Scopus

Document details

Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More...

Full Text View at Publisher

Indonesian Journal of Electrical Engineering and Computer Science
Volume 7, Issue 1, July 2017, Pages 123-130

Artificial neural network based fast edge detection algorithm for mri medical images (Article)

Gunawan, T.S.[a], Yaacob, I.Z.[a], Kartiwi, M.[b], Ismail, N.[c], Za'bah, N.F.[a], Mansor, H.[a]

[a]Department of Electrical and Computer Engineering, Kulliyyah of Engineering International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia
[b]Department of Information Systems, Kulliyyah of ICT, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia
[c]Electrical Engineering Department, Faculty of Science and Technology, Universitas Islam Negeri Sunan Gunung Djati, Bandung, Indonesia

Abstract

View references (14)

Currently, magnetic resonance imaging (MRI) has been utilized extensively to obtain high contrast medical image due to its safety which can be applied repetitively. To extract important information from an MRI medical images, an efficient image segmentation or edge detection is required. Edges are represented as important contour features in the medical image since they are the boundaries where distinct intensity changes or discontinuities occur. However, in practices, it is found rather difficult to design an edge detector that is capable of finding all the true edges in an image as there is always noise, and the subjectivity of sensitiveness in detecting the edges. Many traditional algorithms have been proposed to detect the edge, such as Canny, Sobel, Prewitt, Roberts, Zerocross, and Laplacian of Gaussian (LoG). Moreover, many researches have shown the potential of using Artificial Neural Network (ANN) for edge detection. Although many algorithms have been conducted on edge detection for medical images, however higher computational cost and subjective image quality could be further improved. Therefore, the objective of this paper is to develop a fast ANN based edge detection algorithm for MRI medical images. First, we developed features based on horizontal, vertical, and diagonal difference. Then, Canny edge detector will be used as the training output. Finally, optimized parameters will be obtained, including number of hidden layers and output threshold. The edge detection image will be analysed its quality subjectively and computational. Results showed that the proposed algorithm provided better image quality while it has faster processing time around three times time compared to other traditional algorithms, such as Sobel and Canny edge detector.

Author keywords

Artificial neural network Canny edge detector Edge detection MRI images

Funding details

Funding number	Funding sponsor	Acronym
RIGS16-336-0500	International Islamic University Malaysia	IIUM

Funding text

This research has been supported by International Islamic University Malaysia Research Grant, RIGS16-336-0500.

ISSN: 25024752 **DOI:** 10.11591/ijeecs.v7.i1.pp123-130
Source Type: Journal **Document Type:** Article

Metrics

0 Citations in Scopus

0 Field-Weighted Citation Impact

PlumX Metrics

Usage, Captures, Mentions, Social Media and Citations beyond Scopus.

Cited by 0 documents

Inform me when this document is cited in Scopus:

Set citation alert > Set citation feed >

Related documents

Associative approach for edge detection
Acevedo, E. , Acevedo, A. , Martínez, F.
(2014) Conference Proceedings - IEEE International Conference on Systems, Man and Cybernetics

Neural network based edge detection for CBCT segmentation
Pavaloiu, I.-B. , Goga, N. , Vasilateanu, A.
(2016) 2015 E-Health and Bioengineering Conference, EHB 2015

The development of pancreatic cancer CAD system for CT and US images
Su, J.-L. , Chen, G.-W. , Hsu, Y.-C.
(2015) IFMBE Proceedings

View all related documents based on references

Find more related documents in Scopus based on:

Original language: English **Publisher:** Institute of Advanced Engineering and Science

References (14)

View in search results format >

All | Export | Print | E-mail | Save to PDF | Create bibliography

1 Balafar, M.A., Ramli, A.R., Saripan, M.I., Mashohor, S.
Review of brain MRI image segmentation methods

(2010) *Artificial Intelligence Review*, 33 (3), pp. 261-274. Cited 159 times.
doi: 10.1007/s10462-010-9155-0

