Simulating Multi-Car Racing Environment with Reinforcement Learning

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A Racing Model Focused on Team-Based Strategy

Presented By:
Akshat Singh (20031)
Ananya Gandhi (20319)
Chinmay Mundane

Introduction

- Most RL models for car racing focus on optimizing one car or one driver in isolation.
- Popular models simulate individual car behavior and race strategy, aiming to maximize the performance of that single car.
- In multiple racing tournaments like FIA World Endurance Championship, Deutsche Tourenwagen Masters, Super GT etc. manufacturers enter with multiple cars.
- Each manufacturer tries to maximise their team ranking instead of focusing on just one car.

Goal:

- **Team-Based Racing Simulation:** Our goal is to create a multi-agent RL environment where each team consisting of two cars competes.
- The team wins if any one of its cars finishes first.
- This model will emphasize teamwork, coordination, and collective strategies.

How do we simulate:

- There is a paper on the single agent variant of car racing: Deep Latent Competition: Learning to Race Using Visual Control Policies in Latent Space
- The paper provided an environment for training the model.
- There is a fork of the paper available that has applied various reinforcement learning algorithms: multi_car_racing.
- We will use this fork, tune it slightly for multi-agent model, and test it on these various applied algorithms like PPO, A3C, DQN, etc.