

A structure-from-motion method for 3-D reconstruction of moving objects from multiple-view image sequences

Le H.V.

Department of Electrical and Computer Engineering, Vietnam National University, Hanoi

Abstract: Solving the correspondence problem is the most essential task for multiview reconstruction techniques, yet finding unique correspondences between views is impossible at some points, due to such problems as occlusions and ambiguities. We have developed a closed-form solution through constructive geometry for a special case of the structure-from-motion (SfM) problem with four rigidly moving points. This solution allows the 3-D position of a point on a moving object to be computed without having to find the correspondence between its projections on the image planes of multiple views, given its projected 2-D motion vector on an image plane and 3-D information of three other points. With this method we do not have to depend entirely on multiview feature correspondences in reconstructing 3-D objects, hence easing those problems caused by occlusions and ambiguities. ??2004 IEEE.

Index Keywords: Cameras; Computer vision; Image analysis; Image quality; Mathematical models; Three dimensional computer graphics; Motion constraints; Moving objects; Multiple view image sequences; Structure from motion (SfM) problems; Image reconstruction

Year: 2004

Source title: Proceedings - International Conference on Image Processing, ICIP

Volume: 3

Page : 1955-1958

Link: [Scopus Link](#)

Correspondence Address: Le, H.V.; Department of Electrical and Computer Engineering, Vietnam National University, Hanoi, Viet Nam; email: hvle@hn.vnn.vn

Conference name: 2004 International Conference on Image Processing, ICIP 2004

Conference date: 18 October 2004 through 21 October 2004

Conference code: 65024

ISSN: 15224880

Language of Original Document: English

Abbreviated Source Title: Proceedings - International Conference on Image Processing, ICIP

Document Type: Conference Paper

Source: Scopus

Authors with affiliations:

1. Le, H.V., Department of Electrical and Computer Engineering, Vietnam National University, Hanoi

References:

1. Roach, J.W., Aggarwal, J.K., Determining the movement of Objects from a sequence of images (1980) IEEE Transactions on Pattern Analysis and Machine Intelligence, 2 (6), pp. 554-562. , November

2. Faugeras, O.D., Maybank, S., Motion from point matches: Multiplicity of solutions (1990) *International Journal of Computer Vision*, 4 (3), pp. 225-246
3. Tomasi, C., Kanade, T., Shape and motion from image streams under orthography: A factorization method (1992) *International Journal of Computer Vision*, 9 (2), pp. 137-154. , November
4. Waxman, A.M., Duncan, J.H., Binocular image flows: Steps toward stereo-motion fusion (1986) *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 8 (11), pp. 715-729. , November
5. Mitiche, A., A computational approach to the fusion of stereo and kineopsis (1988) *Motion Understanding: Robot and Human Vision*, pp. 81-95. , W. N. Martin and J. K. Aggarwal, Eds., Kluwer Academic Publishers
6. Zhang, Z., Faugeras, O.D., 3D dynamic scene analysis (1992) *Springer Series in Information Sciences*, 27. , T. S. Huang, Ed., Springer-Verlag
7. Li, L., Duncan, J.H., 3-D Translational motion and structure from binocular image flows (1993) *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 15 (7), pp. 657-667. , July
8. Ho, P.-K., Chung, R., Stereo-motion with stereo and motion in complement (2000) *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 22 (2), pp. 215-220. , February