Automatic Landmark Selection for Visual Autonomous UAV Navigation

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Abstract

Several Computer Vision Autonomous UAV Navigation Systems have been studied and proposed in recent literature, in order to overcome the navigation in GPS-denied areas. One of those systems is based on the recognition of specific landmarks on the UAV route. Previous works, though, have used artificial landmarks and real landmarks selected by a human operator for the navigation. The selection of the landmarks has a significant influence in the results for the recognition, and the human selection may not necessarily be good landmarks for the computer vision system. This work, then, aims to develop an algorithm that automatically selects landmarks on an image of the flight route that can be more easily recognized by the Landmark Recognition System. The criterion to select a landmark is based on features detected by ORB or AKAZE. Those features are then separated in clusters by their position in the image, using a proposed self-adaptive spatial clustering algorithm, which was built by modification on the X-Means algorithm.

Keywords: Landmark, Feature Detection, UAV, Computer Vision, Autonomous Navigation, X-Means, Clustering

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