**IT4060 – Machine Learning**

**Lab 10 – Q Learning**

For this you may need Ubuntu (or any Linux distribution) installed. If you don’t have Ubnutu, you may install VMPlayer first and then download the following Virtual Machine to run Ubuntu.

VM Player 12

<https://filehippo.com/download_vmware_player/75472/>

Ubuntu VM

<https://mysliit-my.sharepoint.com/:u:/g/personal/dharshana_k_sliit_lk/EW1f04rofDFEhS0Jf0jHmhgBSKYiZE5aovskGtYK324Sxw?e=Tzbbb6>

VM password - lab

**Setting up the environment**

To set up the Python notebook with the libraries to run the lab, we’ll use Docker. (Note that you don’t have to use docker and set up the environment manually. But docker makes it easy as you can run the notebook server (or any other software) as a server in a container (similar to a lightweight Virtual machine) without doing any manual configuration.

1. Run the VM and type the password ‘lab’ to login. (if you have already Ubuntu installed, you can skip this step)

2. Open the command shell using Ctrl+Alt+T

3. Download the docker image for the configured python notebook using the following command. This will download an image of the server to the local VM.

*sudo docker pull jaimeps/rl-gym*

Note: sudo password is also ‘lab’

This will download the docker image to the local docker registry from the remote docker repository.

4. Run the following command to check whether the docker image is downloaded.

*sudo docker images*

5. Run the following command to run the docker instance.

*sudo docker run --name rl -p 8888:8888 jaimeps/rl-gym*

Here ‘rl’is the docker instance name (you can give any name) and the first port is the port that you’ll use to access the docker instance. The second port is the docker instance’s internal port. The last argument is the image name (you have to use it).

6. Then the console will print a link similar to the following (may not be exactly the same). Right Click and select ‘Open link’ to run the python notebook with the necessary libraries to run the example.

<http://0.0.0.0:8888/?token=6f8d463940282ba9eed849f249737068b8dd068a5cdbe0b7>

**Running the example.**

Upload the attached python notebook file to the python notebook running in the VM (you may have to download the notebook file to the VM to do that). You may have to select ‘Restart and Run all cells option’ to run the example.

The example is explained in the following tutorial.

<https://www.learndatasci.com/tutorials/reinforcement-q-learning-scratch-python-openai-gym/>

You may uncomment the code in the commented ‘brute force method’ and comment the ‘reinforcement learning method’ to compare the performance of the two methods.

**Note:** You may reduce the number of epochs (iterations) if it’s taking too much time.

Add comments to explain each important line of the code.

Compare the results (Timesteps taken and penalities) of the two approaches (brute force vs reinforcement learning) and copy the results to a text file

**Submission.**

Upload the resulting comparison of the results (Timesteps taken and penalities) of the two approaches in a text file with the final notebook file. You may zip the two files into a single zip file. The zip file name should be the registration no.