Comparative Study on Four Algorithms for Dense Matching of Aerial Images

Yen-Ting Lee[1]   Jaan-Rong Tsay[2]

[1]*Graduate Student, Department of Geomatics, National Cheng Kung University*
1 University Road, Tainan 70101, Taiwan, nm1377@yahoo.com.tw
[2]*Associate Prof., Department of Geomatics, National Cheng Kung University*
1 University Road, Tainan 70101, Taiwan, tsayjr@mail.ncku.edu.tw

Firstly, this paper will propose an integrated algorithm for densely matching aerial images, in which both the tensor voting method and the SIFT approach developed in NCKU are integrated with the aid of dense object points acquired by airborne LiDAR. Also, another three algorithms for dense matching of aerial images are to be adopted in this study, and they are (1) Photosynth, namely a free software developed by Microsoft and University of Washington, (2) Pix4UAV, namely a commercial software, and (3) the SIFT approach for densely matching multiple images developed in NCKU. The afore-mentioned four algorithms will be compared with respect to their dense matching performance inclusive of four issues: (1) accuracy, (2) reliability, (3) point density and (4) computation speed. This study adopts some aerial images covering a test field with high accuracy of check points. Error detection on their matching results will be done either by bundle block adjustment or relative orientation computation. The rate of successful matching will be assessed and analyzed. After blunder detection and deletion, the accuracy of the final matching results will be evaluated by means of those ground check points. Some statistical figures will be used to illustrate the quality and efficiency of these four dense matching algorithms. Also, conclusions will be drawn.

Keywords: aerial images, dense matching, tensor voting, SIFT, Photosynth, Pix4UAV