Abstract

This paper proposes a novel method which combines both median filter and simple standard deviation to accomplish an excellent edge detector for image processing. First of all, a denoising process must be applied on the grey scale image using median filter to identify pixels which are likely to be contaminated by noise. The benefit of this step is to smooth the image and get rid of the noisy pixels. After that, the simple statistical standard deviation could be computed for each 2×2 window size. If the value of the standard deviation inside the 2×2 window size is greater than a predefined threshold, then the upper left pixel in the 2×2 window represents an edge. The visual differences between the proposed edge detector and the standard known edge detectors have been shown to support the contribution in this paper.
Pattern Analysis and Machine Intelligence, 8(6):679–698.
- Desolneux A., Moisan L. And Morel J. -M. 2001. Edge Detection by Helmholtz Principle, Journal of Mathematical Imaging and Vision 14: 271–284.
- Frei W. and Chen C. 1977. Fast Boundary Detection: A Generalization and New Algorithm. IEEE Trans. Computers, vol. C-26, no. 10, 988-998.
- Gao W., Yang L., Zhang X. and Liu H. 2010. An Improved Sobel Edge Detection. IEEE international conference on computer science and information technology (ICCSIT), vol. 5, 67-71.
- Giannarou S. and Stathaki T. 2011. Optimal edge detection using multiple operators for image understanding. EURASIP Journal on Advances in Signal Processing 2011, 28.
- Gonzalez R. C. and Woods R. E. 2001. Digital Image Processing. Upper Saddle River, NJ: Prentice-Hall.
- Jing L., Peikang H., Xiaohu W. and Xudong P. 2009. Image edge detection based on beamlet transform, Journal of Systems Engineering and Electronics, Vol. 20, No. 1, 1–5.
- Lei Z., Shouping D. and Honglian M., 2008. Recent Methods and Applications on Image Edge Detection. Proceedings of the 2008 International Workshop on Education Technology and Training & 2008 International Workshop on Geoscience and Remote Sensing, vol. 1, 332-335.
- Maini R. and Aggarwal H, 2009. Study and Comparison of Various Image Edge Detection Techniques. International Journal of Image Processing (IJIP), vol. 3, issue 1, 1-11.
- Nadernejad E. 2008. Edge Detection Techniques: Evaluations and Comparisons. Applied Mathematical Sciences, Vol. 2, no. 31, 1507 – 1520.
- Ritter G. X. and Joseph N. Wilson 2000. Handbook of Computer Vision Algorithms in Image Algebra, CRC Press.
- Sobel I. E. 1970. Camera models and machine perception. Ph. D. dissertation, Stanford University, Stanford, Calif, USA.
- Tzu-Heng Henry Lee. Edge Detection Analysis. Graduate Institute of Communication Engineering, National Taiwan University, Taipei, Taiwan, ROC.
- Yi S., Labate D., Easley G. R. and Krim H. 2009. A Shearlet Approach to Edge Analysis and Detection. IEEE Trans. Image Proc. 18(5) 929–941.
- Zheng L. He X. Edge, 2004. Detection Based on Modified BP Algorithm of ANN. Proceeding VIP 2003 of the Pan-Sydney area workshop on visual information processing, 119-122.
- Ziou D. and Tabbone S. 1998. Edge Detection Techniques - An Overview. International Journal of Pattern Recognition and Image Analysis, vol. 8,537-559.

Index Terms

Computer Science  Image Processing
Keywords

Computer vision  edge detection  median filter  standard deviation