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An Approach to Autonomous Drones Using Deep Reinforcement Learning and Object Detection

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Abstract : Presently, there are few cases of complete automation of drones and its allied intelligence capabilities. In essence, the potential of the drone has not yet been fully utilized. This paper presents feasible methods to build an intelligent drone with smart capabilities such as self-driving, and obstacle avoidance. It does this through advanced Reinforcement Learning Techniques and performs object detection using latest advanced algorithms, which are capable of processing light weight models with fast training in real time instances. For the scope of this paper, after researching on the various algorithms and comparing them, we finally implemented the Deep-Q-Networks (DQN) algorithm in the AirSim Simulator. In future works, we plan to implement further advanced self-driving and object detection algorithms, we also plan to implement voice-based speech recognition for the entire drone operation which would provide an option of speech communication between users (People) and the drone in the time of unavoidable circumstances. Thus, making drones an interactive intelligent Robotic Voice Enabled Service Assistant. This proposed drone has a wide scope of usability and is applicable in scenarios such as Disaster management, Air Transport of essentials, Agriculture, Manufacturing, Monitoring people movements in public area, and Defense. Also discussed, is the entire drone communication based on the satellite broadband Internet technology for faster computation and seamless communication service for uninterrupted network during disasters and remote location operations. This paper will explain the feasible algorithms required to go about achieving this goal and is more of a reference paper for future researchers going down this path.

Keywords : convolution neural network, natural language processing, obstacle avoidance, satellite broadband technology, self-driving
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