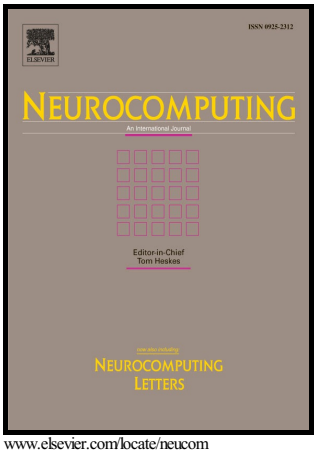

www.elsevier.com/locate/neucom

Correntropy-Based Level Set Method for Medical Image Segmentation and Bias Correction

Sanping Zhou, Jinjun Wang, Mengmeng Zhang, Qing Cai, Yihong Gong

PII: S0925-2312(17)30032-2
DOI: http://dx.doi.org/10.1016/j.neucom.2017.01.013
Reference: NEUCOM17910

To appear in: *Neurocomputing*

Received date: 8 August 2016
Revised date: 3 December 2016
Accepted date: 4 January 2017

Cite this article as: Sanping Zhou, Jinjun Wang, Mengmeng Zhang, Qing Cai and Yihong Gong, Correntropy-Based Level Set Method for Medical Image Segmentation and Bias Correction, *Neurocomputing*, http://dx.doi.org/10.1016/j.neucom.2017.01.013

Correntropy-Based Level Set Method for Medical Image Segmentation and Bias Correction

Sanping Zhou[a], Jinjun Wang[a,*], Mengmeng Zhang[b], Qing Cai[b], Yihong Gong[a]

[a]*The institute of artificial intelligence and robotic, Xi'an Jiaotong University, Xian Ning West Road No.28, Shaanxi, 710049, P.R. China*

[b]*Department of Automatic Control, Northwestern Polytechnical University, You Yi West Road No.127, Shaanxi, 710072, P.R. China*

Abstract

This paper presents a novel correntropy-based level set method (CLSM) for medical image segmentation and bias field correction. Firstly, we build a local bias-field-corrected fitting image (LBFI) model in the level set formulation by simultaneously using the bias field information and the local intensity information. Then, a local bias-field-corrected image fitting (LBIF) energy is introduced by minimizing the difference between the LBFI and the input image in a neighborhood, which makes it effective in segmenting images with intensity inhomogeneity. Finally, by incorporating the correntropy criterion into the LBIF energy, the proposed CLSM can decrease the weights of the samples that are away from the intensity means, which is more robust to the effects of noise. The CLSM is then integrated with respect to the neighborhood center to give a global property of image segmentation and bias field correction. Extensive experiments on both synthetic images and real medical images are provided to evaluate our method, shown significant improvements on both efficiency and accuracy, as compared with the state-of-the-art methods.

Keywords: Medical image segmentation, Level set method, Bias field correction, Intensity inhomogeneity, Active contour model

1. Introduction

Image segmentation is a fundamental problem and complex task in the field of image processing and computer vision, because the segmentation result will

*Corresponding author: Tel.: +86-029-83395146; Fax: +86-029-83395175;
Email address: jinjun@mail.xjtu.edu.cn (Jinjun Wang)