International Journal of Engineering and Technology Innovation, vol. 4, no. 4, 2014, pp. 260 - 268

Dynamic Image Stitching for Panoramic Video

Jen-Yu Shieh*, Yu-Ching Liao, Guo-Jyun Lioao, and Yu-Ting Liou

Department of Electro-Optics Engineering, National Formosa University, Yunlin County, 632, Taiwan.

Received 23 January 2014; received in revised form 13 June 2014; accepted 19 July 2014

Abstract

The design of this paper is based on the Dynamic image titching for panoramic video. By utilizing OpenCV visual function data library and SIFT algorithm as the basis for presentation, this article brings forward Gaussian second differenced MoG which is processed basing on DoG Gaussian Difference Map to reduce order in synthesizing dynamic images and simplify the algorithm of the Gaussian pyramid structure. MSIFT matches with overlapping segmentation method to simplify the scope of feature extraction in order to enhance speed. And through this method traditional image synthesis can be improved without having to take lots of time in calculation and being limited by space and angle.

This research uses four normal Webcams and two IPCAM coupled with several-wide angle lenses. By using wide-angle lenses to monitor over a wide range of an area and then by using image stitching panoramic effect is achieved. In terms of overall image application and control interface, Microsoft Visual Studio C# is adopted to a construct software interface. On a personal computer with 2.4-GHz CPU and 2-GB RAM and with the cameras fixed to it, the execution speed is three images per second, which reduces calculation time of the traditional algorithm.

Keywords: image stitching, panoramic image, image matching, SIFT algorithm, OpenCV visual function library

References

[1] D. G. Lowe, "Distinctive image features from scale-invariant keypoints," International Journal of Computer Vision, vol. 60, no. 2, pp. 91-110, 2004.
[2] C. Harris and M. Stephens, "A Combined Corner and Edge Detector," Proc. Alvey Vision Conf., 1988, pp. 147-151.
[3] M. Kass, A. Witkin, and D. Terzopoulos, "Snake: Active contour models," International Journal of Computer Vision, vol. 1, no. 4, pp. 321-331, 1988.
[4] J. J. Koenderink, "The structure of images," Biological Cybernetics, vol. 50, no. 5, pp. 363-396, 1984.
[5] T. Lindeberg, "Scale-space theory: A basic tool for analyzing structures at different scales," Journal of applied statistics, vol. 21, no. 1, pp. 225-270, 1994.
[6] T. Tuytelaars and K. Mikolajczyk, "Local invariant feature detectors: A survey," Foundations and Trends in Computer Graphics and Vision, vol. 3, no. 3, pp. 177-280, 2008.
[7] W. K. Tang, T. T. Wong and P. A. Heng, "A system for real-time panorama generation and display intele-immersive applications," IEEE Trans. On Multimedia, vol. 7, no. 2, pp. 280-292, 2005.
[8] B. Matthew and D. G. Lowe, "Automatic panoramic image stitching using invariant features," International Journal of Computer Vision, vol. 74, no. 1, pp. 59-73, 2007.
[9] R. Szeliski, "Image alignment and stitching: A tutorial," Foundations and Trends in Computer Graphics and Vision, vol. 2, no. 1, pp. 1-104, 2006.

*Corresponding author. E-mail address: reed@nfu.edu.tw
Tel.: +886-9-56169985; Fax: +886-5-6365348

[10] J. Y. Shieh and M. N. Lee, "Analysis of flare and ghost on full view lens," International Journal of Engineering and Technology Innovation, vol. 1 no. 1, pp. 27-34, 2011.
[11] J. Y Shieh and M. N. Lee, "A two-stage Taguchi design example-image quality promotion in miniature camera/cell-phone lens," International Journal of Engineering and Technology Innovation, vol. 2, no. 3, pp. 163-171, 2012.

Copyright © TAETI