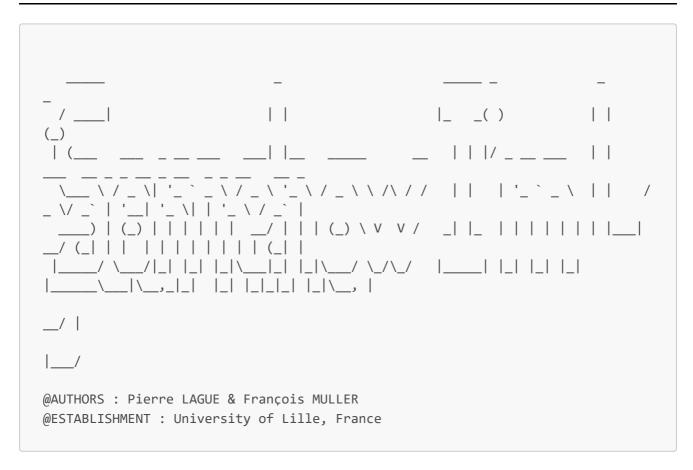
SomehowImLearning



Welcome,

This repository aims to demonstrate the efficiency of known reinforcement learning algorithms on hard-coded environments.

It is an initiative of the authors following the class "Reinforcement Learning" led by Pr. Philippe Preux at the University of Lille.

The key points to remember from this repository:

- explicitely coded algorithms and environments
- easy use
- insights on the performance of the algorithms on the environments compared to state-of-the-art models
- we're just two chill guys coding stuff and somehow it's working

Explanation of the structure

TODO: once we have all of our programs (algo, models, results) we use the tree command and describe each of the folders or files

Introduction to the algorithms

TODO: short context to markovian decision problems

TODO: short introduction to each algorithms (math ++?)

N.B: take it chronologically (markovian decision problems, discretized q learning, tabular q

learning, continuous NFQ, DQN, Direct policy, etc.)

How to use the repo

The root

At the root of the repository, you will find two python scripts simulation_car.py. This script simulates
the an environment with a specific model, for a certain amount of time. (e.g. python
simulation environment.py <env name> <model name> <simulation time>).

- For the car simulation :
 - o it ends once the car has gotten a positive result
 - o you can monitor its speed, reward, position and movements on the hill
- For the pendulum simulation :
 - o it lasts a certain time (cli argument)
 - o you can monitor rewards, angular position, angular velocity, actions

The algorithms/environments folder

In this folder you will find an implementation of each of our environments. The structure of the environment is purely indicative, but change it and the programs wont work so good after that. We tried to make it as general as possible (define your envs features and at least a reset and a step function).

We highly encourage you to try and develop new environments (and visualisations if you want) and then open an issue to inform us.

TODO: litteraly the rest

Results for now

NFQ (offline)

Car Environment

• *Setup 1*:

PROFESSEUR: M.DA ROS

- o nb_episodes: 10
- o episodes_per_iter: 200
- evaluation_episodes: 10
- o gamma: 0.99
- o Ir: 0.001
- hidden layers: (5, 5)

- Training Time: 544.59 seconds (~9min)
- Iterations to first success: 17
- o model:nfq_car_model_10_ep.pkl

Pendulum Environment

- *Setup 1*:
 - o nb_episodes: 150
 - o episodes_per_iter: 5000
 - o evaluation_episodes: 10
 - o gamma: 0.99
 - o Ir: 0.001
 - hidden_layers: (5, 5)
 - Training Time: 140.84 seconds (~2min30)
 - o model:nfq_pendulum_model_150_ep.pkl

DQN (online)

Car Environment

- *Setup 1*:
 - o nb_episodes: 500
 - o iterations_per_ep: 200
 - o target_network_update: 5
 - o gamma: 0.99
 - o Ir: 0.001
 - hidden_layers: (5, 5)
 - o epsilon_decay: 0.9995
 - Training Time: 402.24 seconds (~7min)
 - Iterations to first success: 17
 - o model:dqn_car_500_ep.pth

Pendulum Environment

- *Setup 1*:
 - o nb_episodes: 50000
 - o iterations_per_ep: 5000
 - o target_network_update: 5
 - o gamma: 0.99
 - o Ir: 0.001
 - hidden_layers: (5, 5)
 - o epsilon_decay: 0.9995
 - Training Time: 305.56 seconds (~5min)
 - o model:dqn_pendulum_50000_ep.pth