Code Description

The main code is reported in the **Navigation.ypynb** file, which includes information about the requirements and at the beginning runs some code examples to get environment information.

The code used to train Agent is a simple value-based training algorithm knows as Deep Q-Network.

The package contains two additional files with **(model.py**, and **dqn_agent.py**) which contains the code for the model and the agent used for the training.

Deep Q-Network

The learning algorithm used is part of the Q-learning methods which uses a reinforcement learning method based on getting the maximum reward possible according to a set of SARSA episodes.

The denomination "Deep" is added due the fact that the algorithm instead of a Q-value table for maximizing its rewards, uses a Deep Neural Network.

Math behind the DQN: https://towardsdatascience.com/dqn-part-1-vanilla-deep-q-networks-6eb4a00febfb

Model Architecture

Input: 37 nodes (as many as the states)

FC Layer 1: 64 nodes

RELU activation

FC Layer 2: 64 nodes

RELU activation

Output: 4 nodes (as many as the actions)

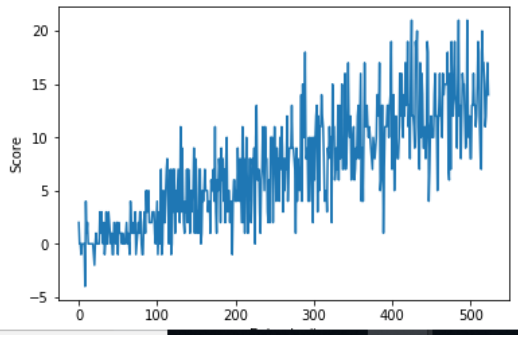
Chosen Params

state_size ***37*** || action_size ***4*** || randon seed ***40***

In [8]:
```
import time
timer_start = time.time() #Checking on training start time
scores = dqn(n_episodes=2000, max_t=1000, eps_start=1.0, eps_end=0.01, eps_decay=0.995) #training using
dqn
print("Training Time = {:.2f} min".format((time.time()-timer_start)/60))
```

```
Episode 100     Average Score: 0.97
Episode 200     Average Score: 4.32
Episode 300     Average Score: 7.02
Episode 400     Average Score: 9.83
Episode 500     Average Score: 12.58
Episode 524     Average Score: 13.00
Environment solved in 424 episodes!     Average Score: 13.00
Training Time = 7.32 min
```

In [9]:
```
# plot the scores
fig = plt.figure()
ax = fig.add_subplot(111)
plt.plot(np.arange(len(scores)), scores)
plt.ylabel('Score')
plt.xlabel('Episode #')
plt.show()
```



Future Developments

The vanilla DQN used for training the Agent works fine, but there is still room for improvements such as implementing: *a double DQN, a dueling DQN, and/or prioritized experience replay!*