

Towards generation of effective 3D surface models from UAV imagery Using Open Source

Tools

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Abstract:

There has been increase popularity in large scale mapping for deriving the 3D surface and elevation models of the earth and building structures. The techniques of computer vision comprising feature detections and matching and photogrammetry play important roles in deriving near accurate 3D reconstruction of scenes from 2D images. The image captured by the UAVs being very high resolution in nature, there is need for more sophisticated processing and analyzing of the imagery to generate 3D models and other useful imagery products. The open source based softwares are excellent tool for research and can be modified or changes best suited specific to our model since specific or combinations of algorithms behaves differently based on nature of UAV image scene to be process. Despite many algorithms available for performing the feature extractions from images, little study has been done to identify the suitable detector algorithms to be used based on the nature of image or scene UAV captures. An attempt has been made to understand and analyse the suitability of feature detection and descriptors algorithms for different scene types. This paper also describes the popular technique called Structure from Motion process pipeline for sequential processing of UAV images with high overlapping which involves the estimation of 3D point clouds from the keypoints correspondences. The relative accuracy of the 3D point cloud derived from our approach is comparable with similar output from other state-of-the-art UAV processing systems and found to be matched with high precision.

Keywords: UAV, Open Source, Remote Sensing, 3D reconstruction, Point Clouds, Structure from Motion