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3D DEM generation from digital aerial photographs considering the influence of vegetation

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High-resolution topographic data has been generated in Japan according to development of surveying technique. In particular, DEM (Digital Elevation Model) made from LiDAR data is used in various fields. However, topographic data of mountain area is lower in accuracy than that of plain since LiDAR survey is not conducted well in mountain area. Therefore, there are few maps which micro-topography such as scarp or crack is correctly represented on (ex. Yagi et al., 2003; Sato et al., 2004).

Recently, combined technique of Sfm (Structure from motion) and MVS (Multi-View Stereo) has applied to generation of DEM from digital aerial photographs (ex. Uchiyama et al., 2014). Using this technique, we try to generate 3D DEM from GSI digital aerial photographs. One of the most important problems is to remove vegetation from 3D model. In order to minimize the error of removing, we select Kiso Mountain Range as a test field.

The method of this study includes extraction of vegetation area, mask of vegetation area of aerial photographs and, generation of DEM using Sfm-MVS software. NDVI (Normalized Difference Vegetation Index) is an index which is often used to extract vegetation from satellite image. In order to extract vegetation not from satellite image but from digital aerial photographs, an index 2G_RBi (Richardson et al., 2007) is introduced. Correlation between NDVI and 2G_RBi are calculated from Landsat satellite image and threshold between vegetation and the others is decided. After masking vegetation area in aerial photographs, ortho photo and 3D DEM are generated using Agisoft PhotoScan.

In this presentation, we will discuss the DEM and its precision.

Keywords: digital aerial photograph, DEM, ortho image, vegetation, NDVI