



A collaborative Image Edge Detection binary data Using the concept of Fuzzy Logic

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Abstract— In this paper, we present methods for edge segmentation of satellite images; we used five techniques for this category; Sobel operator technique, Roberts Cross Edge Detector, Prewitt technique, Laplacian technique and Edge Maximization Technique (EMT). In the first section of the paper we analysis the Introduction of edge detection. In the second section of the paper we described the Edge Detection Techniques. In the third section we are analysis the Related Work. In the fourth section we described different steps of Fuzzy Logic Using Logic Using Edge Detection. In the fifth section we described CBIR Technique and Bacterial Foraging Optimization Technique. Finally we present the Conclusion & future works with the references.

1. INTRODUCTION

Edge detection is a lot of common for police work discontinuities in grey level than police work isolated points and skinny lines as a result of isolated points and thin lines thus not occur oftentimes in most sensible images [1]. The sting is that the boundary between two regions with comparatively distinct grey level properties. It is assumed here that the transition between two regions is properties. it's assumed here that the transition between two regions is determined on the premise of grey level discontinuities alone [2].

Edge detection is a crucial pre-processing step for any image process application, object recognition and feeling detection. Edge detection is very useful just in case of noise free pictures. But in case of vociferous pictures it's a difficult task. Noisy images area unit corrupted pictures [3]. Their parameters are troublesome to investigate and discover. Edge detection is a basic tool employed in most image process applications to get info from the frames as a precursor step to feature extraction and object segmentation. This method detects outlines of Associate in Nursing object and bounds between objects and also the background within the image. Associate in Nursing edge-detection filter can also be accustomed improve the looks of blurred image; to the present cause a lot of studies take this subject is provide a number of these studies briefly: Soft computing techniques have found wide applications. Edge could be a boundary between two homogeneous regions. Edge detection refers to the process of characteristic and locating sharp discontinuities in a picture [4].

2. EDGE DETECTION TECHNIQUES

A. Edge Detection:- cagey finds edges by trying for native maxima of the gradient of $f(x, y)$. The gradient is calculated victimization the by-product of a Gaussian filter. the tactic uses 2 thresholds to detect sturdy and weak edges, and includes the weak edges within the output as long as they're connected to sturdy edges. Therefore, this methodology is a lot of likely to discover true weak edges. The enforced Canny edge detector conferred the most effective performance both visually and quantitatively supported the measures like mean sq. distance, error edge map and signal to noise magnitude relation. Using the implemented cagey edge detector as Associate in Nursing enhancement tool for remote sensing pictures, the result was sturdy and achieved a awfully high enhancement level [5].

I. Sobel Operators:-

Sobel Operators area unit the computation of the partial derivation in gradient may be approximated in digital pictures. This technique performs second spacial gradient measurement on a picture and conjointly it emphasizes regions of high spacial frequency that correspond to edges. usually it's accustomed notice the approximate absolute gradient magnitude at every purpose in Associate in Nursing input grayscale image. In theory a minimum of, the operator consists of a try three|of three} $\times 3$ convolution masks as shown in figure. One mask is just the other turned by 90° . The masks is separate measurements of the gradient element in every orientation that's G_x and G_y . These is combined along to seek out absolutely the magnitude of the gradient at every purpose and also the orientation of that gradient.

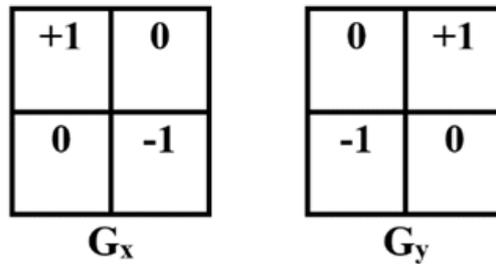


Figure I: The Sobel masks

II. Roberts Cross Edge Detector:- The Roberts Cross operator performs a straightforward, quick to compute, 2-D spacial gradient measuring on Associate in Nursing image. It so highlights regions of high spacial frequency which frequently correspond to edges. In its most common usage, the input to the operator could be a grayscale image, as is that the output. constituent values at each purpose within the output represent the calculable absolute magnitude of the spacial gradient of the input image at that time. **III. Prewitt Operator:-** The prewitt operator is Associate in Nursing approximate thanks to estimate the magnitude and orientation of the sting. The prewitt operator uses the same equations because the Sobel operator, except the constant $k = one$. Compare than Sobel operator this prewitt operator doesn't place any stress on pixels that area unit nearer to the centre of the masks [6].

