Lab 2: Playing OpenAI Gym Games

Reinforcement Learning with TensorFlow & OpenAI Gym
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Installation

TensorFlow is an Open Source Software Library for Machine Intelligence

OpenAI Gym

A toolkit for developing and comparing reinforcement learning algorithms. It supports teaching agents everything from walking to playing games like Pong or Go.

Read the launch blog post
View documentation
View on GitHub
Basic installation steps

- **Python**
- **TensorFlow**
  - `sudo apt-get install python-pip python-dev`
  - `pip install tensorflow` (or `pip install tensorflow-gpu`)
- **OpenAI Gym**
  - `sudo apt install cmake`
  - `apt-get install zlib1g-dev`
  - `sudo -H pip install gym`
  - `sudo -H pip install gym[atari]`
Basic installation - quick checking

hunkim@rl-hunkim:$ python
Python 2.7.12 (default, Nov 19 2016, 06:48:10)
[GCC 5.4.0 20160609] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> import tensorflow
>>> import gym

Questions: https://www.facebook.com/groups/TensorFlowKR/
Basic OpenAI Gym Environment

```python
import gym
env = gym.make("FrozenLake-v0")
observation = env.reset()
for _ in range(1000):
    env.render()
    action = env.action_space.sample() # your agent here (this takes random actions)
    observation, reward, done, info = env.step(action)
```
```python
class _Getch:
    def __call__(self):
        fd = sys.stdin.fileno()
        old_settings = termios.tcgetattr(fd)
        try:
            tty.setraw(sys.stdin.fileno())
            ch = sys.stdin.read(3)
        finally:
            termios.tcsetattr(fd, termios.TCSADRAIN, old_settings)
        return ch

inkey = _Getch()

# MACROS
LEFT = 0
DOWN = 1
RIGHT = 2
UP = 3

# Key mapping
arrow_keys = {
    '\x1b[A': UP,
    '\x1b[B': DOWN,
    '\x1b[C': RIGHT,
    '\x1b[D': LEFT
}
```
import gym
from gym.envs.registration import register
import sys, tty, termios

# Register FrozenLake with is_slippery False
register(
    id='FrozenLake-v3',
    entry_point='gym.envs.toy_text:FrozenLakeEnv',
    kwargs={'map_name': '4x4', 'is_slippery': False}
)

env = gym.make('FrozenLake-v3')
ext = env.step(action)  
env.render()  # Show the board after action

if done:
    print("Finished with reward", reward)
    break

while True:
    # Choose an action from keyboard
    key = inkey()
    if key not in arrow_keys.keys():
        print("Game aborted!")
        break

    action = arrow_keys[key]
    state, reward, done, info = env.step(action)
    env.render()  # Show the board after action

    if done:
        print("Finished with reward", reward)
        break
Game play


* run in terminal. Keyin does not work in PyCharm!
Frozen Lake World (OpenAI GYM)

Agent

(1) env.step(action)

(2) state, reward, done, info

env = gym.make ('FrozenLake-v3')

Environment
NEXT: Try Frozen Lake Real Game?
Next
Q-learning (Table)