Score: 196.80
Environment solved in 285 episodes! Average Score: 196.80
0:05:42.941373
Run: 9 -----
Episode 100
            Average Score: 13.31
Episode 200
            Average Score: 12.95
Episode 300 Average Score: 100.67
Episode 400 Average Score: 168.70
            Average Score: 195.55
Episode 422
Environment solved in 322 episodes!
                                Average Score: 195.55
0:08:13.557635
Run: 10 -----
Episode 100
             Average Score: 15.22
Episode 200 Average Score: 13.89
Episode 300 Average Score: 47.86
Episode 386
            Average Score: 196.35
```

## Environment solved in 286 episodes! 0:05:18.287580



30 40 50 Number of episodes(x10) 70



Average Score: 196.35

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Episode:
          1 Number of steps:
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<IPython.core.display.HTML object>
wandb: Agent Starting Run: hljmaezw with config:
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wandb:
          GAMMA: 0.9032139723471868
wandb:
          LR: 3.1900755954006034e-05
wandb:
          MAX_TRUNCATION: 0.7043922740013564
wandb:
          NUM LAYERS: 10
wandb:
          NUM_NEURONS_EACH_LAYER: 64
wandb:
          UPDATE EVERY: 22
wandb:
          a_TUNE: 0.8408808506168791
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
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<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
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<IPython.core.display.HTML object>
Run: 1 ------
Episode 100
             Average Score: 15.28
Episode 200
            Average Score: 11.74
Episode 300 Average Score: 12.79
Episode 400 Average Score: 15.11
Episode 500
            Average Score: 10.32
           Average Score: 10.30
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:14.577481
Run: 2 ------
Episode 100
              Average Score: 15.38
Episode 200
             Average Score: 11.81
            Average Score: 12.80
Episode 300
           Average Score: 10.60
Episode 400
Episode 500
            Average Score: 10.68
Episode 501
            Average Score: 10.67
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:09.245623
Run: 3 ------
Episode 100 Average Score: 17.54
Episode 200
            Average Score: 13.79
Episode 300
            Average Score: 13.38
           Average Score: 14.24
Average Score: 12.51
Episode 400
Episode 500
             Average Score: 12.51
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:19.753112
Run: 4 -----
Episode 100 Average Score: 14.89
Episode 200 Average Score: 12.78
Episode 300
            Average Score: 14.47
            Average Score: 10.10
Episode 400
Episode 500
            Average Score: 9.623
Average Score: 9.61
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:07.443216
Run: 5 -----
Episode 100
             Average Score: 17.14
Episode 200 Average Score: 11.59
Episode 300 Average Score: 11.04
```

Average Score: 10.88

Average Score: 13.68

Episode 400

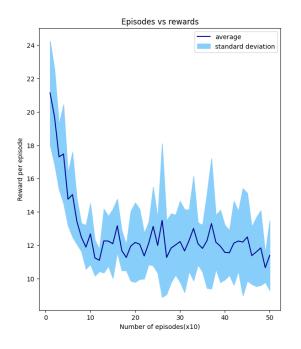
Episode 500

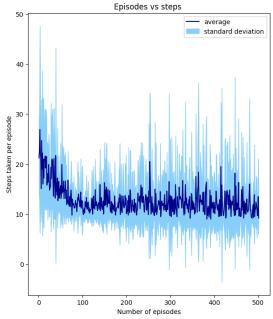
```
Episode 501
              Average Score: 13.68
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:10.769966
Run: 6 -----
Episode 100
              Average Score: 15.10
Episode 200 Average Score: 11.48
Episode 300 Average Score: 11.04
Episode 400
             Average Score: 12.05
Episode 500
             Average Score: 11.67
Episode 501 Average Score: 11.66
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:07.384203
Run: 7 ------
Episode 100
             Average Score: 15.28
Episode 200
              Average Score: 11.84
Episode 300 Average Score: 11.11
Episode 400 Average Score: 11.36
Episode 500
             Average Score: 12.49
           Average Score: 12.49
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:08.966362
Run: 8 -----
Episode 100
              Average Score: 14.31
Episode 200
              Average Score: 10.90
Episode 300
             Average Score: 10.81
           Average Score: 11.71
Episode 400
Episode 500
             Average Score: 13.24
Episode 501
              Average Score: 13.18
Experiment ended because of bad results, no significant improvement of the agent
performance
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Run: 9 ------
Episode 100
           Average Score: 15.80
Episode 200
             Average Score: 11.99
Episode 300 Average Score: 11.96
Episode 400 Average Score: 12.92
Episode 500 Average Score: 10.65
Episode 501
             Average Score: 10.66
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:14.089716
Run: 10 ------
Episode 100 Average Score: 15.12
Episode 200 Average Score: 11.26
             Average Score: 12.09
Episode 300
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Episode 400 Average Score: 13.14 Episode 500 Average Score: 12.63 Episode 501 Average Score: 12.64

Experiment ended because of bad results, no significant improvement of the agent

performance 0:01:14.020700





Episode: 1 Number of steps: 21 Episode: 2 Number of steps: 23 Episode: 3 Number of steps: 27 Episode: 4 Number of steps: 22 Episode: 5 Number of steps: 21 Episode: 6 Number of steps: 15 Episode: 7 Number of steps: 25 Episode: 8 Number of steps: 19 Episode: 9 Number of steps: Episode: 10 Number of steps: Episode: 11 Number of steps: 21 Episode: 12 Number of steps: 17 Episode: 13 Number of steps: 21 Episode: 14 Number of steps: 21 Episode: 15 Number of steps: 22 Episode: 16 Number of steps: 19 Episode: 17 Number of steps: 21 Episode: 18 Number of steps: 22 Episode: 19 Number of steps: 16 Episode: 20 Number of steps: 18

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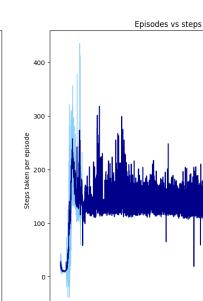
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Episode: 501 Number of steps: 9
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Agent Starting Run: 79z8l1on with config:
wandb:
         BATCH SIZE: 431
wandb:
         EPS_DECAY: 0.9674236948730496
wandb:
         GAMMA: 0.8213264938905515
wandb: LR: 9.505280432729254e-05
wandb: MAX_TRUNCATION: 1.362855508717414
wandb: NUM_LAYERS: 2
wandb: NUM_NEURONS_EACH_LAYER: 64
wandb: UPDATE_EVERY: 45
wandb: a_TIME: 0_10320270204531045
wandb:
         a_TUNE: 0.19329279204531247
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 ------
Episode 100
              Average Score: 12.22
Episode 200 Average Score: 11.13
Episode 300 Average Score: 172.67
              Average Score: 195.64
Episode 311
Environment solved in 211 episodes! Average Score: 195.64
0:03:45.455866
Run: 2 -----
Episode 100 Average Score: 12.88
Episode 200
             Average Score: 60.45
Episode 273 Average Score: 195.07
Environment solved in 173 episodes! Average Score: 195.07
0:03:43.348392
Run: 3 -----
Episode 100
              Average Score: 13.49
Episode 200
              Average Score: 55.15
            Average Score: 195.89
Episode 269
Environment solved in 169 episodes!
                                    Average Score: 195.89
```

0:03:47.562342

```
Episode 100
                Average Score: 11.91
Episode 200
                Average Score: 10.18
Episode 300
                Average Score: 106.13
Episode 400
                Average Score: 124.27
Episode 500
                Average Score: 127.85
Episode 600
                Average Score: 131.18
Episode 700
                Average Score: 131.55
Episode 800
                Average Score: 128.72
Episode 900
                Average Score: 159.12
Episode 1000
                Average Score: 133.67
Episode 1100
                Average Score: 134.52
Episode 1200
                Average Score: 139.41
Episode 1300
                Average Score: 142.73
Episode 1400
                Average Score: 156.79
Episode 1500
                Average Score: 157.18
Episode 1600
                Average Score: 145.50
Episode 1700
                Average Score: 141.07
                Average Score: 142.29
Episode 1800
Episode 1900
                Average Score: 140.96
Episode 2000
                Average Score: 142.88
Episode 2100
                Average Score: 145.21
Episode 2200
                Average Score: 143.95
Episode 2300
                Average Score: 138.50
Episode 2400
                Average Score: 139.03
Episode 2500
                Average Score: 141.08
Episode 2600
                Average Score: 136.82
Episode 2700
                Average Score: 138.26
Episode 2800
                Average Score: 135.88
Episode 2900
                Average Score: 132.44
Episode 3000
                Average Score: 136.14
Episode 3100
                Average Score: 135.45
Episode 3200
                Average Score: 133.33
Episode 3300
                Average Score: 133.12
Episode 3400
                Average Score: 132.09
Episode 3500
                Average Score: 133.54
Episode 3600
                Average Score: 128.60
Episode 3700
                Average Score: 123.72
Episode 3800
                Average Score: 128.82
Episode 3900
                Average Score: 124.57
Episode 4000
                Average Score: 125.46
Episode 4100
                Average Score: 128.56
Episode 4200
                Average Score: 124.28
Episode 4300
                Average Score: 123.98
                Average Score: 125.92
Episode 4400
Episode 4500
                Average Score: 123.03
Episode 4600
                Average Score: 126.67
Episode 4700
                Average Score: 127.69
```

