DroneRL: A Community Project for Real World Drone Learning in Simulated Environments

The advent desire for improved robot autonomy has caused a boom in developing, and sharing, deep reinforcement learning environments. End-to-end development requires connecting several hardware and software components needed for training, evaluating, comparing, and sharing such environments.

I have developed a modulated Python library designed to ease the burden of such tasks. The presented Drone Reinforcement Learning (DroneRL) library is designed so users can interchange packaged and custom components such as drone environments, sensors, observation spaces (multi-modal, single-modal, and temporal), action spaces (discrete and continuous), reward functions, learning algorithms, and others. The novelty of this approach is the end-to-end development with custom user components, which will automatically work with both built-in and other user-shared components. This library is a robust foundation of which I am building my thesis, brick by brick, which requires the flexibility that DroneRL provides. I have demonstrated it's end-to-end utility with both in-house and third-party components such as Microsoft AirSim, Unreal Engine, Stable-Baselines3, OpenAI Gym, and the DJI Tello SDK. Current research is underway that uses DroneRL to develop efficient navigation algorithms which optimize power consumption and exploit a variable, dynamic multimodal sensor array.

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This research is supported by the National Science Foundation grant (DUE-1930546) and the Computational Science Research Center (CSRC) at San Diego State University.