

Author's Accepted Manuscript

Multi-focus image fusion based on depth extraction
with inhomogeneous diffusion equation

Jinsheng Xiao, Tingting Liu, Yongqin Zhang,
Baiyu Zou, Junfeng Lei, Qingquan Li



PII: S0165-1684(16)00031-1
DOI: <http://dx.doi.org/10.1016/j.sigpro.2016.01.014>
Reference: SIGPRO6040

To appear in: *Signal Processing*

Received date: 28 July 2015
Revised date: 12 January 2016
Accepted date: 14 January 2016

Cite this article as: Jinsheng Xiao, Tingting Liu, Yongqin Zhang, Baiyu Zou, Junfeng Lei and Qingquan Li, Multi-focus image fusion based on depth extraction with inhomogeneous diffusion equation, *Signal Processing* <http://dx.doi.org/10.1016/j.sigpro.2016.01.014>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Multi-focus image fusion based on depth extraction with inhomogeneous diffusion equation

Jinsheng Xiao^{a,b}, Tingting Liu^a, Yongqin Zhang^c, Baiyu Zou^a, Junfeng Lei^a, Qingquan Li^{d,e}

^a*School of Electronic Information, Wuhan University, Wuhan, Hubei 430072, China*

^b*Department of Computer Science, University of California, Santa Barbara, CA 93106, USA*

^c*Institute of Computer Science and Technology, Peking University, Beijing 100871, China*

^d*State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan, Hubei 430072, China*

^e*President Office, Shenzhen University, Shenzhen, Guangdong 518060, China*

Abstract

The defocus of imaging can be modeled as a heat diffusion process and represented mathematically by a diffusion equation, where the image blur is corresponded to the diffusion of heat. To improve the quality of observed images, we propose an algorithm of multi-focus image fusion based on the depth extraction. The optical imaging of two multi-focus images is simulated by the heat equations of positive regions, where the scene depth is estimated by the inhomogeneous diffusion equation. An adaptive initialization of image depth estimation is proposed to improve the simulation accuracy of inhomogeneous diffusion process. Image depth is approximated by an iterative solution of the partial differential equation. According to the depth information, the target images are adaptively divided into three types of regions: clear regions, fuzzy regions and transition regions. Finally, the fusion of multi-focus images is achieved by not only extracting the pixels of clear regions but also merging the pixels of transition regions. Theoretical analysis and experimental results show that the proposed algorithm can avoid the blocking artifacts, and outperform the state-of-the-art methods both subjectively and objectively in most cases.

Keywords: Image fusion, multi-focus, depth extraction, partial differential equation

Email addresses: xiaojs@whu.edu.cn (Jinsheng Xiao), zhangyongqin@pku.edu.cn (Yongqin Zhang)

Download English Version:

<https://daneshyari.com/en/article/6958344>

Download Persian Version:

<https://daneshyari.com/article/6958344>

[Daneshyari.com](https://daneshyari.com)