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Episode 4800
             Average Score: 134.55
Episode 4900 Average Score: 127.48
Episode 5000
              Average Score: 128.36
11:00:03.131933
Run: 5 -----
Episode 100
             Average Score: 12.16
Episode 200 Average Score: 12.16
Episode 200 Average Score: 13.63
Episode 300 Average Score: 145.68
            Average Score: 195.08
Episode 344
Environment solved in 244 episodes!
                                  Average Score: 195.08
0:04:03.177864
Run: 6 -----
Episode 100
             Average Score: 11.78
Episode 200
            Average Score: 36.74
           Average Score: 191.02
Episode 300
Episode 400
            Average Score: 175.26
Episode 500
             Average Score: 170.15
             Average Score: 169.87
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:12:40.449570
Run: 7 ------
Episode 100
             Average Score: 12.73
Episode 200 Average Score: 13.95
Episode 300 Average Score: 176.47
Episode 312 Average Score: 196.64
Environment solved in 212 episodes!
                                  Average Score: 196.64
0:03:37.330931
Run: 8 -----
             Average Score: 12.17
Episode 100
Episode 200
            Average Score: 13.74
Episode 300 Average Score: 185.24
Episode 307 Average Score: 196.61
Environment solved in 207 episodes!
                                  Average Score: 196.61
0:03:34.112307
Run: 9 -----
Episode 100
             Average Score: 14.93
Episode 200
            Average Score: 86.70
Episode 300 Average Score: 175.25
Episode 400 Average Score: 169.79
             Average Score: 195.38
Episode 449
Environment solved in 349 episodes!
                                 Average Score: 195.38
0:12:00.359563
Run: 10 -----
Episode 100
             Average Score: 11.92
Episode 200 Average Score: 10.07
Episode 300 Average Score: 151.86
            Average Score: 196.87
Episode 319
```

Environment solved in 219 episodes! 0:03:32.177871



1000

2000

Number of episodes

Average Score: 196.87

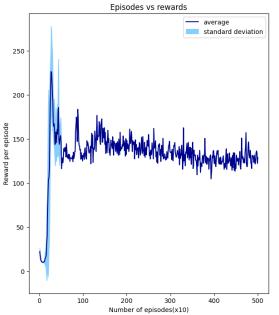
average

4000

5000

3000

standard deviation



Episode: 1 Number of steps: 28 Episode: 2 Number of steps: 19 Episode: 3 Number of steps: 24 Episode: 4 Number of steps: 16 Episode: 5 Number of steps: 25 Episode: 6 Number of steps: 24 Episode: 7 Number of steps: 23 Episode: 8 Number of steps: 19 Episode: 9 Number of steps: 19 Episode: 10 Number of steps: 24 Episode: 11 Number of steps: 23 Episode: 12 Number of steps: 19 Episode: 13 Number of steps: 20 Episode: 14 Number of steps: 20 Episode: 15 Number of steps: 17 Episode: 16 Number of steps: 14 Episode: 17 Number of steps: 17 Episode: 18 Number of steps: 14 Episode: 19 Number of steps: 15 Episode: 20 Number of steps: 18 Episode: 21 Number of steps: 14 Episode: 22 Number of steps: 12 Episode: 23 Number of steps: 16 Episode: 24 Number of steps: 14

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Episode:
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Agent Starting Run: Otniv4zd with config:
wandb:
          BATCH SIZE: 100
wandb:
          EPS_DECAY: 0.947156368286084
wandb:
          GAMMA: 0.8495150839507726
wandb:
         LR: 6.143882538508602e-05
wandb:
          MAX_TRUNCATION: 1.4553132406153464
wandb:
          NUM_LAYERS: 2
wandb:
           NUM_NEURONS_EACH_LAYER: 128
wandb:
          UPDATE_EVERY: 139
           a_TUNE: 0.8559516443565589
wandb:
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Episode 100
               Average Score: 12.13
Episode 200
               Average Score: 11.01
               Average Score: 169.23
Episode 300
```

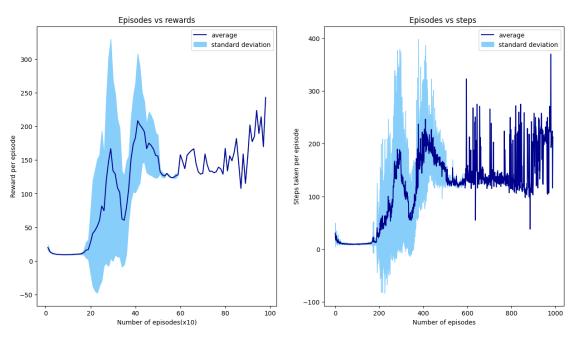
```
Average Score: 195.79
Episode 313
Environment solved in 213 episodes! Average Score: 195.79
0:02:35.271032
Run: 2 -----
Episode 100
             Average Score: 11.20
Episode 200 Average Score: 9.950
Episode 300 Average Score: 11.82
Episode 400 Average Score: 24.33
Episode 500
             Average Score: 192.38
Episode 503
           Average Score: 195.28
Environment solved in 403 episodes! Average Score: 195.28
0:03:06.956181
Run: 3 ------
Episode 100 Average Score: 10.85
Episode 200 Average Score: 10.50
             Average Score: 121.32
Episode 300
Episode 330 Average Score: 196.81
Environment solved in 230 episodes! Average Score: 196.81
0:02:36.039205
Run: 4 -----
Episode 100 Average Score: 12.48
Episode 200 Average Score: 36.52
Episode 250 Average Score: 196.18
Environment solved in 150 episodes! Average Score: 196.18
0:02:27.945379
Run: 5 -----
Episode 100
             Average Score: 10.79
Episode 200 Average Score: 10.79
Episode 200 Average Score: 9.741
Episode 300 Average Score: 10.35
Episode 400
             Average Score: 92.91
           Average Score: 196.57
Episode 433
Environment solved in 333 episodes! Average Score: 196.57
0:02:44.736167
Run: 6 -----
Episode 100 Average Score: 11.36
Episode 200 Average Score: 11.22
Episode 300 Average Score: 14.42
Episode 400
            Average Score: 87.78
Episode 446 Average Score: 196.80
Environment solved in 346 episodes! Average Score: 196.80
0:02:51.253722
Run: 7 -----
Episode 100 Average Score: 11.08
Episode 200
             Average Score: 10.91
Episode 299 Average Score: 198.66
Environment solved in 199 episodes! Average Score: 198.66
0:02:33.135549
Run: 8 ------
```

