Assignment on
"Deep Reinforcement Learning and Application to the Intrusion Response Case"

To be completed by July 24th, 2023

Consider the following extension to the Taxi-v3 environment provided by OpenAI gym: the Taxi car has a fuel tank that can hold up to 10 (discrete) gallons of fuel.

- When a new episode starts, the fuel tank contains a random amount of fuel (any discrete number from 1 to 10).
- There is at least one gas station at distance 1 from the taxi.
- There are at least 4 other gas stations in random positions on the map, totaling 5 gas stations.
- Every move of the taxi requires 1 gallon of fuel.
- When the taxi is in a position with a gas station, it can decide whether to make gas or to keep on going. If the decision is to make gas, the tank is completely replenished.
- If the tank is empty, the episode terminates with a penalty.

The student is required to:

- Design and develop such extension and train an agent on it using Q-Learning
- Write a short report (2 to 4 pages) explaining how the extension was designed and comparing the experimental results (feasibility of the problem, time to reach convergence, observed behavior) obtained by using the new environment with those obtained with the Taxi-v3 environment.