Reinforcement Learning for Self Driving Racing Car Games

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Abstract : This research aims to create a reinforcement learning agent capable of racing in challenging simulated environments with a low collision count. We present a reinforcement learning agent that can navigate challenging tracks using both a Deep Q-Network (DQN) and a Soft Actor-Critic (SAC) method. A challenging track includes curves, jumps, and varying road widths throughout. Using open-source code on Github, the environment used in this research is based on the 1995 racing game WipeOut. The proposed reinforcement learning agent can navigate challenging tracks rapidly while maintaining low racing completion time and collision count. The results show that the SAC model outperforms the DQN model by a large margin. We also propose an alternative multiple-car model that can navigate the track without colliding with other vehicles on the track. The SAC model is the basis for the multiple-car model, where it can complete the laps quicker than the single-car model but has a higher collision rate with the track wall.