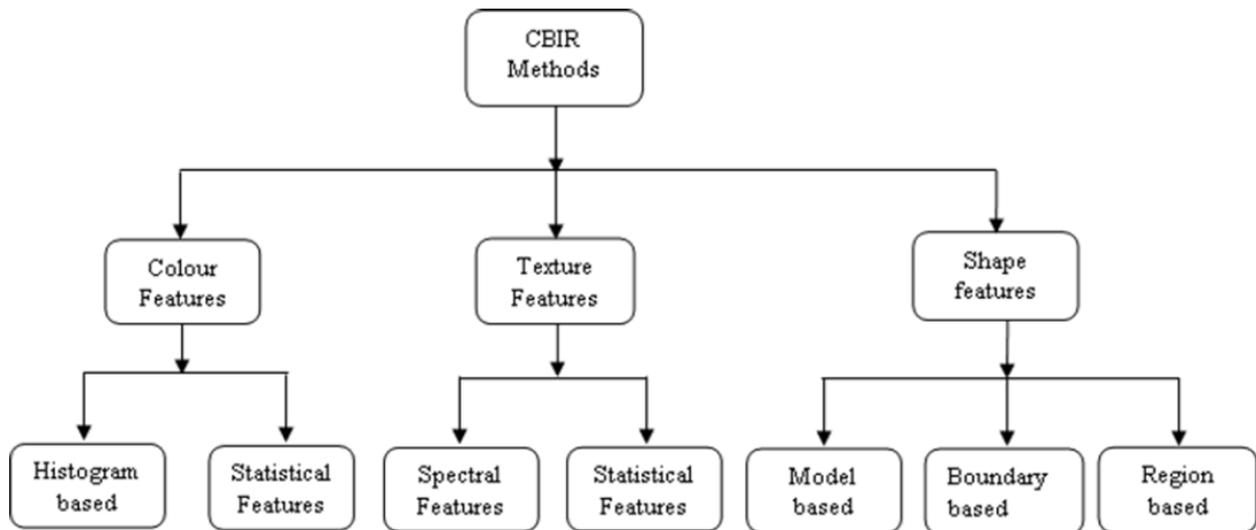


Fig. 2 Architecture of CBIR system

3. Previous WORK

3.1 M Rama Baic , Dr V Venkata Krishna[8] is described that new morphological approach for noise removal seed edge detection is introduced for both binary and grey scale pictures.

3.2 Tzu-Heng Henry Lee and capital of Taiwan, Taiwan, ROC[9] is represented the varied edge detection algorithms and detector style ways are described and mentioned.

3.3 Hindu deity Basu, Senior Member[10] is gift a survey of Gaussian-based edge detection techniques. that represented in an exceedingly grey level image, an edge could also be outlined as a pointy modification in intensity. Edge detection is that the method that detects the presence and locations of those intensity transitions.

3.4 Mohamed A. El-Sayed[11] is represented that the hybrid entropic edge detector and planned method is decrease the computation time with generate prime quality of edge detection.

3.5 Manimala Singha and K.Hemachandran[12] is represented that the experimental result shows that the planned methodology outperforms the opposite retrieval methods in terms of Average exactitude. 3.6 Zhi-Hua Zhou dynasty, Ke-Jia Chen, and Yuan Jiang[13] is represented that the pictures having simple color bar chart options.

3.7 Peter Wilkins, Paul Ferguson, Alan F. Smeaton and Cathal Gurrin[14] says that the approach to reducing the search area for image retrieval represented has potential, as these results show that a good degree of overlap is achieved in a reduced set that may be retrieved in an exceedingly timely manner .

3.8 M. Sujaritha and S. Annadurai[15] is described that a unique level set methodology for color image segmentation that victimization Binary Level-set Partitioning Approach . It eliminates the requirement of the re-initialization, calculation of variety of regions procedure that is incredibly pricey.

3.9 Jun Zhang, Qieshi Zhang and Jinglu Hu[16] in 2009 introduced the conception of recent color thresholding methodology for police work and trailing multiple faces in video sequences. It introduced the creating the colour triangular from RGB color area and analyzing the characters of centriods region for color segmentation.

