Artificial Intelligence Assignment #2

Due Date
- 2021-12-17 (Friday) 11:59pm

Programming Details
- Python 3
- There is no external library required for this assignment
- Possible to use any IDE (SublimeText, VS Code, Vim, …)

Grading Policy
- Win 0~4 levels = 100% (20% for each level)

Assignment Details
- Write an **Q-learning** agent to play **Pacman**
- **Ghost** : It follows the user if the user is nearby, otherwise move randomly
- **User** : It moves by your policy
- **Item** : User get a point when eat an item on the board
- **Score** :
    - Each move : -1
    - Eat item : +10
    - Win : +500
    - Lose : -500
- To win, you should eat every item before catched by ghosts
- If you catched by ghosts or make too many move, you will lose

Need to Do
- Modify a **next_pos_v3** function in **user.py** file to win all levels
- It is allowed to add any new class or function, but the **next_pos_v3** function is required
- Skeleton code of **Q-learning (v2)** and **Approximate Q-learning (v3)** are given
- You are not allowed to modify the other files

How to Test Your Code
- Change the **move=v2** and **level** in **main.py** file to test user policy
- It will train 1000 episodes and gives an step-by-step test episode
- There are 5 levels (0 ~ 4)

Need to Include

- Zip of your code. (**user.py** in **student_id.zip**)
- Please include only **user.py** file (do not make additional files)

Submission

- Submit your file in ETL → Assignment 2
- Zip your **user.py** into **student_id.zip** (ex: **2021-12345.zip**)

Late Submission Penalty

- Late submission is allowed, but there is a 20% point deduction per day up to a maximum of four days.

Download

- Python 3 : https://www.python.org/downloads/
- Alternatively, you can use **Anaconda** to install python.
  https://www.anaconda.com/products/individual-d#Downloads

Win	Lose

```
##########        ##########
#     #     #      #....#....#
# ## # ## #        #.##.#.##.#
#G## # ## #        #.##.#.##.#
# U.       #       #...   ....#
#### # ####        #### #.####
#          #       #... G....#
# ## #  # #        #.##U#. #.#
# ## # ## #        #.##.#.##.#
#     #    #       #....#....#
##########        ##########
| Score : 446 | Time : 54 |    | Score : 35 | Time : 5 |
...                            ...
========= Finish =========     ========= Finish =========
Total score : 955              Total score : -466
Total time : 54                Total time : 5
```