Abstract

Watershed transform, as was described by Vincent and Soille, is a segmentation algorithm based on a flooding process of the gradient image, which is observed as a topographic surface. Watershed transform aims at finding the peaks in this surface and identifying them as image contours. This algorithm is used in many applications for its flexibility. However, its main
limitation is the over segmentation. In this paper, we will try to overcome this limitation. The
enhancement phase is based on filtering the original image by an anisotropic diffusion filter and
then quantizing the gradient image. For evaluation, the improved algorithm is applied on an
empirical basis for image segmentation research in order to be compared with other
segmentation algorithms. Simulation results prove the effectiveness of our algorithm.
Watershed algorithm is used in medical field in order to extract areas of interest in an image
representing a section bone. Finally, the implementation phase in a Virtex 5 is based on the co
 design methodology. The synthesis results show that the performance of the developed design
is 130 MHz and the hardware occupation is about 78% for an image of size of 256*256.

Reference

- A.Michael Parfitt, Mark k.Dreznnr, Francis H.Glorieux, Jhon A.Kanis, Hartmut Malluche,
Pierre J.Menuier, Susan Mott and Robert R.Recker « A bone histomorphometry:
Standardization of Nomenclature. Symbols and Units», Journal of bone and Mineral Research,
Volume 2, Number 6, 1987.
- Bo Zhao, Zhongxiang Zhun, Enrong Mao and Zhenghe Song «Image Segmentation
Based on Ant Colony Optimization and K-Means Clustering» College of Engineering China
- C. Rambabu. I. Chakrabarti and A. Mahanta «Flooding-based watershed algorithm and
Number. 3, June 2004.
- Carolina A. Moreira Kulak, David W. Dempster «Bone histomorphometry: a concise
review for endocrinologists and clinicians», Arq Bras Endocrinol Metab, 2010.
- DO Minh Chau « Evaluation de la segmentation d’images », Institut de la francophonie
- Eric Lespessailles, Christine Chappard, Nicolas Bonnet, Claude Laurent Benhamou,
«Imaging techniques for evaluating bone microarchitecture». Elsevier, Revue du Rhumatisme
HW/SW Co-design to Implement an Embedded Face Recognition/ Verification System on an
FPGA».
- H.S.Sheshadri and A. Kandaswamy «Detection of Breast Cancer Tumor based on
Morphological Watershed Algorithm» Department of ECE. PSG College of Technology.
Coimbatore.
- Hye Suk Kim, Hyo Sun Yoon, Nguyen Dinh Toan and Guee Sang Lee «Anisotropic
Diffusion Transform based on Directions of Edges» Korea IEEE 8th International Conference on
Computer and Information Technology Workshops.
- H.LOUKIL HADJ KACEM and M.S BOUHLEL «Elaboration d’une Quantification
Semilogarithmique pour l’Amlioration de la Norme de Compression JPEG», 5th International
Conference: Sciences of Electronic. Technologies of Information and Telecommunications
March 2009, TUNISIA.
- K.Karantzalos. D. Argialas «Improving edge detection and watershed segmentation with
anisotropic diffusion and morphological levellings» Remote Sensing Laboratory, School of
Rural and Surveying Engineering (SRSE), National Technical University of Athens (NTUA),
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- Li Gao, Shuyuan Yang, Jie Xia, Junli Liang, Yuhua, Qin «A new marker-based watershed algorithm», China 2006
- Luc Vincent and Pierre Soille "Watersheds in Digital Spaces: An Efficient Algorithm Based on Immersion Simulations " 0162 ¡ 8828–91=0600 ¡ 058301:0001991IEEE
- Accelerate Software Algorithms on FPGAs, available at www.impulseaccelerated.com/eval/index
- Computer Vision Group, available at www.eecs.berkeley.edu/Research/Projects/CS/vision/grouping/segbench/

Index Terms

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Key words

Watershed  quantization  anisotropic filter

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co-design