Problems Page

Problem-1:
The openai gym library in my laptop was not compatible with python version 3.9 and was asking for python 3.7. I came up with 2 solutions
1. Try to install openai gym that is compatible with python 3.9 and work on the sample code
2. Try to install python 3.7 and run all the installations again.

Problem -2:
How to create a virtual environment for a particular version of python?
Solution:
1. A single laptop can have multiple versions of python
2. Use the command py -3.7 -m venv myenv. Here the 3.7 represents the version of python we need to work on and myenv is the name we need to give to the environment.

Problem -3:
Which version of Open AI gym works well with python 3.9?
Solution: It is said that version 0.26.2 and above would support python 3.9.

Problem -4:
If we lose pip in the virutal environment created then use the command python -m ensurepip --upgrade. Here ensurepip is a package that is available at the time of creating virtual environment which helps in installing pip.

Problem-1 Resolved Process:
The Problem-1 was resolved with option 1 from problem-1. The code given in the book was old hence had some changes to be made.
1. In the new version a render mode is always supposed to be given.
2. Give render_mode="human" so that we can see the animation happening.

Now that I have completed this first step I am going to upload all the related files onto github.

Challenge-6: From Here we are going more seriously so each and every aspect will be logged. I am trying to implement RL algorithm on a Breakout game for practice.

Problem-1: Tried calling the breakout environment using the same name 'Breakout Deterministic-v4' from the book and got an error saying there is no game environment named Breakout Deterministic.

Solution: Asked the chatGPT or bing to show me how to call the right environment.

Reason: The reason for asking chatGPT is that I had a hunch that maybe the name Breakout Deterministic might be outdated in the future updates.

Problem-2: I tried calling the environment with the new name 'ALE/Breakout-v5' but got an error saying no namespace ALE available.

Solution: When asked chatGPT what does the error mean it replied saying that I don't have a Atari related project downloaded for calling atari game environments.

I was successfully able to install the ALE (Arcade Learning Environment) and have also installed ROM's using autorom library. Once the autorom is installed run the command autorom in the command line for registering the rom and then we can successfully use the environment.

Challenge-2:
To create an agent and perform an action based on the input.

Challenge-2 is completed and related code is uploaded on github.

Challenge-3:
Try implementing a 2048 game environment. Since it is the main idea of the project.
1. Understand the action space
2. Play a sample game till the board is full or 2048 is achieved.

I have found a repository on github rgal/gym-2048: Open AI gym environment for the game 2048 (github.com).
This repository can be used to play 2048 but the grid is printed every time.

Problem-1:
Have to find a way to save all the moves in a document for better understanding.

Decision-1: I am going to use the github source given above to complete the project and at the end of the project I will try to find something better.

Problem - 2: Try to play the game by understanding the actions and giving them as inputs from the keyboard to the game.
This steps helps in improving the understanding of the action space of the game.

From the test it is clear that the action space is Discrete with 4 actions
0 - up
1 - right
2 - down
3 - left

Problem - 3: I will try to use 0,1,2,3 and repeat the order and see how many moves it takes to get the game done.
Done.

Note-1: Aparently, there is a library called universe that is related to OpenAI. It was released after gym and has the capability to adapt to various environments outside the gym and python.

Problem-4: Have to try to implement 2048 game using the universe.

Challenge-7: Try implementing openai universe.

Problem-1: Tried running a sample code and received an error saying no module named universe.

Solution: Install universe using the command 'pip install universe'.

Problem-2: Open AI universe is only available for python 2.7 and python 3.5.

Solution: I have to install python 3.5 and create a new environment using python 3.5

Problem-3: I was not able to find python 3.5 version.

Solution: The link below has many different .exe files of python versions. GitHub - adang1345/PythonWindows: Unofficial Python installers for Windows

Problem-4: When trying to install universe on windows I am getting an error saying fastzbarlight cannot be used for windows and the fastzbarlight is important library for universe.

Solution: I am trying to use docker and create an ubuntu environment and then create a virtual environment for python 3.5 and then try installing universe.

If the above method fails or the system becomes very slow then I have another idea. The idea is I have my old laptop with ubuntu but I forgot the password. I will try to reinstall ubuntu in it and then try to work on it again.

Problem-5: I have installed python3.5.10 on ubuntu. Now I have to create a virtual env and then install universe and try running the sample files.

Problem-6: How to create virtual environment on ubuntu?

1. Use the command 'python3.5 -m venv my_env' this creates the virtual environment on the name my_env in the folder required.
2. Use the command 'source my_env/bin/activate' to activate the environment.

Problem-7: I need an editor to write python scripts on ubuntu?