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Episode 100
                Average Score: 10.89
Episode 200
                Average Score: 9.800
Episode 300
                Average Score: 13.78
Episode 400
                Average Score: 103.87
                Average Score: 148.80
Episode 500
Episode 600
                Average Score: 132.11
Episode 700
                Average Score: 147.10
Episode 800
                Average Score: 140.47
Episode 900
                Average Score: 146.38
Episode 989
                Average Score: 195.09
Environment solved in 889 episodes!
                                        Average Score: 195.09
0:23:40.300515
Run: 9 -----
Episode 100
                Average Score: 10.87
Episode 200
                Average Score: 12.25
Episode 300
                Average Score: 127.37
Episode 333
                Average Score: 196.81
Environment solved in 233 episodes!
                                        Average Score: 196.81
0:02:32.956508
Run: 10
                Average Score: 11.38
Episode 100
```

Episode 100 Average Score: 11.38
Episode 200 Average Score: 12.80
Episode 300 Average Score: 56.97
Episode 400 Average Score: 181.02
Episode 500 Average Score: 139.18
Episode 581 Average Score: 125.55

Experiment ended because of bad results, no significant improvement of the agent performance

0:07:47.184405



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         447 Number of steps: 178
Episode:
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Agent Starting Run: u2fvnof2 with config:
wandb:
          BATCH_SIZE: 236
wandb:
          EPS_DECAY: 0.9304010177021712
wandb:
          GAMMA: 0.8563815339181461
wandb:
          LR: 5.005234263690648e-05
wandb:
          MAX_TRUNCATION: 0.95776310243926
wandb:
          NUM_LAYERS: 2
wandb:
          NUM_NEURONS_EACH_LAYER: 128
wandb:
          UPDATE_EVERY: 59
wandb:
          a_TUNE: 0.8528776935471074
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 -----
Episode 100
               Average Score: 14.24
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Episode 200
           Average Score: 15.34
Episode 300
             Average Score: 180.88
Episode 308
              Average Score: 195.93
Environment solved in 208 episodes!
                                   Average Score: 195.93
0:03:03.446410
Run: 2 -----
Episode 100 Average Score: 10.47
Episode 200 Average Score: 9.530
Episode 300
             Average Score: 10.34
Episode 400
             Average Score: 23.83
Episode 475 Average Score: 196.92
Environment solved in 375 episodes!
                                   Average Score: 196.92
0:03:13.998769
Run: 3 ------
Episode 100
           Average Score: 10.37
             Average Score: 9.493
Episode 200
Episode 300
             Average Score: 10.53
Episode 400 Average Score: 132.37
Episode 429 Average Score: 196.41
Environment solved in 329 episodes!
                                   Average Score: 196.41
0:03:08.257866
Run: 4 ------
Episode 100
             Average Score: 10.67
Episode 200 Average Score: 9.701
Episode 300 Average Score: 11.76
Episode 400 Average Score: 161.41
Episode 413
              Average Score: 197.72
Environment solved in 313 episodes! Average Score: 197.72
0:03:11.846283
Run: 5 ------
Episode 100 Average Score: 10.94
Episode 200 Average Score: 10.13
Episode 300 Average Score: 11.26
             Average Score: 29.08
Episode 400
Episode 441
              Average Score: 196.65
Environment solved in 341 episodes! Average Score: 196.65
0:03:11.776267
Run: 6 -----
Episode 100 Average Score: 10.66
Episode 200 Average Score: 10.24
Episode 300
             Average Score: 123.73
Episode 331 Average Score: 196.17
Environment solved in 231 episodes! Average Score: 196.17
0:03:00.982341
Run: 7 ------
Episode 100 Average Score: 10.65
Episode 200 Average Score: 9.960
Episode 300
             Average Score: 10.71
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Episode 400 Average Score: 13.81 Episode 499 Average Score: 197.32

Environment solved in 399 episodes! Average Score: 197.32

0:03:20.460227

Run: 8 -----

Episode 100 Average Score: 10.99
Episode 200 Average Score: 9.910
Episode 300 Average Score: 12.22
Episode 400 Average Score: 61.15
Episode 474 Average Score: 196.08

Environment solved in 374 episodes! Average Score: 196.08

0:03:30.279011

Run: 9 -----

Episode 100 Average Score: 10.24
Episode 200 Average Score: 9.603
Episode 300 Average Score: 10.69
Episode 400 Average Score: 13.32
Episode 500 Average Score: 82.22
Episode 501 Average Score: 84.10

Experiment ended because of bad results, no significant improvement of the agent performance

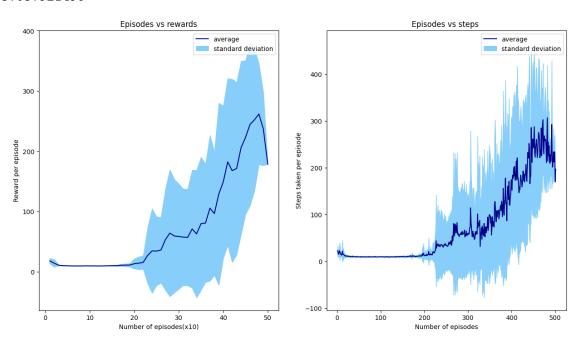
0:01:31.740843

Run: 10 -----

Episode 100 Average Score: 10.47 Episode 200 Average Score: 9.680 Episode 300 Average Score: 13.37 Episode 374 Average Score: 198.11

Environment solved in 274 episodes! Average Score: 198.11

0:03:03.921496



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<IPython.core.display.HTML object>
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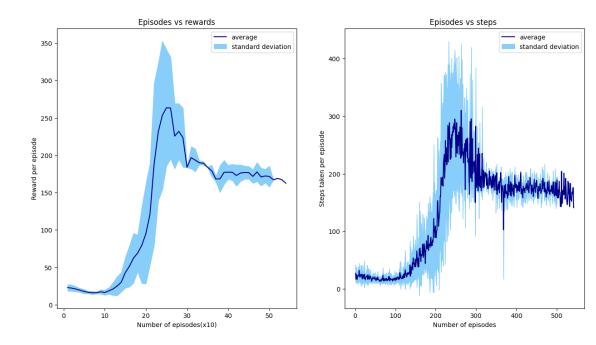
```
wandb: Agent Starting Run: sdijsg95 with config:
wandb: BATCH_SIZE: 82
wandb: EPS_DECAY: 0.9945620516333
wandb: GAMMA: 0.8958667088537814
wandb: LR: 6.191606487231409e-05
         EPS_DECAY: 0.994562051633274
wandb: MAX_TRUNCATION: 1.542127674530617
wandb: NUM_LAYERS: 2
wandb: NUM_NEURONS_EACH_LAYER: 64
wandb: UPDATE_EVERY: 22
          a_TUNE: 0.38708164195434613
wandb:
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 -----
Episode 100 Average Score: 18.34
Episode 200
              Average Score: 47.05
Episode 266
              Average Score: 195.36
Environment solved in 166 episodes! Average Score: 195.36
0:02:39.843572
Run: 2 ------
Episode 100 Average Score: 19.35
Episode 200 Average Score: 44.89
Episode 248 Average Score: 195.64
Environment solved in 148 episodes! Average Score: 195.64
0:02:35.743138
Run: 3 -----
              Average Score: 19.65
Episode 100
Episode 200 Average Score: 48.69
Episode 300 Average Score: 179.46
Episode 400 Average Score: 184.22
Episode 500
              Average Score: 185.30
Episode 501 Average Score: 185.21
Experiment ended because of bad results, no significant improvement of the agent
performance
0:10:36.021004
Run: 4 ------
Episode 100
              Average Score: 17.03
```

<IPython.core.display.HTML object>

Average Score: 109.97

Episode 200

Average Score: 195.60 Episode 234 Environment solved in 134 episodes! Average Score: 195.60 0:02:25.109739 Run: 5 -----Episode 100 Average Score: 18.80 Average Score: 51.37 Episode 200 Episode 265 Average Score: 198.15 Environment solved in 165 episodes! Average Score: 198.15 0:02:49.778305 Run: 6 -----Episode 100 Average Score: 19.03 Average Score: 31.71 Episode 200 Average Score: 197.61 Episode 299 Environment solved in 199 episodes! Average Score: 197.61 0:02:51.817765 Run: 7 ------Episode 100 Average Score: 16.41 Episode 200 Average Score: 35.36 Episode 300 Average Score: 132.97 Episode 400 Average Score: 180.40 Episode 500 Average Score: 163.44 Episode 542 Average Score: 164.17 Experiment ended because of bad results, no significant improvement of the agent performance 0:10:04.121300 Run: 8 -----Episode 100 Average Score: 16.32 Episode 200 Average Score: 39.21 Episode 282 Average Score: 196.63 Environment solved in 182 episodes! Average Score: 196.63 0:02:46.426055 Run: 9 ------Episode 100 Average Score: 18.14 Episode 200 Average Score: 30.69 Episode 268 Average Score: 195.19 Environment solved in 168 episodes! Average Score: 195.19 0:02:32.873491 Run: 10 ------Episode 100 Average Score: 20.99 Episode 200 Average Score: 55.14 Episode 277 Average Score: 197.05 Environment solved in 177 episodes! Average Score: 197.05 0:02:58.597294



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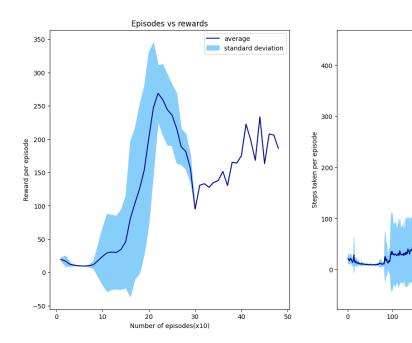
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          279 Number of steps:
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          303 Number of steps:
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          304 Number of steps:
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          305 Number of steps:
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          306 Number of steps:
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          307 Number of steps:
                                  188
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          309 Number of steps:
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Episode:
          311 Number of steps:
Episode:
          312 Number of steps:
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Episode:
          313 Number of steps:
                                  170
Episode:
          314 Number of steps:
                                  199
Episode:
          315 Number of steps:
                                  236
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Episode: 316 Number of steps: 196
Episode: 317 Number of steps: 176
Episode: 318 Number of steps: 206
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Sweep Agent: Waiting for job.
wandb: Job received.
wandb: Agent Starting Run: y6aweian with config:
wandb:
       BATCH_SIZE: 445
wandb:
         EPS_DECAY: 0.9539558814765162
wandb:
         GAMMA: 0.8074208494107936
wandb: LR: 6.720252804661174e-05
wandb: MAX_TRUNCATION: 1.3790537169095152
wandb: NUM_LAYERS: 2
wandb: NUM_NEURONS_EACH_LAYER: 128
wandb: UPDATE_EVERY: 14
wandb:
         a_TUNE: 0.17577417109251392
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 ------
Episode 100
             Average Score: 39.62
Episode 190
              Average Score: 195.21
Environment solved in 90 episodes! Average Score: 195.21
0:03:33.442156
Run: 2 ------
Episode 100 Average Score: 11.41
             Average Score: 58.86
Episode 200
Episode 258 Average Score: 196.72
Environment solved in 158 episodes! Average Score: 196.72
0:03:26.001477
Run: 3 ------
           Average Score: 11.48
Average Score: 184.00
Episode 100
Episode 200
Episode 204
             Average Score: 195.88
```

```
Environment solved in 104 episodes! Average Score: 195.88
0:03:17.828633
Run: 4 -----
Episode 100 Average Score: 11.10
Episode 200
            Average Score: 37.55
Episode 256 Average Score: 197.39
Environment solved in 156 episodes! Average Score: 197.39
0:03:25.879450
Run: 5 -----
Episode 100 Average Score: 11.43
Episode 200 Average Score: 24.14
Episode 283 Average Score: 196.43
Environment solved in 183 episodes! Average Score: 196.43
0:03:32.950045
Run: 6 ------
            Average Score: 12.15
Episode 100
Episode 200
            Average Score: 112.57
Episode 238 Average Score: 195.17
Environment solved in 138 episodes! Average Score: 195.17
0:03:23.222850
Run: 7 ------
Episode 100 Average Score: 10.93
Episode 200
            Average Score: 16.74
Episode 264 Average Score: 196.84
Environment solved in 164 episodes! Average Score: 196.84
0:03:26.778653
Run: 8 -----
Episode 100 Average Score: 10.81
Episode 200 Average Score: 26.51
Episode 202 Average Score: 105.10
Episode 292
            Average Score: 195.10
Environment solved in 192 episodes! Average Score: 195.10
0:03:39.199737
Run: 9 ------
Episode 100 Average Score: 11.40
Episode 200 Average Score: 150.32
Episode 210 Average Score: 195.01
Environment solved in 110 episodes! Average Score: 195.01
0:03:18.547795
Run: 10 ------
Episode 100 Average Score: 11.62
            Average Score: 23.99
Episode 200
            Average Score: 162.23
Episode 300
Episode 400 Average Score: 145.17
Episode 488 Average Score: 195.38
Environment solved in 388 episodes! Average Score: 195.38
0:10:26.797661
```