3.10 Khang Siang Tan, Nor Ashidi Mat Isa[17] in 2010 presents a unique bar chart thresholding – fuzzy C-means hybrid (HTFCM) approach that could notice completely different application in pattern recognition furthermore as in pc vision to get all attainable uniform regions within the color image.

4. Formal logic victimization EDGE DETECTION

A formal logic reasoning strategy is planned for edge detection in digital pictures while not determining the edge price or would like coaching algorithm.

I. Fuzzy Image process Fuzzy image process is that the assortment of all approaches that perceive, represent and method the images, their segments and options as fuzzy sets. The illustration and process depend upon the selected fuzzy technique and on the matter to be solved. Fuzzy image process has 3 main stages: image fuzzification, modification of membership values and image defuzzification[18].

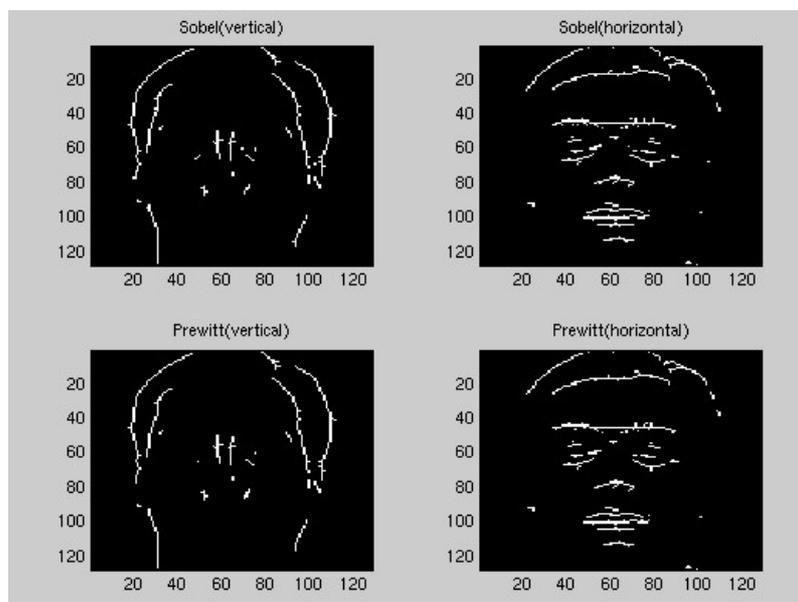
II. Fuzzy Sets and Fuzzy Membership Functions The system implementation was applied considering that the input image and also the output image obtained once defuzzification area unit each 8-bit quantized; this manner, their grey levels area unit perpetually between 0 and 255. The fuzzy sets were created to represent every variable's intensities; these sets were associated to the linguistic variables —Black, Edge and The functions adopted to implement the —and and —or operations were the minimum and maximum functions, severally. The values of the membership's operate of the output area unit designed to separate the values of the blacks, whites and edges of the image[19].

III. Abstract thought Rules Definitions

The abstract thought rules is depends on the weights of the eight neighbors grey level pixels, if the neighbors weights area unit degree of blacks or degree of whites. The powerful of those rules is that the ability of extract all edges within the processed image directly. This study is assaying all the pixels of the processed image by studying matters of every neighbor of every pixel.

5. CBIR Technique and microorganism hunting optimization Technique

5.1 CBIR Technique: - In CBIR the particular contents of the image area unit accustomed describe Associate in Nursing analyze an image. The contents of a picture area unit accustomed type a set of feature vectors victimization the tactic concerned. Various techniques area unit used for extraction of the feature vectors for a picture. a number of these techniques involve victimization attributes like form, color, textures and edge density of a picture to extract the feature vector [22].





5.2 Microorganism hunting optimization Technique:- A new organic process technique, known as microorganism foraging theme appeared in Passino (2002), Liu and Passino (2002). hunting is shapely as Associate in Nursing optimization method wherever bacterium get to maximize the energy obtained per unit time spent during foraging[22]. A group of bacterium tries to succeed in an optimum price by following four stages: Chemo taxis, swarming, replica, and elimination and dispersal. To start out with, there'll be as several solutions because the variety of bacterium. So, each bacterium produces an answer iteratively for a group of optimal values of parameters. Bit by bit all the bacteria converge to the world optimum. In the chemo taxis stage, the bacterium either resort to a tumble followed by a tumble or build a tumble followed by a run or swim. this can be the movement stage of bacterium accomplished through swimming and tumbling.