I have found an app that works same like VS Code called VS Codium which is a open source version of VS Code.
Below is the installation process
1. Use the command 'sudo snap install codium --classic'. Here snap is a package manager available inbuilt in ubuntu. --classic flag refers to installing a stable version of codium.

The task is still incomplete

Challenge - 4:
To work on developing agents.

Problem-1: Start developing basic understanding on question like
1. What is a Markov Decision Process?
2. What is the connection between Markov Decision Process and Reinforcement Learning?

Challenge-5:
Now that I have developed a decent understanding on MDP's I am going to learn using tensorflow with open AI.

Problem-1:
Tensorflow is very new to me and there are a lot of things to understand. For now, I am going to focus on using tensorflow along with Open AI. Once I am able to develop a application of reinforcement learning. I will look into learning more of the tensorflow by practising it on various applications.

Challenge-8:
As a part of achieving Challenge 7 I had to take the hard path of brining out my old laptop and reinstalling the ubuntu in it since I have forgot my password.
Upon installing upgrading the ubuntu to the latest 22.04 version which comes with default 3.10 version python.

In order to install python 3.5.10 I have followed following commands in the terminal of ubuntu
Step-1:
sudo apt-get install build-essential checkinstall
sudo apt-get install libreadline-gplv2-dev libncursesw5-dev libssl-dev libsqlite3-dev tk-dev libgdbm-dev libc6-dev libbz2-dev

From <https://askubuntu.com/questions/682869/how-do-i-install-a-different-python-version-using-apt-get>

Step-2:
I have created a new folder python and carried out following steps
cd /python
sudo wget https://www.python.org/ftp/python/3.5.10/Python-3.5.10.tgz

From <https://askubuntu.com/questions/682869/how-do-i-install-a-different-python-version-using-apt-get>

Step-3:
sudo tar xzf Python-3.5.10.tgz

From <https://askubuntu.com/questions/682869/how-do-i-install-a-different-python-version-using-apt-get>

Step-4:
cd Python-3.5.10
sudo ./configure
sudo make altinstall

From <https://askubuntu.com/questions/682869/how-do-i-install-a-different-python-version-using-apt-get>

Step-5:
Check the version to make sure by the command 'python3.5 --version'

Challenge - 9:
As implementing universe was becoming difficult in all aspects. I have found that there is a Gym environment for 2048. This environment has no graphical render. But, has a printed render.

Using the render I have developed a random agent in the file gametest.py
The random agent randomly selects the actions to be taken. But, in edge case scenarios it compares other the observations and proceeds accordingly.

Note: The agent is capable of playing a full game whether we win or not the board completely fills up.

Challenge - 10: I want to store the observations of each step in a file before that I want to separate the agent from environment.
1. To upload the code in github -- done
2. To separate the agent and environment -- done
3. To write a blog about the work.

Challenge - 11: I have developed a random agent so now I am going to focus on learning new algorithms and see how they work against the 2048 game. Feels like I am coming to an end on the project.

I am starting with Dynamic Programming from the book 'The Reinforcement Learning Workshop'.

While Studying I had one thought for metric evaluation for the 2048 game. i.e., To use all the developed agents for a fixed number of steps and then record the score achieved by each agent.

There are aparently few algorithms that can help in solving 2048 problems. I want to find how these algorithms are suitably but not the others?

Challenge 13:
I am trying to work on an example given in the book and the relate to my random agent work.

1. I have forgotten the main thing about the agents to receive reward. My random agent has nothing to do with rewards then there is no scope for growth.
I have an updated for an agent where:
1. The agent observes reward for all the moves in the present state and then takes action with the move that gives the highest reward.
2. The issue with creating such an agent is it will take a lot of time to complete the game.

Note: The agent is supposed to learn on its own by making mistakes. I as a programmer should not update the policy and create agents. The agent has to update the random policy that I have assigned to it based on the observations and rewards.

The issue in the note is so

So, Dynamic Programming can be used when we know all the details of an environment. Details like the transition probabilities etc.,

Hence, it is hard to use Dynamic Programming and algorithms like policy iteration and value iteration for our case of 2048 game.

Challenge - 14:
Reinforcement Learning Problem is a problem that can be conveyed as a MDP problem.

But, I have till now never tried to relate my 2048 game problem to a MDP which means that what ever the agent code I have written will never achieve the ability to solve the game.

So, my immediate challenge is to try making my 2048 game problem into a MDP step by step. i.e.,
1. Make a statement that satisfies the Markov Property
2. Updating the statement to Markov Chain
3. Further updating it to Markov Reward Process
4. Then reaching the final Markov Decision Process.