

{tag}

{/tag}

International Journal of Computer Applications

© 2014 by IJCA Journal

Volume 107 - Number 3

Year of Publication: 2014

Authors:

Raad H. Thaher

Zaid K. Hussein

10.5120/18735-9977

{bibtex}pxc3899977.bib{/bibtex}

## Abstract

Stereo vision system used to reconstruct a 3D scene from 2D images taken by a pair of optical cameras (left and right images) and it is used to estimate the distance of the object. The modified version for the (SAD) algorithm is called the Canny Block Matching Algorithm (CBMA) to find the Disparity map, the algorithm consist of two parts the Canny edge detector and Block matching technique with Sum of Absolute Difference (SAD) to determine disparity map to reduce the execution time. The system has been implemented using two cameras arranged in a manner to enhance the detection range of objects from (30cm to 4m). The results show good outputs with less error percentage, as compared with the real objects depth and the Execution time is approximated to the real-time performance. The algorithms implemented using MATLAB (8. 0) technical programing language.

## Refer

## ences

- Iocchi L. and Konolige K. , "A Multiresolution Stereo Vision System for Mobile Robots", Proc. of AI Workshop on New Trends in Robotics, 1998.
- G. Macesanu, S. Grigorescu , T. T. Cocias , and F. Moldoveanu , "An Object

Detection and 3D Reconstruction Approach For Real-Time Scene Understanding &quot; Bulletin of the Transylvania University of Brasov, Series I: Engineering Sciences • Vol. 4 (53) No. 1 - 2011.

- Marr D. , and Poggio T. , &quot;Cooperative Computation of Stereo Disparity&quot;; Science, New Series, Vol. 194, No. 4262, pp. 283-287, Oct. 15, 1976.
- Marr D. , and Poggio T. , &quot;A Computational Theory of Human Stereo Vision&quot;; proceedings of the Royal Society of London. Series B, Biological Sciences, Vol. 20, No. 1156, pp. 301-328, May 23, 1979.
- Eric W. , and Grimson L. , &quot;Computational Experiments with a Feature Based Stereo Algorithm&quot;; Massachusetts Institute of Technology, Jan. , 1984.
- Hakkarainen J. , and Lee, &quot;A 40×40 CCD/CMOS Absolute-Value-of-Difference Processor for Use in a Stereo Vision System&quot;; IEEE, Journal of Solid-State Circuits, Vol. 28, No. 7, pp. 799-807, July 1993.
- Labayrad R. and Aubert D. &quot;Robust and Fast Stereovision Based Road Obstacles Detection for Driving Safety Assistance&quot;; IAPR Workshop on Machine Vision Application, pp. 624-627, Japan, Dec. , 2002.
- Vatansever M. , &quot;3D Reconstruction Using a Spherical Spiral Scan Camera&quot;; M. Sc. Thesis, Computer Engineering, Izmir Institute of Technology, Izmir, 2006.
- Fengjun HU and Yanwei Zhao &quot;Comparative Research of Matching Algorithms for Stereo Vision &quot;; Journal of Computational Information Systems 9: 13, PP 5457–5465, 2013.
- Adam Tawfik Sharkasi, &quot;Stereo Vision Based Aerial Mapping Using GPS and Inertial Sensors &quot;; Virginia Polytechnic Institute and State University, Thesis, M. Sc. April 30, 2008.
- Chinapirom T. , Witkowski U. , and Ruckert U. , &quot;Stereoscopic Camera for Autonomous Mini-Robots Applied in KheperaSot League&quot;; Heinz Nixdorf Institute, University of Paderborn, Germany, 2007.
- Goshtasby A. , &quot;2-D and 3-D Image Registration&quot;; a John Wiley & Sons, Inc. , Book, 2005.
- Myron Z. Brown, &quot;Advances in Computational Stereo&quot;; IEEE Transactions on Pattern Analysis and Machine Intelligence, VOL. 25, NO. 8, August, 2003.
- <http://vision.middlebury.edu/stereo/>
- Raman Maini and Dr. Himanshu Aggarwal,&quot;Study and Comparison of Various Image Edge Detection Techniques&quot;; International Journal of Image Processing (IJIP), Volume (3): Issue (1), pp. 1-12 2001.
- [http://en.wikipedia.org/wiki/Canny\\_edge\\_detector](http://en.wikipedia.org/wiki/Canny_edge_detector)
- <https://kobefyp.googlecode.com/hg/doc/Midterm%20Progress%20Report.docx>.
- Adam Tawfik Sharkasi, &quot;Stereo Vision Based Aerial Mapping Using GPS and Inertial Sensors &quot;; Virginia Polytechnic Institute and State University, Thesis, M. Sc. April 30, 2008.

## Index Terms

Computer Science

Image Processing

### **Keywords**

Stereo Vision   Disparity   Epipolar geometry   SAD   CBMA.