CAP5625 - Introduction to Robotics
Project 2: Reinforcement Learning for Mixing
Part 2: Q-Learning

In this project, the objective is to create a Reinforcement Learning agent capable of efficiently mixing two different types of objects uniformly within a container. Your current task is to implement the Q-Learning algorithm to achieve this goal.

Task:

The action space, state space, and reward function has been decided by you in the prior phase. Your task is to modify the provided Python code to implement the Q-Learning algorithm including:
- Initialize Q-table by all zeros. It is a matrix that has the number of states as rows and number of actions as columns, i.e. a *states* x *actions* matrix.
- Train the Q-learning model and update the Q-table.
- Once the model is trained, use the Q-table to decide which action to take. For any state, choose the action with the highest Q value.
- Other necessary steps

Submission:

- Submit your training code
- Submit a video that shows mixing of the objects after you run your code
- Submit a text file containing the reward of each episode in the training
- Submit your test script of using the learned Q-table. If you Q-table is saved in another file, include that file
- Submit a .txt file with the following results:
  - How many times the objects were mixed successfully in 10 trials if you choose action randomly and how long they took?
  - How many times the objects were mixed successfully in 10 trials if you choose action based on Q-learning and how long they took?