Task: Implementing Q-Learning in a Hybrid Approach

You will work in teams of up to **3** members to complete the following task. Your objective is to implement Q-Learning in two environments: one custom-built and one using a standardized library (gym). You will also prepare a PowerPoint presentation summarizing your work and findings. To be Presented in the LAB

Additionally, you will upload your model to Hugging Face and a video of your agent across the environment.

What to do

Part 1: Build a Custom Gridworld Environment

1. **Create a 5x5 Gridworld**:
    - Define the start state at (0, 0) and the goal state at (4, 4).
    - Place obstacles at positions like (2, 2) and (3, 3).
2. **Set Rewards**:
    - Goal: +100
    - Obstacle: -10
    - Each step: -1
3. **Implement Q-Learning**:
    - Initialize a Q-table.
    - Use the Bellman equation to update Q-values.
    - Implement an epsilon-greedy policy for action selection.
4. **Train and Test**:
    - Train the agent over multiple episodes.
    - Visualize the learned policy (optimal path).

Part 2: Use a gym Environment

1. **Choose and Set Up the MountainCar-v0 Environment**:
    - Use MountainCar-v0 from the gym library.
    - In this environment, the agent must learn to drive a car up a steep hill, requiring it to learn to balance and gather enough speed to reach the goal.
2. **Understand the Environment**:
    - Visualize it using env.render().
    - Check the state and action spaces.
3. **Implement Q-Learning**:
    - Adapt your Q-Learning code from Part 1 to work with the MountainCar-v0 environment.
4. **Train and Test**:
    - Train the agent over multiple episodes.
    - Visualize and evaluate the learned policy.

Deliverables

1. **Presentation**: Prepare a PowerPoint (up to 6 slides) covering:
    - Task overview and approach.
    - Findings from the custom Gridworld.
    - Findings from the MountainCar-v0 environment.
    - Comparative analysis of performance.
    - Challenges and insights.
2. **Model Upload**:
    - Upload your trained model to Hugging Face, including the code and the environment settings.