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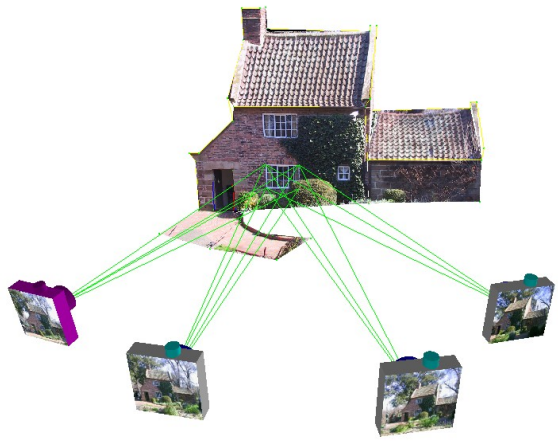

Recent developments in photogrammetric orientation of close-range image networks and high-resolution satellite imagery

Dr. Clive Fraser

This talk overviews recent research work in photogrammetry being undertaken at the University of Melbourne. The focus of the presentation is upon developments in high-precision sensor orientation and calibration in both close-range photogrammetry and for high-resolution satellite imagery.

In regard to close-range photogrammetry, fully automatic orientation and sensor calibration has been routinely applied for more than a decade, but only in structured networks, namely those utilizing either artificial targets or narrow baseline image configurations. Structure-from-motion (SfM) concepts developed in computer vision are now finding application within photogrammetry, but utilization of SfM approaches can prove problematic when metric integrity within the 3D measurement process has to be assured. The presentation will address automated orientation and calibration, and the potential of SfM models for close-range photogrammetry. Concepts will be illustrated via software demonstrations.

Ground control points (GCPs) are essential in the georeferencing of high-resolution satellite imagery in instances where 1-pixel and even sub-pixel accuracy is sought. Basically, GCPs allow for the compensation of biases within the attitude sensors (star trackers) on the satellites and they are needed irrespective of whether a rigorous orientation model or an empirically derived model such as rational functions is employed. However, the establishment of GCPs is an expensive operation, especially for multi-scene georeferencing. In order to overcome this problem, a new long-strip orientation technique has been developed, whereby the orbit and attitude parameters within a single strip of imagery can be adjusted using as few as four GCPs, irrespective of the length of the strip. Moreover, tie points between adjacent images in the strip are not needed. Pixel-level georeferencing accuracy is then possible for very long strips of images (eg >20 scenes) with just a few GCPs at each end of the strip. The developed sensor orientation model for long-strip adjustment will be overviewed and the results of tests with both Quickbird and ALOS PRISM HRSI will be reviewed.

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Carlson Auditorium, Center for Imaging Science (Bldg. 76)