

Author's Accepted Manuscript

Automated grading of breast cancer histopathology using cascaded ensemble with combination of multi-level image features

Tao Wan, Jiajia Cao, Jianhui Chen, Zengchang Qin



PII: S0925-2312(16)30547-1
DOI: <http://dx.doi.org/10.1016/j.neucom.2016.05.084>
Reference: NEUCOM17160

To appear in: *Neurocomputing*

Received date: 15 January 2016
Revised date: 24 May 2016
Accepted date: 27 May 2016

Cite this article as: Tao Wan, Jiajia Cao, Jianhui Chen and Zengchang Qin. Automated grading of breast cancer histopathology using cascaded ensemble with combination of multi-level image features, *Neurocomputing* <http://dx.doi.org/10.1016/j.neucom.2016.05.084>

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.

Automated grading of breast cancer histopathology using cascaded ensemble with combination of multi-level image features

Tao Wan^a, Jiajia Cao^b, Jianhui Chen^c, Zengchang Qin^{b,*}

^a*School of Biomedical Science and Medical Engineering, Beihang University, Beijing, 100191, China*

^b*Intelligent Computing and Machine Learning Lab, School of Automation Science and Electrical Engineering, Beihang University, Beijing, 100191, China*

^c*No. 91 Central Hospital of PLA, Henan, 454000, China*

Abstract

We present a novel image-analysis based method for automatically distinguishing low, intermediate, and high grades of breast cancer in digitized histopathology. A multiple level feature set, including pixel-, object-, and semantic-level features derived from convolutional neural networks (CNN), is extracted from 106 hematoxylin and eosin stained breast biopsy tissue studies from 106 women patients. These multi-level features allow not only characterization of cancer morphology, but also extraction of structural and interpretable information within the histopathological images. In this study, an improved hybrid active contour model based segmentation method was used to segment nuclei from the images. The semantic-level features were extracted by a CNN approach, which described the proportions of nuclei belonging to the different grades, in conjunction with pixel-level (texture) and object-level (architecture) features, to create an integrated set of image attributes that can potentially outperform either subtype of features individually. We utilized a cascaded approach to train multiple support vector machine (SVM) classifiers using combinations of feature subtypes to enable the possibility of maximizing the performance by leveraging different feature

*Corresponding author. Tel.: +86 010 82316875; fax: +86 010 82316875. E-mail address: zcqn@buaa.edu.cn (Z. Qin).

This work was partially supported by the National Natural Science Foundation of China under award Nos. 61305047 and 61401012.

Download English Version:

<https://daneshyari.com/en/article/4947890>

Download Persian Version:

<https://daneshyari.com/article/4947890>

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