View at Publisher

2 Jiang, J., Trundle, P., Ren, J.
Medical image analysis with artificial neural networks

(2010) *Computerized Medical Imaging and Graphics*, 34 (8), pp. 617-631. Cited 105 times.
doi: 10.1016/j.compmedimag.2010.07.003

View at Publisher

3 Chang, C.-Y.
Contextual-based hopfield neural network for medical image edge detection

(2006) *Optical Engineering*, 45 (3), art. no. 037006. Cited 18 times.
doi: 10.1117/1.2185488

View at Publisher

4 Khadidos, A., Sanchez, V., Li, C.-T.
Weighted Level Set Evolution Based on Local Edge Features for Medical Image Segmentation

(2017) *IEEE Transactions on Image Processing*, 26 (4), art. no. 7847297, pp. 1979-1991.
doi: 10.1109/TIP.2017.2666042

View at Publisher

5 Cao, W., Zhou, Y., Chen, C.L.P., Xia, L.
Medical image encryption using edge maps

(2017) *Signal Processing*, 132, pp. 96-109. Cited 3 times.
doi: 10.1016/j.sigpro.2016.10.003

View at Publisher

6 Meftah, B., Lezoray, O., Benyettou, A.
Segmentation and edge detection based on spiking neural network model

(2010) *Neural Processing Letters*, 32 (2), pp. 131-146. Cited 26 times.
doi: 10.1007/s11063-010-9149-6

View at Publisher

7 Li, H., Liao, X., Li, C., Huang, H., Li, C.
Edge detection of noisy images based on cellular neural networks

(2011) *Communications in Nonlinear Science and Numerical Simulation*, 16 (9), pp. 3746-3759. Cited 57 times.
doi: 10.1016/j.cnsns.2010.12.017

View at Publisher

8 Somkantha, K., Theera-Umpon, N., Auephanwiriyakul, S.
Boundary detection in medical images using edge following algorithm based on intensity gradient and texture gradient features

(2011) *IEEE Transactions on Biomedical Engineering*, 58 (3 PART 1), pp. 567-573. Cited 50 times.
doi: 10.1109/TBME.2010.2091129

View at Publisher

9 Hamamci, A., Kucuk, N., Karaman, K., Engin, K., Unal, G.
Tumor-cut: Segmentation of brain tumors on contrast enhanced mr images for radiosurgery applications

(2012) *IEEE Transactions on Medical Imaging*, 31 (3), art. no. 6112681, pp. 790-804. Cited 73 times.
doi: 10.1109/TMI.2011.2181857

View at Publisher

10 Nikolic, M., Tuba, E., Tuba, M.
Edge detection in medical ultrasound images using adjusted Canny edge detection algorithm

(2016) *24th Telecommunications Forum, TELFOR 2016*, art. no. 7818878. Cited 3 times.
ISBN: 978-867466649-4
doi: 10.1109/TELFOR.2016.7818878

View at Publisher

11 Pratondo, A., Chui, C.-K., Ong, S.-H.
Robust edge-stop functions for edge-based active contour models in medical image segmentation

(2016) *IEEE Signal Processing Letters*, 23 (2), art. no. 7353157, pp. 222-226. Cited 7 times.
doi: 10.1109/LSP.2015.2508039

View at Publisher

12 Huang, B., Jiao, Y.
A New Adaptive Threshold Image-Denoising Method Based on Edge Detection
(2014) *Indonesian Journal of Electrical Engineering and Computer Science*, 12, pp. 3509-3514. Cited 3 times.

13 Ting, Y., Mingxing, G., Yanming, W.
Ultrasound image segmentation based on the mean-shift and graph cuts theory
(2013) *Indonesian Journal of Electrical Engineering and Computer Science*, 11, pp. 5600-5608. Cited 2 times.

14 Gunawan, T.S., Bacar, E.A.
Parallel algorithms for edge detection on cluster computer
(2011) *Selected Readings in Computing and Telecommunications*
M. Kartiwi, T. S. Gunawan, and A. H. A. Hashim, Eds. Kuala Lumpur: IIUM Press

Gunawan, T.S.; Department of Electrical and Computer Engineering, Kulliyyah of Engineering International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia; email:tsgunawan@iium.edu.my