Episodes vs steps

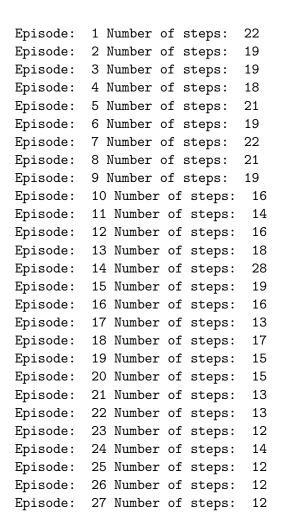
200

Number of episodes

300

average standard deviation

500



```
Episode:
          28 Number of steps:
                                 10
Episode:
          29 Number of steps:
                                 11
          30 Number of steps:
Episode:
                                 12
Episode:
          31 Number of steps:
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Episode:
          32 Number of steps:
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Episode:
          33 Number of steps:
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Episode:
          34 Number of steps:
Episode:
          35 Number of steps:
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Episode:
          36 Number of steps:
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Episode:
          37 Number of steps:
                                 11
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Episode:
          39 Number of steps:
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          40 Number of steps:
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Episode:
          41 Number of steps:
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Episode:
          42 Number of steps:
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Episode:
          43 Number of steps:
                                 11
Episode:
          44 Number of steps:
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Episode:
          45 Number of steps:
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Episode:
          46 Number of steps:
                                 10
Episode:
          47 Number of steps:
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Episode:
          48 Number of steps:
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Episode:
          49 Number of steps:
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Episode:
          50 Number of steps:
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Episode:
          51 Number of steps:
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Episode:
          52 Number of steps:
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Episode:
          53 Number of steps:
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Episode:
          54 Number of steps:
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          55 Number of steps:
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          56 Number of steps:
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Episode:
          57 Number of steps:
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          58 Number of steps:
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          59 Number of steps:
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Episode:
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          61 Number of steps:
Episode:
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Episode:
          62 Number of steps:
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          63 Number of steps:
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          71 Number of steps:
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          73 Number of steps:
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Episode:
          74 Number of steps:
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Episode:
          75 Number of steps:
                                 12
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Episode:
          76 Number of steps:
                                 10
Episode:
          77 Number of steps:
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Episode:
          78 Number of steps:
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Episode:
          79 Number of steps:
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Episode:
          80 Number of steps:
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          81 Number of steps:
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          83 Number of steps:
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          84 Number of steps:
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          85 Number of steps:
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          86 Number of steps:
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Episode:
          89 Number of steps:
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Episode:
          90 Number of steps:
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          91 Number of steps:
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          92 Number of steps:
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          93 Number of steps:
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          121 Number of steps:
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Episode:
          122 Number of steps:
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Episode:
          123 Number of steps:
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Episode:
          124 Number of steps:
                                  28
Episode:
          125 Number of steps:
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Episode:
          126 Number of steps:
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Episode:
          127 Number of steps:
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          138 Number of steps:
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Episode:
          141 Number of steps:
          142 Number of steps:
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          143 Number of steps:
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           144 Number of steps:
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          145 Number of steps:
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          147 Number of steps:
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          148 Number of steps:
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          149 Number of steps:
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Episode:
          150 Number of steps:
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Episode:
           151 Number of steps:
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Episode:
          152 Number of steps:
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          154 Number of steps:
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          155 Number of steps:
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          156 Number of steps:
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          158 Number of steps:
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          163 Number of steps:
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Episode:
          164 Number of steps:
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Episode:
           166 Number of steps:
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Episode:
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           167 Number of steps:
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Episode:
          168 Number of steps:
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Episode:
          169 Number of steps:
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Episode:
          170 Number of steps:
                                  165
Episode:
          171 Number of steps:
                                  126
```

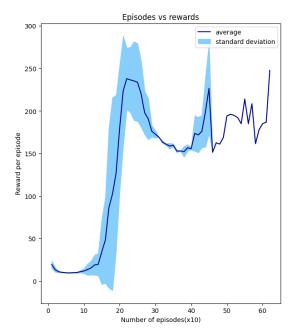
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Episode:
          172 Number of steps:
                                  139
                                  128
Episode:
          173 Number of steps:
Episode:
          174 Number of steps:
                                  144
Episode:
          175 Number of steps:
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Episode:
          176 Number of steps:
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Episode:
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Episode:
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          182 Number of steps:
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          187 Number of steps:
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          188 Number of steps:
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          189 Number of steps:
          190 Number of steps:
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          191 Number of steps:
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          192 Number of steps:
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          196 Number of steps:
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Episode:
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Episode:
          218 Number of steps:
                                  254
Episode:
          219 Number of steps:
                                  292
```

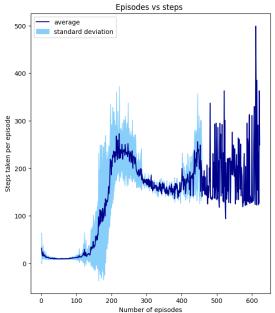
```
274
Episode:
          220 Number of steps:
Episode:
          221 Number of steps:
                                  268
Episode:
          222 Number of steps:
                                  256
                                  251
Episode:
          223 Number of steps:
Episode:
          224 Number of steps:
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Episode:
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Episode:
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          229 Number of steps:
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                                  278
          230 Number of steps:
Episode:
          231 Number of steps:
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Episode:
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          232 Number of steps:
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Episode:
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Episode:
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Episode:
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Episode:
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Episode:
          245 Number of steps:
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          254 Number of steps:
                                  249
Episode:
          255 Number of steps:
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Episode:
          259 Number of steps:
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Episode:
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Episode:
          262 Number of steps:
                                  197
Episode:
                                  187
Episode:
          263 Number of steps:
Episode:
          264 Number of steps:
                                  196
Episode:
          265 Number of steps:
                                  180
Episode:
          266 Number of steps:
                                  191
Episode:
          267 Number of steps:
                                  179
```

```
Episode: 268 Number of steps: 197
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Agent Starting Run: a6snkxdg with config:
wandb:
         BATCH SIZE: 109
wandb:
         EPS_DECAY: 0.9381989534050912
wandb:
         GAMMA: 0.8869649295017897
wandb: LR: 6.791548514344285e-05
wandb: MAX_TRUNCATION: 1.176591109915182
wandb: NUM_LAYERS: 2
wandb: NUM_NEURONS_EACH_LAYER: 128
wandb:
         UPDATE_EVERY: 39
wandb:
         a_TUNE: 0.32047596981992543
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 ------
Episode 100
              Average Score: 14.13
Episode 200 Average Score: 125.06
Episode 300 Average Score: 173.29
              Average Score: 158.97
Episode 400
Episode 457
               Average Score: 195.64
Environment solved in 357 episodes! Average Score: 195.64
0:10:10.907421
Run: 2 -----
Episode 100 Average Score: 11.97
Episode 200 Average Score: 57.28
              Average Score: 195.85
Episode 259
Environment solved in 159 episodes! Average Score: 195.85
0:02:30.052855
Run: 3 ------
Episode 100
              Average Score: 11.90
Episode 200 Average Score: 163.82
Episode 210 Average Score: 196.86
```

Environment solved in 110 episodes! Average Score: 196.86

