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Search for possibility to use wavelet transform in virtual slides' quality evaluation

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Abstract

Introduction: Quality of digital images obtained by scanning the same histological slide using various scanners may be different. Usually an expert who looks at a picture on a screen assesses its quality.

Amis: In this work we attempt to create an objective method of comparing virtual slides' quality. We also write a computer program to execute the quality analysis for loaded images.

Methods: An experiment is carried out for two sets of 10 slides scanned using 2 different devices. One set of slides was scanned and the images captured and digitized by using a robotic microscope Axioscope2 (Zeiss) equipped with AxioCam Hrc CCD camera. Second set of the same glass slides was made with the use of commercial available DeskScan (Zeiss) with standard equipment. For stitching and conversion a software based on and utilizing advances in aerial and satellite imaging was used.
Wavelet transform is used to make space-frequency analysis of an image. This transform is carried out for different resolution levels to check how the assessment changes while resizing an image. Moreover, for high resolution images only respective fragments of whole images may be taken for the analysis. This makes the computation faster. Parameters which may describe information potential, like specially worked out energy, are calculated for a transformed image.

Results/Conclusion: Choosing a wavelet and other functions or parameters appropriate for virtual slides is a part of this work. Results of the automatic evaluation are compared to opinion expressed by an expert. Then, the parameters are improved to make the automatic evaluation more reliable.