

BLOB FEATURE EXTRACTION FOR AERIAL IMAGES USING WAVELET TRANSFORM

Pei-Chi Huang¹, Pai-Hui Hsu²

*¹Department of Civil Engineering, National Taiwan University,
No. 1, Sec. 4, Roosevelt Road, Taipei, 10617 Taiwan, r01521115@ntu.edu.tw*

*²Department of Civil Engineering, National Taiwan University,
No. 1, Sec. 4, Roosevelt Road, Taipei, 10617 Taiwan, hsuph@ntu.edu.tw*

Abstract: With the development of technology in both computer vision and image processing, a variety of image matching algorithms have been gradually proposed. The methods of image matching can be roughly divided into area-based and feature-based matching, both of them should detect candidate features before matching. The point features used in area-based matching are usually the obvious corners or junctions of edges, which are called point-like keypoints. On the other hand, feature-based matching detects blob-like keypoints which refers to small regions in image and calculates the descriptors around the keypoints to create a correspondence relationship between the two images for the rotation and scale invariance. The SIFT (Scale-Invariant Feature Transform) algorithm proposed by Lowe (2004) belongs to a kind of feature-based image matching and is widely used in both computer vision and photogrammetry field. In the stage of feature detection, SIFT finds the extreme points in Gaussian image pyramids and a series of candidate keypoints are determined and localized accurately by the interpolation of nearby data using quadratic Taylor expansion. But there is a great amount of calculation in producing image pyramids and finding extremes. Also, the thresholds for keypoint localization are determined by experience. In this paper, the wavelet transform is used to find the blob-like feature points for image matching. Wavelet transform is one of the most popular analysis tools of the time-frequency transformation. The basic concept of wavelet multiresolution analysis is very similar to the Gaussian pyramid which is used in SIFT, but wavelet transform can detect the extreme points more accurately and have a better efficiency in searching extreme points. Generally, the wavelet transform is commonly used to detect the distinct features such as corners and edges. In this paper, the wavelet transform is used to detect the blob-like point features using the modulus maxima approach, then the descriptors in blob regions can be calculated for subsequent feature-based matching. In the experiment of this study, the proposed method is applied on a set of aerial images and the performance are illustrated

comparing with the SIFT algorithm.

Keyword : wavelet transform, blob feature detection, extreme points