On the opposite hand, in swarming, each Escherichia coli bacteria signals another bacterium via attractants to swarm along. This is basically the cell to cell communication stage. Furthermore, within the replica the smallest amount healthy bacteria die and of the healthiest, every bacteria splits into 2 bacterium, that area unit placed at the same location. whereas within the elimination and dispersal stage, any bacteria from the overall set will be either eliminated or distributed to a random location throughout the optimisation. This stage prevents the bacterium from attaining the native optimum[23]. within the above-named rule the bacterium undergoes taxis, wherever they like to move towards a nutrient gradient and avoid noxious surroundings. usually the bacterium move for a extended distance in an exceedingly friendly surroundings.

BFOA mimics the four principal mechanisms observed in an exceedingly real microorganism system[24],[25]: chemotaxis, swarming, replica, and elimination-dispersal to resolve this non-gradient optimization downside. A virtual bacteria is actually one trial resolution that moves on the functional surface to find the world optimum.

i) Chemotaxis: This method simulates the movement of Associate in Nursing E.coli cell through swimming and tumbling via flagella. Biologically Associate in Nursing E.coli bacterium will move in 2 alternative ways. It can swim for a amount of your time within the same direction or it may tumble, and alternate between these 2 modes of operation for the complete lifespan.

ii) Swarming: a motivating cluster behavior has been determined for many motile species of bacterium including E.coli and S. typhimurium, wherever tangled and stable spatio-temporal patterns (swarms) area unit formed in solid nutrient medium. A group of E.coli cells organize themselves in an exceedingly traveling ring by moving up the nutrient gradient once placed amidst a solid matrix with one nutrient chemo-effector. The cells once aroused by a high level of succinate, unharness Associate in Nursing attractant aspartate, which helps them to combination into teams and so move as concentric patterns of swarms with high bacterial density.

iii) Elimination and Dispersal: Gradual or fast changes within the native surroundings wherever a bacteria population lives might occur because of varied reasons e.g. a big native rise of temperature might kill a group of bacterium that area unit presently in an exceedingly region with a high concentration of nutrient gradients. Events can occur in such a fashion that every one the bacterium in a region area unit killed or a gaggle is distributed into a new location. To simulate this development in BFOA some bacterium area unit liquidated haphazardly with a very little chance whereas the new replacements are at random initialized over the search area.

6. CONCLUSION

1. During this paper a general edge detection techniques to check out however a image gets fetched out from the database.
2. The aim of the work is to retrieve pictures with less noise .Images with noise within the info can be reduced with completely different techniques as well as the CBIR methodology.
3. Tto style Associate in nursing rule to figure on the parameters of the corrupted vociferous pictures. The rule includes the subsequent steps to seek out the sides of the images.
4. BFOA has been devised with the aim of finding global extremes, this error is predicted. If a variety of preferential treatment specified pixels connected to edge pixels get a bonus is introduced then this problem is satisfied. it's noted that our results show some disconnected edges.

References

- [1] N. Senthilkumaran, R. Rajesh, "Edge Detection Techniques for Image Segmentation and A Survey of Soft Computing Approaches", International Journal of Recent Trends in Engineering, Vol. 1, No. 2, PP.250-254, May 2009.



