

## Obstacle Avoidance Using Image-Based Visual Servoing Based on Deep Reinforcement Learning

**Authors :** Tong He, Long Chen, Irag Mantegh and Wen-Fang Xie

**Abstract :** This paper proposes an image-based obstacle avoidance and tracking target identification strategy in GPS-degraded or GPS-denied environment for an Unmanned Aerial Vehicle (UAV). The traditional force algorithm for obstacle avoidance could produce local minima area, in which UAV cannot get away obstacle effectively. In order to eliminate it, an artificial potential approach based on harmonic potential is proposed to guide the UAV to avoid the obstacle by using the vision system. And image-based visual servoing scheme (IBVS) has been adopted to implement the proposed obstacle avoidance approach. In IBVS, the pixel accuracy is a key factor to realize the obstacle avoidance. In this paper, the deep reinforcement learning framework has been applied by reducing pixel errors through constant interaction between the environment and the agent. In addition, the combination of OpenTLD and Tensorflow based on neural network is used to identify the type of tracking target. Numerical simulation in Matlab and ROS GAZEBO show the satisfactory result in target identification and obstacle avoidance.

**Keywords :** image-based visual servoing, obstacle avoidance, tracking target identification, deep reinforcement learning, artificial potential approach, neural network

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