```
0:02:21.222862
Run: 4 ------
Episode 100 Average Score: 10.71
Episode 200 Average Score: 46.80
Episode 250 Average Score: 195.07
Environment solved in 150 episodes!
                               Average Score: 195.07
0:02:22.446287
Run: 5 -----
Episode 100
            Average Score: 11.58
Episode 200
            Average Score: 19.65
Episode 285 Average Score: 196.72
Environment solved in 185 episodes! Average Score: 196.72
0:02:33.833807
Run: 6 ------
Episode 100
          Average Score: 10.94
            Average Score: 66.00
Episode 200
Episode 268 Average Score: 195.86
Environment solved in 168 episodes! Average Score: 195.86
0:02:29.883043
Run: 7 -----
Episode 100 Average Score: 10.52
Episode 200 Average Score: 21.82
Episode 269
            Average Score: 196.09
Environment solved in 169 episodes! Average Score: 196.09
0:02:25.836937
Run: 8 -----
Episode 100
             Average Score: 11.02
Episode 100 Average Score: 11.02
Episode 200 Average Score: 42.09
Episode 300 Average Score: 192.26
Episode 400
            Average Score: 157.47
            Average Score: 163.01
Episode 500
Episode 600 Average Score: 190.10
Episode 622 Average Score: 195.33
Environment solved in 522 episodes!
                                Average Score: 195.33
0:16:09.318909
Run: 9 -----
Episode 100
            Average Score: 11.76
Episode 200
            Average Score: 54.61
Episode 282 Average Score: 195.18
Environment solved in 182 episodes! Average Score: 195.18
0:02:38.089668
Run: 10 ------
Episode 100 Average Score: 11.33
Episode 200
            Average Score: 47.71
Episode 268 Average Score: 195.33
Environment solved in 168 episodes! Average Score: 195.33
0:02:35.855145
```





```
Episode:
          1 Number of steps:
                                32
Episode:
          2 Number of steps:
                                22
Episode:
          3 Number of steps:
                                18
Episode:
          4 Number of steps:
                                15
Episode:
          5 Number of steps:
                                24
Episode:
          6 Number of steps:
                                17
Episode:
          7 Number of steps:
                                19
Episode:
          8 Number of steps:
                                15
Episode:
          9 Number of steps:
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Episode:
          10 Number of steps:
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Episode:
          11 Number of steps:
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Episode:
          12 Number of steps:
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Episode:
          13 Number of steps:
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Episode:
          14 Number of steps:
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Episode:
          15 Number of steps:
                                 13
Episode:
          16 Number of steps:
                                 13
Episode:
          17 Number of steps:
                                 12
Episode:
          18 Number of steps:
                                 13
Episode:
          19 Number of steps:
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<IPython.core.display.HTML object>
wandb: Agent Starting Run: orbkgolu with config:
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wandb:
         GAMMA: 0.9715704993413474
wandb:
        LR: 1.8422788619594917e-05
wandb:
         MAX_TRUNCATION: 0.6481935369515359
wandb:
          NUM_LAYERS: 2
wandb:
          NUM_NEURONS_EACH_LAYER: 64
wandb:
          UPDATE_EVERY: 11
wandb:
           a_TUNE: 0.6612431162655902
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Episode 100
               Average Score: 11.01
Episode 200
               Average Score: 9.440
Episode 300
               Average Score: 9.25
Episode 400
               Average Score: 9.43
Episode 500
               Average Score: 9.46
Episode 501
               Average Score: 9.47
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:35.626038
Run: 2 -----
Episode 100
                Average Score: 11.43
Episode 200
               Average Score: 9.323
Episode 300
               Average Score: 9.26
               Average Score: 9.48
Episode 400
Episode 500
               Average Score: 9.36
Episode 501
               Average Score: 9.36
```

Experiment ended because of bad results, no significant improvement of the agent

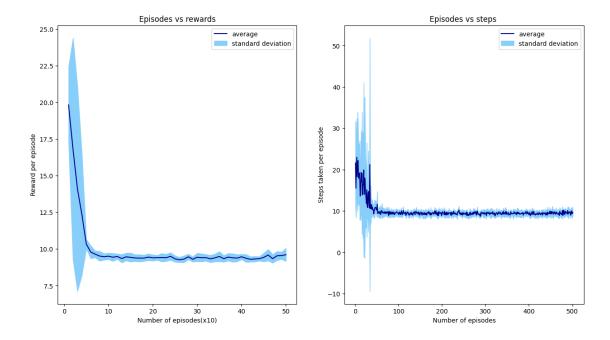
```
performance
0:00:35.888097
Run: 3 ------
Episode 100 Average Score: 11.72
Episode 200
             Average Score: 9.430
             Average Score: 9.40
Episode 300
           Average Score: 9.44
Average Score: 9.47
Episode 400
Episode 500
Episode 501
             Average Score: 9.47
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:36.507237
Run: 4 ------
Episode 100 Average Score: 1...
Episode 200 Average Score: 9.391
Episode 300
             Average Score: 9.35
Episode 400
             Average Score: 9.37
Episode 500 Average Score: 9.44
Episode 501 Average Score: 9.45
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:36.381208
Run: 5 -----
Episode 100 Average Score: 11.25
Episode 200 Average Score: 9.476
Episode 300 Average Score: 9.40
Episode 400
             Average Score: 9.38
Episode 500
              Average Score: 9.41
Episode 501
              Average Score: 9.39
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:35.885097
Run: 6 ------
Episode 100
              Average Score: 11.27
Episode 200 Average Score: 9.482
Episode 300 Average Score: 9.51
Episode 400
             Average Score: 9.43
Episode 500
             Average Score: 9.34
Episode 501 Average Score: 9.34
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:35.812080
Run: 7 ------
Episode 100
             Average Score: 11.66
Episode 200
             Average Score: 9.371
Episode 300 Average Score: 9.39
Episode 400 Average Score: 9.36
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Average Score: 9.59

Episode 500

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Average Score: 9.58
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:36.293188
Run: 8 -----
Episode 100
              Average Score: 11.64
Episode 100 Average Score: 11.64
Episode 200 Average Score: 9.540
Episode 300 Average Score: 9.43
Episode 400
             Average Score: 9.46
Episode 500
             Average Score: 9.22
Episode 501 Average Score: 9.22
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:36.398212
Run: 9 ------
              Average Score: 18.25
Episode 100
Episode 200 Average Score: 9.345
Episode 300 Average Score: 9.38
Episode 400 Average Score: 9.42
Episode 500
              Average Score: 9.44
            Average Score: 9.45
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:41.928459
Run: 10 ------
Episode 100
               Average Score: 11.57
Episode 200
              Average Score: 9.406
Episode 300
             Average Score: 9.49
            Average Score: 9.31
Episode 400
Episode 500
              Average Score: 9.66
               Average Score: 9.66
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
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0:00:36.270183



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wandb: Agent Starting Run: edylz50k with config:
wandb:
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wandb:
         EPS_DECAY: 0.9213039846395012
wandb:
        GAMMA: 0.9572341571672266
wandb:
        LR: 2.062697010822938e-05
wandb: MAX_TRUNCATION: 1.6278695998762147
wandb: NUM_LAYERS: 4
wandb: NUM_NEURONS_EACH_LAYER: 64
         UPDATE_EVERY: 56
wandb:
wandb:
          a_TUNE: 0.9867830155324524
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
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Run: 1 ------
Episode 100
              Average Score: 11.24
Episode 200
              Average Score: 9.388
Episode 300
              Average Score: 9.37
Episode 400 Average Score: 9.62
Episode 500 Average Score: 9.29
              Average Score: 9.30
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:39.086819
Run: 2 ------
           Average Score: 10.24
Average Score: 9.414
Episode 100
Episode 200
Episode 300
             Average Score: 9.44
             Average Score: 10.52
Episode 400
Episode 500
             Average Score: 11.04
              Average Score: 11.09
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:40.664175
Run: 3 ------
Episode 100
               Average Score: 10.95
           Average Score: 9.52
Episode 200
              Average Score: 9.510
Episode 300
Episode 400
              Average Score: 12.87
Episode 500
            Average Score: 23.48
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Episode 501
              Average Score: 23.70
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:55.896611
Run: 4 ------
Episode 100
              Average Score: 11.49
Episode 200 Average Score: 11.49
Episode 200 Average Score: 9.470
Episode 300 Average Score: 9.41
Episode 400
             Average Score: 11.17
Episode 500
             Average Score: 18.21
Episode 501 Average Score: 18.18
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:49.532176
Run: 5 ------
Episode 100
             Average Score: 10.78
Episode 200
             Average Score: 9.436
Episode 300 Average Score: 9.62
Episode 400 Average Score: 9.39
             Average Score: 10.05
Episode 500
           Average Score: 10.05
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:39.548923
Run: 6 -----
Episode 100
              Average Score: 10.33
Episode 200
              Average Score: 9.400
Episode 300
             Average Score: 9.49
           Average Score: 9.98
Episode 400
Episode 500
             Average Score: 9.870
Episode 501
              Average Score: 9.84
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:39.346878
Run: 7 ------
Episode 100
           Average Score: 10.78
Episode 200
             Average Score: 9.436
Episode 300 Average Score: 9.45
Episode 400 Average Score: 11.25
Episode 500 Average Score: 30.13
Episode 501
             Average Score: 30.39
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:59.570440
Run: 8 -----
Episode 100 Average Score: 10.57
Episode 200 Average Score: 9.421
             Average Score: 9.35
Episode 300
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Episode 400 Average Score: 10.17 Episode 500 Average Score: 16.54 Episode 501 Average Score: 16.95

