Dots Emotion

SiJoong Kim[1], Yong-Ho Kim[1], and Sangkeun Lee[*,1]*

[1] Graduate School of Advanced imaging Science, Multimedia, and Film, Chung-Ang University / Seoul, South Korea
**Corresponding Author (sangkny@cau.ac.kr)*

Abstract: We propose a robust stereo matching algorithm based on graph-cut in a real-time situation. In this paper, we implement the visualize a depth map through two cameras. And obtained visualize a depth map and block-based random pixels implement the template matching.

Keywords: stereo matching, segmentation.

Received Oct. 13, 2016; revised manuscript received Nov.03; accepted for publication Nov. 21, 2016; published online Nov. 30, 2016. DOI: 10.15323/techart.2016.11.3.4.33 / ISSN: 2288-9248.

1. Introduction

All of the image is made in the form of pixel-based, and also referred to as a dot.

90s, graphic design had to be drawn directly take point. As well as processing speed, and tray capacity is limited, and there were uncomfortable portability. However, nowadays high-quality graphics have been developed due to the development of hardware and software. High-definition graphics are familiar with. But dot graphics in analog form remains attractive. We are aiming for harmonious coexistence of the video from a digital camera devices and dot graphics with analog attractive.

2. Purpose

Modern images come out visual range of people based on high-definition graphics, furthermore appear HDR(High Dynamic Range) [1], technique. Based on these techniques, we can see an actual dark portion more brighter and clearly. Now-a-days, with superior performance, however, we go live nostalgic, always remember the old days of storage. The analog is that both technology and art can be represented, and everyone who misses the last day can approach comfortably. Because of these reasons, I choose the analog to theme and represent the dots graphics.

3. Implementation

This paper proposed in two steps. It represents a dots graphic as stereo matching and template matching.

A. Stereo Matching based on Graph-cut

We estimate the disparity maps $f = \{f^L, f^R\}$ for both the left and the right images. To estimate the disparity map f, we formulate MAP-MRF model as follows [2],

$$E(f) = E_d(f) + E_s(f) \quad (1)$$

data energy $E_d(f)$ and the smoothness energy $E_s(f)$ are defined by

$$E_d(f) = \sum_p D_p(f_p) \quad (2)$$

$$E_s(f) = \sum_{(p,q)\in N(p)} V_{pq}(f_p, f_q) \quad (3)$$

Where N is a local four-neighborhood surrounding the pixel p, $D_p(f_p)$ is the data cost that the dissimilarity between left and right image, $V_{pq}(f_p, f_q)$ is the smoothness cost that the penalty value about thediscontinuity of disparities between neighboring pixels.

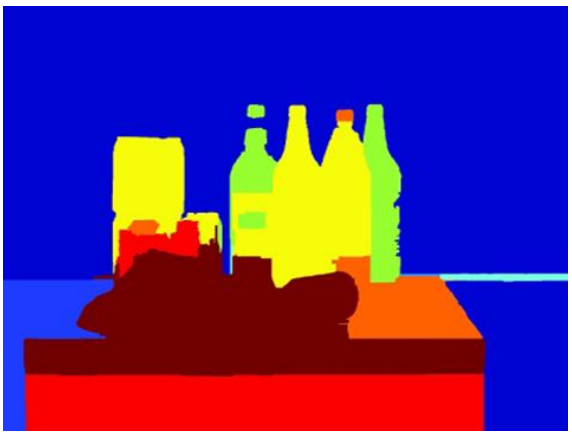

Fig. 1. Visualize Depth Map Based on Graph-Cuts

B. Template matching based on SAD

To obtain visualize a depth map from the graph cuts. Next, it uses similar measurements between the algorithm in block-based random pixel image and a depth map.

Fig. 2. Proposed method

4. Conclusion

This paper proposed a graph-cuts based global matching method However, this method is very complex and many computations, not suitable for real-time. In order to solve this problem, as follows, the same two methods Further work will be focused on improving the real-time system.

A. Algorithm

Graph cuts based stereo matching has a relationship with the surrounding pixels by using data term and smoothness term. Because so many computing amount is not suitable for real-time.

To solve this problem, Semi-Global matching and suitable for stereo matching using the patch match based super pixel.

B. Hardware Processor

FPGA(Field Programmable Gate Array) can do which working Parallel circuit configuration with the programmable. It is possible to obtain satisfactory results for real-time processing [3].

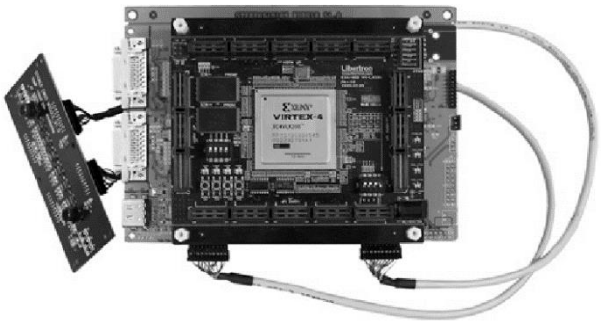

Fig. 3. Implemented real-time stereo vision system Based on FPGA

Acknowledgement

This work was supported by the Commercializations Promotion Agency for R&D Outcomes(COMPA), the National Research Foundation of Korea grant funded by the Korea government(MSIP)(No. 2016K000202, No. NRF-2014R1A2A1A11049986) and BK21 plus.

References

[1] P. E. Debevec, and J. Malik, “Recovering High Dynamic Range Radiance Maps from Photographs,” *ACM SIGGRAPH Computer Graphics*, pp. 369-378, 1997.

[2] Y. Boykov, O. Veksler, and R. Zabih, “Fast Approximate Energy Minimization via Graph Cuts,” *IEEE Trans. Pattern Analysis and Machine Intelligence.*, vol. 23, no. 11, pp. 1222-1239, Nov. 2001.

[3] S. Jin, J. Cho, X. D. Pham, K. M. Lee, S. K. Park, M. Kim, and J. W. Jeon, “FPGA Design and Implementation of a Real-Time Stereo Vision System,” *IEEE Trans. Circuits Syst. Video Technol.*, vol. 20, no. 1, pp. 191-199, Jan. 2010.

Biographies

SiJoong Kim received his B.S. degree in Electronic Information Engineering from Konyang University, Nonsan, Korea in 2015, and his M.S. degree in image engineering from Chung-Ang University, Seoul, Korea, in 2016. His research interests include stereo matching.

Yong-Ho Kim received his B.S. degree in Computer and Information from Hanseo University, Seosan, Korea in 2008, his M.S. degree in Image Engineering from Chung-Ang University, Seoul, Korea in 2010. He is currently pursuing a Ph.D. degree at Chung-Ang University. His research interests include object recognition via graph matching, image retrieval, stereo matching and image processing.

Sangkeun Lee (SM’12) received his B.S. and M.S. degrees in electronic engineering from Chung-Ang University, Seoul, Korea in 1996 and 1999, respectively, and his Ph.D. in electrical and computer engineering from Georgia Institute of Technology, Atlanta, GA in 2003. He is an associate professor of the graduate school of Advanced Imaging Science, multimedia and Film at Chung- Ang University, Seoul, Korea. From 2003 to 2008, he was a staff research engineer with the Digital Media Solution Lab, Samsung Information and Systems America, Irvine, CA, where he was involved in the development of video processing and enhancement algorithms (DNIe) for Samsung’s HDTV. His current research and development interests include digital video/image processing, denoising, compression for HDTV and multimedia applications, and CMOS image sensors.