Q-Learning-Based Path Planning Approach for Unmanned Aerial Vehicles in a Dynamic Environment

Authors : Raja Jarray, Imen Zaghbani, Soufiene Bouallègue

Abstract : Path planning for Unmanned Aerial Vehicles (UAVs) in dynamic environments poses a significant challenge. Adapting planning algorithms to these complex environments with moving obstacles is a major task in real-world robotics. This article introduces a path-planning strategy based on a Q-learning algorithm, which enables an effective response to avoid moving obstacles while ensuring mission feasibility. A dynamic reward function is introduced, causing the UAV to use the realtime distance between its current position and the destination as training data. The objective of the proposed Q-learning-based path planning algorithm is to guide the drone through an optimal flight itinerary in a dynamic, collision-free environment. The proposed Q-learning-based UAV planner is evaluated considering numerous commonly used performance metrics. Demonstrative results are provided and discussed to show the effectiveness and practicability of such an artificial intelligencebased path planning approach.

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