Experiment ended because of bad results, no significant improvement of the agent performance

0:00:46.096400

Run: 9 -----

Episode 100 Average Score: 10.41
Episode 200 Average Score: 9.517
Episode 300 Average Score: 9.44
Episode 400 Average Score: 13.29
Episode 500 Average Score: 9.341
Episode 501 Average Score: 9.34

Experiment ended because of bad results, no significant improvement of the agent performance

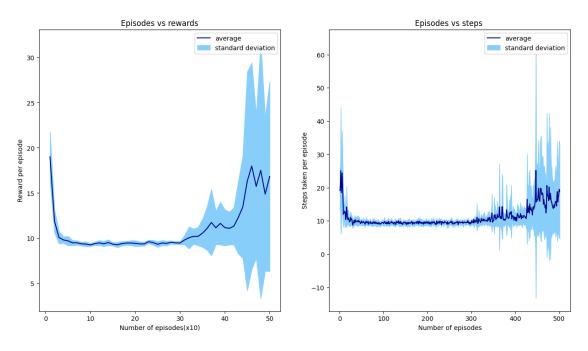
0:00:42.182518

Run: 10 ------

Episode 100 Average Score: 10.76
Episode 200 Average Score: 9.291
Episode 300 Average Score: 9.60
Episode 400 Average Score: 9.40
Episode 500 Average Score: 9.49
Episode 501 Average Score: 9.47

Experiment ended because of bad results, no significant improvement of the agent performance

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wandb: Agent Starting Run: 2kg1599i with config:
           BATCH_SIZE: 93
wandb:
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wandb:
wandb:
           GAMMA: 0.9670269768091512
wandb:
           LR: 5.297330569708928e-05
wandb:
           MAX_TRUNCATION: 1.2639403441561128
wandb:
           NUM_LAYERS: 10
wandb:
           NUM_NEURONS_EACH_LAYER: 64
wandb:
           UPDATE_EVERY: 72
wandb:
           a TUNE: 0.1917370506391084
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
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<IPython.core.display.HTML object>
Run: 1 ------
Episode 100
            Average Score: 13.99
Episode 200
            Average Score: 11.19
Episode 300 Average Score: 12.26
Episode 400 Average Score: 13.27
Episode 500
            Average Score: 13.33
          Average Score: 13.02
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:59.425407
Run: 2 -----
Episode 100
             Average Score: 14.96
            Average Score: 12.17
Episode 200
Episode 300
            Average Score: 13.23
          Average Score: 13.45
Episode 400
Episode 500
            Average Score: 14.05
Episode 501
            Average Score: 14.05
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:03.146247
Run: 3 ------
Episode 100 Average Score: 13.55
Episode 200
            Average Score: 11.25
Episode 300
            Average Score: 12.09
           Average Score: 13.08
Average Score: 15.14
Episode 400
Episode 500
            Average Score: 15.16
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:00.104561
Run: 4 ------
Episode 100 Average Score: 14.48
Episode 200 Average Score: 12.43
Episode 300
            Average Score: 12.13
            Average Score: 13.23
Episode 400
           Average Score: 11.93
Episode 500
            Average Score: 11.98
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:58.763258
Run: 5 -----
Episode 100
             Average Score: 14.53
          Average Score: 11.22
Average Score: 10.55
Episode 200
Episode 300
```

Average Score: 11.34

Average Score: 11.43

Episode 400

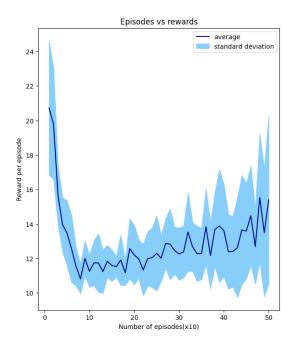
Episode 500

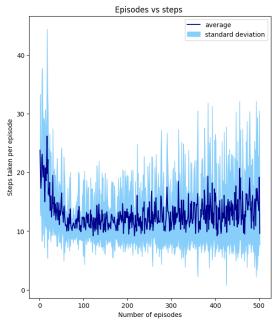
```
Episode 501
              Average Score: 11.42
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:53.887158
Run: 6 -----
Episode 100
              Average Score: 14.85
           Average Score: 12.07
Average Score: 13.37
Episode 200
Episode 300
Episode 400
             Average Score: 13.44
Episode 500
             Average Score: 13.13
Episode 501 Average Score: 13.03
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:01.964980
Run: 7 ------
Episode 100
             Average Score: 13.57
Episode 200
              Average Score: 11.63
Episode 300 Average Score: 11.75
Episode 400 Average Score: 12.73
              Average Score: 14.01
Episode 500
Episode 501
              Average Score: 13.88
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:58.841275
Run: 8 -----
Episode 100
              Average Score: 12.86
Episode 200
              Average Score: 11.03
Episode 300
             Average Score: 12.00
Episode 400
              Average Score: 13.46
Episode 500
              Average Score: 13.08
Episode 501
              Average Score: 12.95
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:57.519978
Run: 9 ------
Episode 100
           Average Score: 13.98
Episode 200
             Average Score: 12.15
Episode 300 Average Score: 11.94
Episode 400 Average Score: 12.36
Episode 500 Average Score: 12.73
Episode 501
             Average Score: 12.73
Experiment ended because of bad results, no significant improvement of the agent
performance
0:00:57.951075
Run: 10 ------
Episode 100 Average Score: 15.03
Episode 200 Average Score: 12.39
             Average Score: 12.76
Episode 300
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Episode 400 Average Score: 13.98 Episode 500 Average Score: 17.42 Episode 501 Average Score: 17.41

Experiment ended because of bad results, no significant improvement of the agent

performance
0:01:05.866861





Episode: 1 Number of steps: 24 Episode: 2 Number of steps: 20 Episode: 3 Number of steps: 17 Episode: 4 Number of steps: 19 Episode: 5 Number of steps: 22 Episode: 6 Number of steps: 23 Episode: 7 Number of steps: 21 8 Number of steps: Episode: 19 Episode: 9 Number of steps: Episode: 10 Number of steps: Episode: 11 Number of steps: 18 Episode: 12 Number of steps: 15 Episode: 13 Number of steps: 21 Episode: 14 Number of steps: 19 Episode: 15 Number of steps: 19 Episode: 16 Number of steps: 22 Episode: 17 Number of steps: 26 Episode: 18 Number of steps: 20 Episode: 19 Number of steps: 22 Episode: 20 Number of steps: 16

