International Journal of Innovative Computing, Information and Control
Volume **4**, Number **3**, March **2008**

ICIC International ©2008 ISSN 1349-4198
pp. **671–680**

IMAGE DETECTION BASED ON SUSAN METHOD AND INTEGRATED FEATURE MATCHING

Muyun Weng[1,2] and Mingyi He[2]

[1]Telecommunication Engineering Institute
Air Force Engineering University
Xi'an 710077, P. R. China
myweng@126.com

[2]School of Electronics and Information
Northwestern Polytechnical University
Xi'an 710072, P. R. China
myhe@nwpu.edu.cn

Received December 2006; revised August 2007

Abstract. *Image detection and feature matching are two major processing procedures for target recognition and tracking in computer vision. In this paper, a new approach to image feature matching is proposed, in which the integrated feature is defined and combined with the SUSAN method for image detection and tracking. Firstly the edge detection employs the SUSAN (Small Univalue Segment Assimilating Nucleus) method at low level image processing. Then, feature matching is conducted with the newly defined an integrated feature, consisting of seven invariant moments of Hu and Normalized Moment of Inertia (NMI) in combination with intensity and configuration information. The feature detection with the SUSAN method locates precisely and is insensitive to local noise. The seven invariant moments and NMI of images have features of translation invariability, rotation invariability and scale invariability. Therefore, the matching algorithm of image integrated features is good for images with somewhat intensity variety, geometry aberration and noise. The matching results can achieve target recognition and tracking. The experimental results also show that the algorithm is efficient.*
Keywords: Object detection, SUSAN method, Integrated feature matching, Recognition and tracking

1. **Introduction.** Image matching is an image processing procedure for target recognition and tracking, in which the given target image or target template is searched from many strange images. Because some factors are affected by imaging conditions, image preprocessing, and so on, there are usually some differences, such as to some extent rotation, translation, scale, between the target template and the candidate targets. Therefore, it is very difficult to detect and locate target images in a strange image according to a target template. In other words, target recognition is a complex procedure using image matching or other techniques. The relation between target template T and potential matching object P usually can be shown by six-parameter orthogonal projection model.

$$\begin{pmatrix} \hat{x} \\ \hat{y} \end{pmatrix} \approx \begin{pmatrix} \beta_{11} & \beta_{12} \\ \beta_{21} & \beta_{22} \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} \begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix} \tag{1}$$

where $(x, y) \in T$, $(\hat{x}, \hat{y}) \in P$, β_{ij} and α_i are constants.

Excellent matching algorithms should be efficient for the images with intensity variety, geometry aberration and variety caused by other factors, and with low computational cost.