Comparison of Normalized Cross Correlation and Mutual Information for Feature Line Matching

Jou-Yu Yen[1] and Liang-Chien Chen [2]

[1] *Special Assistant, Center for Space and Remote Sensing Research, National Central University, No.300, Jhongda Rd., Jhongli City, Taoyuan County 32001, Taiwan, E-mail: yenjouyu@gmail.com*

[2] *Professor, Center for Space and Remote Sensing Research, National Central University, No.300, Jhongda Rd., Jhongli City, Taoyuan County 32001,Taiwan, E-mail: lcchen@csrsr.ncu.edu.tw*

Abstract: Reliable line matching is beneficial for building reconstruction, because the most objects are mainly composed of line segments along boundaries. In matching procedure, the matching index is used to assess the similarity of feature lines among images. Two common matching indices, Normalized Cross Correlation (NCC) and Mutual Information (MI), are employed respectively in this study. Considering that the brightness of the image may vary due to lighting and exposure conditions, NCC evaluate the similarity via calculating the cross correlation with normalization between images. On the other hand, MI is a measure of the images' mutual dependence by computing the entropy. The purpose of this study is to match feature lines with these two indices, and their utility for line matching would be discussed.

The matching method in this study includes three steps: (1) straight line extraction, (2) interest and candidate line selection, and (3) similarity assessment. Since the target in this study is straight line, we detect the edge first followed by the extraction of the line feature in the first step. After the extraction, the selection of interest lines and candidate lines are implemented on master and slave images, respectively. Thus, the strategy that compares the similarity of line neighboring regions is employed for line matching. The experimental results indicate that the proposed method can reach reliable results.

Keyword: Normalized Cross Correlation, Mutual Information, Feature Line Matching