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UAV Data Processing for Large Scale Topographical Mapping

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Abstract. Large scale topographical mapping in the third world countries is really a prominent challenge in geospatial industries nowadays. On one side the demand is significantly increasing while on the other hand it is constrained by limited budgets available for mapping projects. Since the advent of Act Nr.4/yr.2011 about Geospatial Information in Indonesia, large scale topographical mapping has been on high priority for supporting the nationwide development e.g. detail spatial planning. Usually large scale topographical mapping relies on conventional aerial survey campaigns in order to provide high resolution 3D geospatial data sources. Widely growing on a leisure hobby, aero models in form of the so-called Unmanned Aerial Vehicle (UAV) bring up alternative semi photogrammetric aerial data acquisition possibilities suitable for relatively small Area of Interest (AOI) i.e. <5,000 hectares. For detail spatial planning purposes in Indonesia this area size can be used as a mapping unit since it usually concentrates on the basis of sub district area (kecamatan) level. In this paper different camera and processing software systems will be further analyzed for identifying the best optimum UAV data acquisition campaign components in combination with the data processing scheme. The selected AOI is covering the cultural heritage of Borobudur Temple as one of the Seven Wonders of the World. A detailed accuracy assessment will be concentrated within the object feature of the temple at the first place. Feature compilation involving planimetric objects (2D) and digital terrain models (3D) will be integrated in order to provide Digital Elevation Models (DEM) as the main interest of the topographic mapping activity. By doing this research, incorporating the optimum amount of GCPs in the UAV photo data processing will increase the accuracy along with its high resolution in 5 cm Ground Sampling Distance (GSD). Finally this result will be used as the benchmark for alternative geospatial data acquisition in the future in which it can support national large scale topographical mapping program up to the 1:1.000 map scale.

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