Topographic mapping using Unmanned Aerial Vehicle Images Integrated with Aerial Photograph and Satellite Images by Point Cloud Generation

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Abstract: The objectives of this study are to investigate the accuracy and methods of point cloud generation using unmanned aerial vehicle (UAV) and aerial photograph images by Agisoft PhotoScan software. This software is use point cloud for processing images. Main features of this software are automatic camera calibration, automatic tie-point search, aerial triangulation and block adjustment; 3D model generation and export in TIN formats. Furthermore, the information needs using this software during processing data are photo images, ground control points and coordinate system. Unmanned Aerial Vehicle or UAV is extensively applied in various fields such as military applications, archaeology, agriculture and scientific research. This study focuses on topographic mapping and map updating. UAV is one of the alternative ways to ease the process of acquiring data with lower operating cost, low manufacturing and operational costs of the system, and easy to operate. Furthermore, UAV images will be integrated with QuickBird and aerial photograph images that are used as based maps. The main purpose of using UAV image is as a replacement for cloud covered area which normally exists in aerial photograph and satellite image, and for updating topographic map. In this study, ground control points (GCPs) and check points (CPs) were established using real time kinematic Global Positioning System (RTK-GPS) technique. Analyses from this study include qualitative and quantitative assessment. Quantitative assessment is carried out by calculating root mean square error (RMSE). The outputs of this study are orthophoto, contour and digital elevation model (DEM).

Keywords: point cloud, topographic mapping, accuracy, UAV, aerial photograph, satellite images