

Group ID: 1

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Overview

Our project focuses on the Gymnasium CarRacing environment, which is built on Box2D—a 2D physics engine for games. In this environment, a random racing track is generated each episode, and the objective is to train an agent to drive through the entire track successfully. The project aims to apply both **tabular reinforcement learning** and **function approximation methods** to this environment and perform a comparative analysis between their performance.

The action space in CarRacing can be either **continuous** or **discrete**. In the continuous version, the action is a 3-dimensional vector: steering (ranging from -1 to 1), gas (0 to 1), and brake (0 to 1). The discrete version includes five predefined actions: 0 = do nothing, 1 = steer left, 2 = steer right, 3 = gas, and 4 = brake. The observation space is a 96x96 RGB image representing the top-down view of the track and the car.

The final deliverables will include a Jupyter Notebook containing the implementation, a written analysis comparing the two RL approaches, and a discussion with conclusions about their strengths, weaknesses, and applicability in continuous control environments.