The Recovery of Reference Plane of Objects using a Dual-CCD Image System

張家維、紀華偉

E-mail: 9708022@mail.dyu.edu.tw

ABSTRACT

Imagine recognition technique plays an important role in industrial automation. Spatial information recovering from 2D images is one of key element of imagine processing technique. This study develops a method based on the parity of two images to recover the 3D information of an object from 2D images. First, the 2D information of the characteristic points of left and right images is extracted from, then the 3D information of these characteristic points is recovered using the method developed in this study and the parameters of the CCD system. These points’ 3D information is then used to construct a reference plane by using the least square method and Newton’s method. Three examples are given to demonstrate the feasibility of the proposed method. The real positions of the object are known. The comparison results show that the proposed method can recover the object’s 3D information. The error of normal vector and the mid-point coordination of the reference plane calculated from the recovered 3D information are within the acceptable range.

Keywords : Disparity ; Least square Method ; Stereo vision ; Newton’s Method

Table of Contents

REFERENCES

參考文獻 [1] 余松煜、周源華、吳時光，數位影像處理，儒林圖 書，台北；1993。

[2] 楊武智，影像處理與辨認，全華科技圖書；1996。

[3] T. Uchiyama and M. A. Arbib,“ Color image segmentation using competitive learning ”, IEEE Trans. on Pattern Anal. Machine Intell, Vol. 16, pp. 1197-1206, 1994.

[4] E. Littmann and H. Ritter,“ Adaptive color segmentation – A comparison of neural and statistical methods, ” IEEE Trans. On Neural Networks, Vol. 8, Jan. 1997.

[5] H. -D. Cheng, Y. Sun,“ A hierarchical approach to color image segmentation using homogeneity, ” IEEE Trans. on Image Processing, Vol. 9, No. 12,pp.2071-2082, 2000.

[6] N. Vandenbroucke, L. Macaire, J. -G. Postaire,“ Color image segmentation bypixel classification in an adapted hybrid color space. Application to soccer image analysis, ” Computer Vision and Image Understanding, Vol. 90, pp. 190-216, 2003.

[7] A. Dumitras and A. N. Venetsanopoulos,“ Angular map-driven snakes with application to object shape description in color images, ” IEEE Trans. on Image Processing, Vol. 10, No. 12, pp. 1851-1859, 2001.

[8] Y. T. Wu, L. -F. Chen, H. Y. Chen, P. L. Lee, T. C. Yeh, J. -C. Hsieh,“ Awavelet-based approach for color image registration, ” J. Imaging Science and Technology, Vol. 47, No. 3, pp. 185-199, 2003.

[9] F. -H. Cheng, W. -H. Hsu, T. -W. Chen,“ Recoveringcolors in an image with chromatic illuminant, ” IEEE Trans. on Image Processing, Vol. 7, No. 11, pp.1524-1533, 1998.

[10] H.Altunbasak and J. Trussell,“ Colorimetric restoration of digital images, ” IEEE Trans. On Image Processing, Vol. 10, No. 3, pp. 393-402, 2001.

[11] J. F. C. Wanderley and M. H. Fisher, “ Multiscale color invariants based on the human visual system, ” IEEE Trans. on Image Processing, Vol.10, No. 11, pp.1630-1638, 2001.
[12] Varady T. Martin R R and Cox J, “ Reverse engineering of geometric models – an introduction ” ,Computer Aided Design, Vol.29 n.4 pt0, pp.225-268,1997.
[13] Williams, J.A.; Bennamoun, M.; Latham, S（1999） ” Multiple view 3Dregistration: a reviewand a new technique Systems, Man, and Cybernetics ” ,in.- 72 -IEEE Conf. , Volume:3 , p497 -502 [14] Yamany, S.M.; Farag, A.A （1999）, “ Free-form surface registration using surfacesignatures ” ,Computer Vision, The Proc.IEEE Conf. , Volume: 2 , p.1098 – 1104 [15] Lisa, G Brown,（1992） “ A Survey of Image Registration Techniques ” , ACMComputing Survey. Vol 24, No. 4, p.325-376 [16] Goshtasby, A. (1988) “ Image Registration by local approxmation “ ,Image VisionComputing Vol.6,No.4,p.255-261 [17] Wolberg, G. (1990) ” Digital Image Warping ” , IEEE. Computer Society Press, LosAlamitos. Calif.applications, ” D. Reidel PublishingCompany, 1987.
[18] Lew, M.S., Huang, T.S., Wong, K.W., “ Learning and feature selection in stereo matching, ” IEEE Transactions on Pattern Analysis and Machine Intelligence , Vol. 16, No.9, pp.869-881, 1994.
[19] Gonzalez R. C. and Woods R. E., "Digital Image Processing, 2nd ed.",Prentice-Hall, 2002 [20] P.J.M Aarts and Van Laarhoven；
” Simulated annealing and applications: Mathematics and its [21] Gonzalez , R. C., and Woods, R. E., “ Digital Image Processing, ” Addison Wesley, United States of America, 1993.
[22] Vishvjit S. Nalwa, ” A Guided Tour of Computer Vision, ” Addison-Wesley Publishing Company,1993.