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

- 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.
- 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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