Using Thermal Images to Build-up Digital Surface Temperature Model

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Abstract: Thermal infrared (TIR) images show different energy reflection condition of objects, which differ from visible light and near infrared light. Since thermal sensor could collect radiative energy of object in day and night, and present quantitative data in thermal image. Therefore, a suitable representation of temperature information has been the primary motivation of the study.

Temperature change can be considered an important characteristic in natural environment. So TIR images can be used in many aspects, such as volcanic landform monitoring, urban development, and disaster prevention. Nowadays, close range TIR images with high spatial resolution can be acquired, by using low cost and high mobility area based thermal sensor. It can provide better analysis and interpretation results than low spatial resolution platforms, for instance satellite or airplane-based TIR images.

However, TIR images only provide two-dimensional temperature information, but lacking of elevation data at each object space location. This causes analysis, such as volcanic monitoring, which needs both temperature and elevation hard to implement. Hence, this research focused on combining surface temperature and digital surface model (DSM), and presenting a visualized result. Firstly, the simulated experimental area was settled with various materials and height. Secondly, temperature control points were placed within the area for geo-referencing. The preliminary result shows, visualization of surface temperature and elevation of the experimental area can be provided simultaneously in 3 dimensional spaces.