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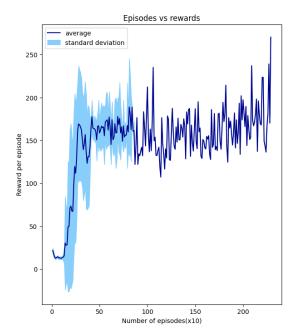
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Episode:
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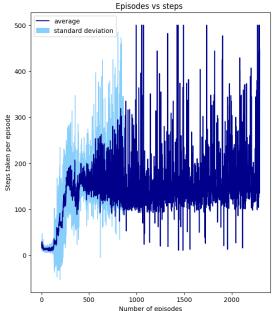
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Episode: 501 Number of steps: 10
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<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
wandb: Agent Starting Run: a8rrj7n9 with config:
wandb:
          BATCH SIZE: 79
wandb:
          EPS_DECAY: 0.9668218493647328
wandb:
          GAMMA: 0.826315409059545
wandb:
          LR: 8.465776832274467e-05
wandb:
          MAX_TRUNCATION: 0.6375798571314568
wandb:
          NUM_LAYERS: 8
wandb:
          NUM_NEURONS_EACH_LAYER: 90
wandb:
          UPDATE_EVERY: 37
wandb:
          a_TUNE: 0.28647247279686106
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
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<IPython.core.display.HTML object>
                             _____
Episode 100
               Average Score: 15.67
Episode 200
               Average Score: 119.76
Episode 300
               Average Score: 155.65
               Average Score: 151.83
Episode 400
Episode 500
               Average Score: 148.42
Episode 600
               Average Score: 136.23
Episode 700
               Average Score: 142.59
Episode 800
               Average Score: 143.72
Episode 900
               Average Score: 146.18
Episode 1000
               Average Score: 156.12
Episode 1100
               Average Score: 156.91
Episode 1200
               Average Score: 134.98
               Average Score: 156.03
Episode 1300
Episode 1400
               Average Score: 158.28
Episode 1500
               Average Score: 165.79
Episode 1600
               Average Score: 151.05
Episode 1700
               Average Score: 151.81
Episode 1800
               Average Score: 160.16
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Episode 1900 Average Score: 163.65
Episode 2000 Average Score: 170.36
Episode 2100 Average Score: 173.91
Episode 2200 Average Score: 179.18
Episode 2293
              Average Score: 196.80
Environment solved in 2193 episodes!
                                    Average Score: 196.80
3:28:16.888986
Run: 2 ------
Episode 100
             Average Score: 13.60
Episode 200
             Average Score: 11.64
Episode 300 Average Score: 97.13
Episode 351 Average Score: 195.42
Environment solved in 251 episodes!
                                  Average Score: 195.42
0:03:38.314815
Run: 3 ------
             Average Score: 15.19
Episode 100
Episode 200
             Average Score: 11.60
Episode 300 Average Score: 12.59
Episode 400 Average Score: 20.32
             Average Score: 171.57
Episode 500
Episode 600
             Average Score: 160.26
           Average Score: 189.25
Episode 700
Episode 716
             Average Score: 196.01
Environment solved in 616 episodes!
                                    Average Score: 196.01
0:13:17.942423
Run: 4 -----
Episode 100
              Average Score: 14.98
Episode 200 Average Score: 12.53
Episode 300 Average Score: 105.30
Episode 301 Average Score: 105.30
             Average Score: 195.28
Episode 351
Environment solved in 251 episodes!
                                  Average Score: 195.28
0:03:24.536286
Run: 5 ------
Episode 100
              Average Score: 13.36
Episode 200 Average Score: 12.33
Episode 300 Average Score: 75.97
Episode 400
             Average Score: 147.82
             Average Score: 157.67
Episode 500
             Average Score: 190.17
Episode 600
Episode 615
              Average Score: 196.02
Environment solved in 515 episodes!
                                   Average Score: 196.02
0:12:43.401445
Run: 6 -----
Episode 100
             Average Score: 14.08
Episode 200
             Average Score: 13.57
Episode 300 Average Score: 145.33
Episode 400 Average Score: 167.87
Episode 500
             Average Score: 181.99
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Episode 545 Average Score: 196.02 Environment solved in 445 episodes! Average Score: 196.02 0:12:24.578990 Run: 7 ------Episode 100 Average Score: 14.17 Average Score: 60.15 Episode 200 Episode 274 Average Score: 195.98 Environment solved in 174 episodes! Average Score: 195.98 0:03:35.225559 Run: 8 -----Episode 100 Average Score: 13.99 Average Score: 12.23 Episode 200 Episode 300 Average Score: 161.96 Episode 320 Average Score: 195.86 Environment solved in 220 episodes! Average Score: 195.86 0:03:28.419023 Run: 9 ------Episode 100 Average Score: 14.41 Episode 200 Average Score: 104.75 Episode 247 Average Score: 195.61 Environment solved in 147 episodes! Average Score: 195.61 0:03:25.363334 Run: 10 -----Episode 100 Average Score: 15.32 Episode 200 Average Score: 13.29 Episode 300 Average Score: 138.50 Episode 400 Average Score: 167.91 Episode 500 Average Score: 158.43 Average Score: 168.19 Episode 600 Episode 700 Average Score: 152.26 Episode 800 Average Score: 175.69 Episode 866 Average Score: 195.44 Environment solved in 766 episodes! Average Score: 195.44

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          588 Number of steps:
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          600 Number of steps:
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Episode:
          601 Number of steps:
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          602 Number of steps:
                                  214
Episode:
          603 Number of steps:
                                  174
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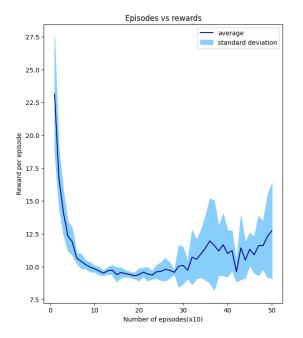
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Episode:
                                  186
          604 Number of steps:
Episode:
          605 Number of steps:
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          648 Number of steps:
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          651 Number of steps:
                                  209
```

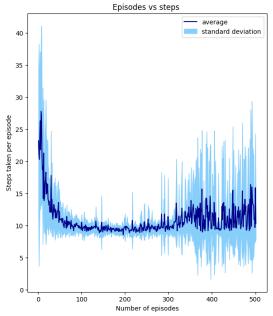
```
Episode:
              652 Number of steps:
                                    129
    Episode: 653 Number of steps: 163
    Episode: 654 Number of steps: 190
    Episode:
              655 Number of steps: 198
              656 Number of steps: 120
    Episode:
              657 Number of steps: 141
    Episode:
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
[]: wandb.agent(sweep_id, train, count=9)
    wandb: Agent Starting Run: s6wtmtgi with config:
    wandb:
               BATCH_SIZE: 469
    wandb:
               EPS_DECAY: 0.972692143062009
    wandb:
               GAMMA: 0.8736173045407283
    wandb:
              LR: 1.4731831999979211e-05
    wandb:
               MAX_TRUNCATION: 0.9112273414866644
    wandb:
               NUM_LAYERS: 8
    wandb:
               NUM_NEURONS_EACH_LAYER: 90
    wandb:
               UPDATE_EVERY: 59
               a TUNE: 0.39984112749615386
    wandb:
    Failed to detect the name of this notebook, you can set it manually with the
    WANDB_NOTEBOOK_NAME environment variable to enable code saving.
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    <IPython.core.display.HTML object>
    Run: 1
    Episode 100
                    Average Score: 13.46
    Episode 200
                    Average Score: 9.452
    Episode 300
                    Average Score: 9.47
    Episode 400
                    Average Score: 11.29
    Episode 500
                    Average Score: 12.66
    Episode 501
                    Average Score: 12.68
    Experiment ended because of bad results, no significant improvement of the agent
    performance
    0:01:11.437117
```

```
Episode 100
              Average Score: 12.82
Episode 200
              Average Score: 9.680
Episode 300
              Average Score: 9.66
Episode 400
              Average Score: 9.36
Episode 500
              Average Score: 9.37
Episode 501
              Average Score: 9.38
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:04.830627
Run: 3 -----
Episode 100
              Average Score: 12.71
Episode 200
             Average Score: 9.532
Episode 300
             Average Score: 9.35
Episode 400
             Average Score: 9.54
           Average Score: 11.90
Episode 500
Episode 501
             Average Score: 11.92
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:07.678269
Run: 4 ------
Episode 100 Average Score: 13.39
Episode 200 Average Score: 9.382
Episode 300
            Average Score: 9.72
Episode 400
             Average Score: 12.08
Episode 500
            Average Score: 11.62
              Average Score: 11.61
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:11.750188
Run: 5 ------
Episode 100
              Average Score: 11.64
Episode 200 Average Score: 9.491
Episode 300 Average Score: 9.56
             Average Score: 11.78
Episode 400
Episode 500
            Average Score: 11.42
Episode 501
              Average Score: 11.49
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:09.337643
Run: 6 -----
Episode 100
             Average Score: 13.30
Episode 200
              Average Score: 9.580
Episode 300
             Average Score: 9.40
Episode 400
             Average Score: 11.31
Episode 500
              Average Score: 10.58
Episode 501
              Average Score: 10.57
Experiment ended because of bad results, no significant improvement of the agent
```

performance

```
0:01:09.058580
Run: 7 ------
Episode 100 Average Score: 12.68
Episode 200 Average Score: 9.489
Episode 300 Average Score: 9.35
Episode 400
             Average Score: 11.44
           Average Score: 10.56
Average Score: 10.35
Episode 500
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:09.524687
Run: 8 -----
Episode 100
              Average Score: 13.16
Episode 200 Average Score: 9.440
Episode 300 Average Score: 10.78
             Average Score: 10.10
Episode 400
Episode 500
              Average Score: 11.06
              Average Score: 11.06
Episode 501
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:10.632936
Run: 9 -----
Episode 100
              Average Score: 13.50
Episode 200 Average Score: 9.602
Episode 300 Average Score: 9.64
Episode 400 Average Score: 12.24
Episode 500
              Average Score: 13.10
Episode 501
           Average Score: 13.04
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:16.905350
Run: 10 ------
Episode 100
             Average Score: 12.52
             Average Score: 9.510
Episode 200
           Average Score: 9.91
Average Score: 11.69
Episode 300
Episode 400
Episode 500
             Average Score: 10.96
Episode 501
              Average Score: 10.96
Experiment ended because of bad results, no significant improvement of the agent
performance
0:01:11.477630
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Episode:
          1 Number of steps:
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          2 Number of steps:
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          8 Number of steps:
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wandb: GAMMA: 0.8240520440566869
wandb:
       LR: 8.655218080382826e-05
wandb: MAX_TRUNCATION: 0.9146610106262836
wandb: NUM_LAYERS: 4
wandb: NUM_NEURONS_EACH_LAYER: 90
wandb: UPDATE_EVERY: 28
wandb:
        a_TUNE: 0.3088172437060571
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
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Run: 1 -----
Episode 100 Average Score: 74.07
Episode 146
            Average Score: 195.51
Environment solved in 46 episodes! Average Score: 195.51
0:03:31.237168
Run: 2 -----
Episode 100
            Average Score: 31.37
Episode 175 Average Score: 197.07
Environment solved in 75 episodes! Average Score: 197.07
0:03:36.566699
Run: 3 -----
Episode 100 Average Score: 34.15
Episode 146 Average Score: 197.07
Environment solved in 46 episodes! Average Score: 197.07
0:03:29.213410
Run: 4 ------
Episode 100
            Average Score: 59.89
Episode 160 Average Score: 195.84
Environment solved in 60 episodes! Average Score: 195.84
0:03:22.472681
Run: 5 -----
Episode 100
            Average Score: 81.95
Episode 165 Average Score: 196.90
Environment solved in 65 episodes! Average Score: 196.90
0:03:30.565507
Run: 6 -----
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Episode 100 Average Score: 86.09 Episode 164 Average Score: 195.08