- [2] Canny, J., —A Computational Approach to Edge Detection, IEEE Trans. Pattern Analysis and Machine Intelligence, 8:679-714, November 1986.
- [3] Advanced Edge Detection Techniques in Computational Vision: <http://www.cpsc.ucalgary.ca/Research/vision/501/dgdetect.pdf>.
- [4] Rafael C. Gonzalez and Richard E. Woods, —Digital Image Processing, Pearson Prentice Hall, 2008. [5] A.A. Alshennawy, A.A. Aly, "Edge Detection in Digital Images Using Fuzzy Logic Technique", World Academy of Science, Engineering and Technology 51 2009.
- [6] Raman, Maini, Sobel, J.S., 2006. Performance evaluation of prewitt edge detector for noisy images. GVIP J. 6 (3).
- [7] Zhong Qiyuan, Huang Xianxiang, Tan Lilong and Zhou Bing, —A method of deleting noise in a binary image based on the mathematical morphology, ICEMI 2007.
- [8] M Rama Bai, Dr V Venkata Krishna and J SreeDevi, —A new Morphological Approach for Noise Removal cum Edge Detection, IJCSI International Journal of Computer Science Issues, Vol. 7, Issue 6, November 2010.
- [9] Tzu-Heng Henry Lee and Taipei, Taiwan ROC, —Edge Detection Analysis, IJCSI International Journal of Computer Science Issues, Vol. 5, Issue 6, No 1, September 2012.
- [10] Mitra Basu, Senior Member IEEE, —Gaussian- Based Edge-Detection Methods—A Survey, IEEE Transactions on System, man, and cybernetics-part c: Application and Reviews, Vol. 32, No. 3, August 2002.
- [11] Mohamed A. El-Sayed, —A New Algorithm Based Entropic Threshold for Edge Detection in Images, IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 5, No 1, September 2011.
- [12] Manimala Singha and K. Hemachandran, —Content Based Image Retrieval using Color and Texture, An International Journal, Vol. 3, No. 1, February 2012.
- [13] Zhi-Hua Zhou, Ke-Jia Chen, and Yuan Jiang, —Exploiting Unlabeled Data in Content- Based Image, Vol. 3, No. 1, February 2012.
- [14] Peter Wilkins, Paul Ferguson, Alan F. Smeaton and Cathal Gurrin, —Text Based Approaches for Content Base Image Retrieval on Large Image Collections, Department of Strategic Technology Korea Telecom research Center, Department of Computer Science Korea University, Seoul 137- 792, Korea, 1995.
- [15] M. Sujaritha and S. Annadurai, (2009). Color Image Segmentation Using Binary Level-set Partitioning Approach. International Journal of Soft Computing, 4: 76-84
- [16] Jun Zhang, Quieshi Zhang and Jinglu HU, RGB color Centriods Segmentation (CCS) for face detection, ICGST-GVIP Journal, ISSN 1687- 398X, Volume (9), issue (II), april 2009.
- [17] Khang Siang Tan, Nor Ashidi Mat Isa (2011) Color image segmentation using histogram thresholding – Fuzzy C- means hybrid approach, K. Siang Tan, N.A. Mat Isa / Pattern Recognition 44 (1–15)
- [18] Tizhoosh H.R., —Fast fuzzy edge detection, Proceedings of Fuzzy Information Processing Society, 2002, pp. 239-242.
- [19] Lin, C. T. and Lee, S. G.: Reinforcement structure/parameter learning for neural network based fuzzy logic systems, IEEE Trans. Fuzzy Systems 2(1) (1994), 46–63.
- [20] Ayman A. Aly, H. Ohuchi and A. Abo-Ismael, —Fuzzy Model Reference Learning Control of 6- Axis Motion Base Manipulator, 7th IEEE International Conference on Intelligent Engineering Systems, Luxer, March, 2003.
- [21] Marjo Markkula, Marius Tico, Bemmu Sepponen, Katja Nirkkonen and Eero Sormunen, —A Test Collection for the Evaluation of Content-Based Image Retrieval Algorithms – A User and Task-Based Approach, Published in Information Retrieval 4(3/4), 275-294 (2001).
- [22] Dr. H. B. Kekre, Dharendra Mishra, —Sectorization of Walsh and Walsh Wavelet in CBIR, International Journal on Computer Science and Engineering (IJCSE) Vol. 3 No. 6 June 2011.
- [23] Mishra, S., 2005. A hybrid least square-fuzzy bacterial foraging strategy for harmonic estimation. IEEE Trans. Evol. Comput. 9 (1), 61–73.
- [24] Mishra, S., Bhende, C.N., 2007. Bacterial foraging technique-based optimized active power filter for load compensation. IEEE Trans. Power Delivery 22 (1), 457–465.
- [25] Passino, K.M., 2002. Biomimicry of bacterial foraging for distributed optimization and control. Control Systems Magazine, IEEE 22 (3), 52–67.
- [26] Raman, Maini, Sobel, J.S., 2006. Performance evaluation of prewitt edge detector for noisy images. GVIP J. 6 (3).