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IEEE Transactions on Image Processing
Volume 27, Issue 7, July 2018, Pages 3586-3598

Benchmark Data Set and Method for Depth Estimation from Light Field Images (Article)

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Abstract

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Convolutional neural networks (CNNs) have performed extremely well for many image analysis tasks. However, supervised training of deep CNN architectures requires huge amounts of labeled data, which is unavailable for light field images. In this paper, we leverage on synthetic light field images and propose a two-stream CNN network that learns to estimate the disparities of multiple correlated neighborhood pixels from their epipolar plane images (EPIs). Since the EPIs are unrelated except at their intersection, a two-stream network is proposed to learn convolution weights individually for the EPIs and then combine the outputs of the two streams for disparity estimation. The CNN estimated disparity map is then refined using the central RGB light field image as a prior in a variational technique. We also propose a new real world data set comprising light field images of 19 objects captured with the Lytro Illum camera in outdoor scenes and their corresponding 3D pointclouds, as ground truth, captured with the 3dMD scanner. This data set will be made public to allow more precise 3D pointcloud level comparison of algorithms in the future which is currently not possible. Experiments on the synthetic and real world data sets show that our algorithm outperforms existing state of the art for depth estimation from light field images. © 1992-2012 IEEE.

Author keywords

deep learning | Depth estimation | disparity | light field | Lytro camera | plenoptic camera | two stream CNN

Indexed keywords

Engineering controlled terms: Cameras | Convolution | Deep learning | Estimation | Image analysis | Image resolution | Learning systems | Media streaming | Neural networks | Three dimensional displays | Variational techniques

Engineering uncontrolled terms: Depth Estimation | disparity | Image color analysis | Light fields | Plenoptic cameras | Streaming media | Two-stream

Engineering main heading: Field emission displays

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Manuscript received July 11, 2017; revised January 4, 2018; accepted February 13, 2018. Date of publication March 9, 2018; date of current version April 20, 2018. This work was supported in part by the China Scholarship Council and National Natural Science Foundation of China under Grant 61573134, Grant 61401046, and Grant 61573135 and in part by the Australian Research Council under Grant DP160101458. The associate editor coordinating the review of this manuscript and approving it for publication was Dr. Yonggang Shi. (Corresponding author: Ajmal Mian.) M. Feng and Y. Wang are with the College of Electrical and Information Engineering, Hunan University, Changsha 410082, China (e-mail: mintfeng@hnu.edu.cn; yaonan@hnu.edu.cn).

ISSN: 10577149
CODEN: IIPRE
Source Type: Journal
Original language: English
DOI: 10.1109/TIP.2018.2814217
Document Type: Article
Publisher: Institute of Electrical and Electronics Engineers Inc.

References (59)

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1 Adelson, E.H., Bergen, J.R.
The plenoptic function and the elements of early vision
(1991) *Computational Models of Visual Processing*, pp. 3-20. Cited 820 times.
Cambridge, MA, USA: MIT Press

2 Wilburn, B., Joshi, N., Vaish, V., Talvala, E.-V., Antunez, E., Barth, A., Adams, A., (...), Levoy, M.
High performance imaging using large camera arrays
(2005) *ACM Transactions on Graphics*, 24 (3), pp. 765-776. Cited 548 times.
doi: 10.1145/1073204.1073259
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3 Kim, C., Zimmer, H., Pritch, Y., Sorkine-Hornung, A., Gross, M.
Scene reconstruction from high spatio-angular resolution light fields
(2013) *ACM Transactions on Graphics*, 32 (4), art. no. 73. Cited 168 times.
doi: 10.1145/2461912.2461926
View at Publisher

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