Environment solved in 64 episodes! Average Score: 195.08

0:03:31.447707

Run: 7 ------

Episode 100 Average Score: 106.55 Episode 146 Average Score: 195.41

Environment solved in 46 episodes! Average Score: 195.41

0:03:28.888794

Run: 8 -----

Episode 100 Average Score: 36.66 Episode 156 Average Score: 197.40

Environment solved in 56 episodes! Average Score: 197.40

0:03:34.279344

Run: 9 -----

Episode 100 Average Score: 128.94 Episode 122 Average Score: 196.40

Environment solved in 22 episodes! Average Score: 196.40

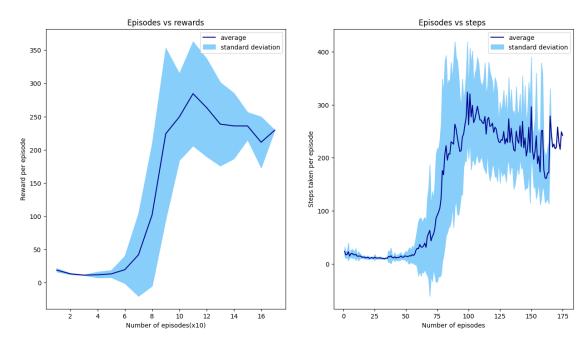
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Run: 10 -----

Episode 100 Average Score: 65.57 Episode 160 Average Score: 196.21

Environment solved in 60 episodes! Average Score: 196.21

0:04:35.210560



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Episode: 149 Number of steps: 210
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Episode: 153 Number of steps: 212
Episode: 154 Number of steps: 241
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Episode 200
               Average Score: 175.21
Episode 216
               Average Score: 195.06
Environment solved in 116 episodes!
                                     Average Score: 195.06
0:04:12.008166
Run: 2 -----
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Episode 200
               Average Score: 124.45
Episode 300
               Average Score: 169.98
Episode 400
               Average Score: 156.79
Episode 500
               Average Score: 143.47
```

Episode 501 Average Score: 143.36 Experiment ended because of bad results, no significant improvement of the agent performance 0:18:40.562141 Run: 3 -----Episode 100 Average Score: 12.90 Episode 179 Average Score: 196.88 Environment solved in 79 episodes! Average Score: 196.88 0:02:37.074267 Run: 4 -----Episode 100 Average Score: 13.99 Episode 167 Average Score: 196.61 Environment solved in 67 episodes! Average Score: 196.61 0:04:39.814245 Run: 5 ------Average Score: 13.60 Episode 100 Episode 192 Average Score: 196.62 Environment solved in 92 episodes! Average Score: 196.62 0:05:03.443618 Run: 6 -----Episode 100 Average Score: 13.34 Episode 200 Average Score: 197.19 Environment solved in 100 episodes! Average Score: 197.19 0:04:59.649063 Run: 7 ------Episode 100 Average Score: 11.59 Episode 200 Average Score: 102.26 Episode 244 Average Score: 195.10 Environment solved in 144 episodes! Average Score: 195.10 0:05:12.359473 Run: 8 -----Episode 100 Average Score: 13.04 Episode 200 Average Score: 100.41
Episode 300 Average Score: 170.82
Episode 400 Average Score: 156.12 Episode 500 Average Score: 145.53 Average Score: 145.50 Episode 501 Experiment ended because of bad results, no significant improvement of the agent performance 0:15:36.297018 Run: 9 -----Episode 100 Average Score: 12.43 Episode 182 Average Score: 196.03 Environment solved in 82 episodes! Average Score: 196.03 0:03:58.273264 Run: 10 ------

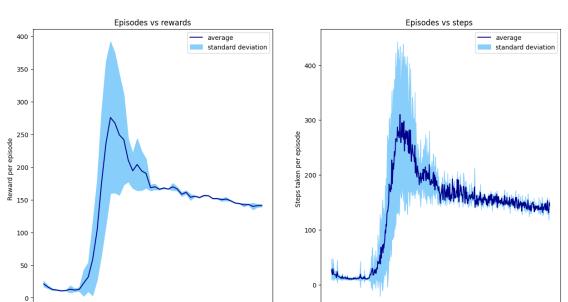
Episode 100 Average Score: 21.31

Episode 185 Average Score: 195.57
Environment solved in 85 episodes! Average Score: 195.57

30

Number of episodes(x10)

0:04:00.698185



300

Number of episodes

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Episode:
          1 Number of steps:
                               27
Episode:
          2 Number of steps:
Episode:
          3 Number of steps:
                               18
Episode:
          4 Number of steps:
                               29
Episode:
          5 Number of steps:
                               24
          6 Number of steps:
Episode:
                               19
Episode:
          7 Number of steps:
                                18
Episode:
          8 Number of steps:
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Episode:
          9 Number of steps:
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          10 Number of steps:
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          11 Number of steps:
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          13 Number of steps:
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          19 Number of steps:
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          22 Number of steps:
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Episode:
          23 Number of steps:
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          24 Number of steps:
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          25 Number of steps:
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          26 Number of steps:
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          27 Number of steps:
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          28 Number of steps:
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          31 Number of steps:
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          32 Number of steps:
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74
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          140 Number of steps:
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Episode:
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<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
```

```
wandb: Agent Starting Run: nagnrs03 with config:
wandb:
           BATCH_SIZE: 217
wandb:
          EPS_DECAY: 0.935763658373329
wandb:
          GAMMA: 0.8340435057709608
wandb:
          LR: 6.0746454412338274e-05
          MAX_TRUNCATION: 1.317568341594579
wandb:
wandb:
          NUM LAYERS: 2
wandb:
          NUM_NEURONS_EACH_LAYER: 128
wandb:
          UPDATE_EVERY: 20
wandb:
           a_TUNE: 0.3197148634006999
Failed to detect the name of this notebook, you can set it manually with the
WANDB_NOTEBOOK_NAME environment variable to enable code saving.
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Run: 1 -----
Episode 100
                Average Score: 12.62
Episode 200
                Average Score: 95.02
Episode 300
                Average Score: 138.70
Episode 400
                Average Score: 159.55
Episode 500
                Average Score: 165.88
                Average Score: 157.51
Episode 600
Episode 700
                Average Score: 164.84
Episode 800
                Average Score: 150.65
Episode 900
                Average Score: 147.86
                Average Score: 140.70
Episode 1000
Episode 1100
                Average Score: 147.13
Episode 1200
                Average Score: 141.73
Episode 1300
                Average Score: 150.09
Episode 1400
                Average Score: 149.22
Episode 1500
                Average Score: 151.74
                Average Score: 143.88
Episode 1600
Episode 1700
                Average Score: 158.40
Episode 1800
                Average Score: 154.34
Episode 1900
                Average Score: 161.95
Episode 2000
                Average Score: 152.50
Episode 2100
                Average Score: 139.18
Episode 2200
                Average Score: 146.48
Episode 2300
                Average Score: 172.85
Episode 2400
                Average Score: 165.34
Episode 2500
                Average Score: 179.30
```

Episode	2600	Average	Score:	175.07
Episode	2700	Average	Score:	167.90
Episode	2800	Average	Score:	153.85
Episode	2900	Average	Score:	147.11
Episode	3000	Average	Score:	154.39
Episode	3100	Average	Score:	150.92
Episode	3200	Average	Score:	144.88
Episode	3300	Average	Score:	141.33
Episode	3400	Average	Score:	146.81
Episode	3500	Average	Score:	137.64
Episode	3600	Average	Score:	137.87
Episode	3700	Average	Score:	140.28
Episode	3800	Average	Score:	143.62
Episode	3900	Average	Score:	144.12
Episode	4000	Average	Score:	140.73
Episode	4048	Average	Score:	139.88