OPTIMAL FEATURE MATCHING FOR 3D RECONSTRUCTION BY COMBINATION OF GLOBAL AND LOCAL INFORMATION

SHENGYONG CHEN 1, ZHONGJIE WANG 2, HANYANG TONG 1, SHENG LIU 1, BEIWEI ZHANG 3

1 College of Computer Science
Zhejiang University of Technology
Hangzhou, China

2 International Max Planck Research School for Computer Science
Saarbruecken, Germany

3 School of Information Engineering
Nanjing University of Finance and Economics
Nanjing, China

Email: sy@ieee.org

ABSTRACT—For feature matching in 3D computer vision, there are two main kinds of methods, i.e. global-based and local-based algorithms. Although both have achieved some useful results, they still have own disadvantages. This paper proposes a novel method which combines the global and local information as much as possible so that it can take both advantages. A series of sub-pixel window correlation method is employed with the guidance of fronto-parallel result to produce some local results. These local results are then repeatedly merged by quadratic pseudo-boolean optimization under the guidance of global information. After several sub-pixel local optimizations, the error rates at high resolution are tremendously reduced. When combining the global and local traits together, the third step optimization can both reduce the low resolution error as well as keep high-accuracy resolution error low. Compared with other existing algorithms, the proposed approach performs well when the scene is comprised with planar or curved surfaces. Practical experiments are carried out in this research to illustrate the method and typical results.

Key Words: Graph cut, computer vision, disparity, stereo vision, image matching, QPBO, 3D reconstruction