Riverbed Grain Size Analysis using UAV Images Techniques

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Abstract: Grain size of riverbed is an important indicator of river morphology. It is possible to estimate the roughness of riverbeds by surveying grain size, distribution, and type. However, the most current method to derive the roughness is manual measurement which is time-consuming and restricted in a small region. On the other hand, with the development of Unmanned Aerial Vehicle (UAV) techniques, the acquisition of high quality spatial information becomes more efficient and low cost. In this study, digital images collected by UAV were used for estimating the grain size of riverbeds. The technique for image classification was proposed by texture analysis and spectral analysis. Texture analysis using Gray-Level Co-Occurrence Matrix (GLCM) and image processing techniques for grain size analysis using Granulometry were both implemented. The results show that the accuracy of image classification achieved more than 80% and varied grain size at different sections in a riverbed can be identified by the proposed approach. Consequently, regions of riverbeds which grain size distribution and manning coefficient have been computed. An efficient technique for analyzing the grain size and thus the morphology of a river becomes available, providing important information of hydrological simulation.

Keywords: Grain size, Unmanned Aerial Vehicle (UAV), image processing, Gray-Level Co-Occurrence Matrix (GLCM), Granulometry