International Journal of Advanced Science and Technology
Vol. 29, No. 3s, (2020), pp. 330-341

Image Segmentation Based On Edge Detection And Enhancement Based On EECS Algorithm

Dr. Rajeev Shrivastava[1], Mohammad Javeed[2], Mallika Jain[3]

[1]Professor, Department of ECE, Sree Dattha Institute of Engineering & Science, Hyderabad,
[2]Assistant Professor, Department of ECE, Sree Dattha Institute of Engineering & Science, Hyderabad
[3]Research Scholar, Department of ECE, JayotiVidyapeeth Women's University, Jaipur,

Abstract:

Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth.Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to monitor machine health conditions during operation. Furthermore, image processing techniques can be employed in infrared imageries.

Medical image processing is a regularly growing and dynamic territory with applications connecting into our regular daily existence, for example, solution, space investigation, observation, validation, mechanized industry review and numerous more zones. For the medical diagnosis segmentation of image plays a vital role. My research since 7 years mainly focuses on segmentation of medical microscopy images. Applications includes brain tumor, leaf disease identification, Mammography etc. I want to introduce a method which is very advanced and accurate for Segmentation based on EECS algorithm. This technique focuses mainly on pre- processing, Edge detection, Enhancement, Thresholding, Feature extraction, Clustering using advanced fuzzy K-means algorithm. Pre-processing will be done first for filtering, after filtering edge detection is applied to the image, then after image will be enhanced, next thresholding will divide the exact object at a particular point in the image. Later feature will be extracted and advance fuzzy K-means clustering will be applied for the segmentation. Due to this technique when compared with other techniques like c-means clustering the time has decreased up to 71% and efficiency of the particular object detection increased more than 22%.

Key Words: *EECS algorithm, Segmentation, Medical Image Processing, K-Means Clustering, Edge Detection, Image enhancement.*

INTRODUCTION

Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth. Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to monitor machine health conditions during operation [3]. Furthermore, image processing techniques can be employed in infrared imageries [4]. In addition, vision is used in the identification and tracking of objects [5,6].

The image enhancement Problem was aimed at preserving or improving the edges of objects in the figure [7]. The color saturation work is performed first, and then the edge is preserved. Another method using morphological filters to improve the edges for increased sharpness on resultant image [8] is proposed. The Problem with improving contrast was also approached by adopting a bloc-based improvement strategy [9, 10]. These localized improvement approaches may be more complex for these applications compared to the global method of equalisation histogram. Histographic image enhancement algorithms are often classified in the statistical and global approach [11]. Essentially, equating attempts to re-map the intensity or other image color of the channel to a certain probability density. In most cases, in order to obtain the highest information content from the output image, the target density must be uniform. It has been noted that direct application of this program may introduce some unwanted artifacts; Therefore, alternative implementation procedures are proposed and advanced [12].

In the case of histogram offsetting implementation, there are different methods that can be retrieved. For example, empirically specific changes can be used [13, 14]. On the other hand, it is usually a challenge to achieve the required optimum setting parameters. To this end, an unfurnished method is created [15]. In this way, the coefficient for a change of power law is determined using the average intensity of the image. The output image, while corrected to the average intensity of the supplied image, cannot provide an attractive perception of a human seer. Another method is built to improve an input image and to maintain the same output average light [16]. Since this algorithm is directed to a flatter mapping density, the complete brightness level is not fully used to convey the information of the scene. At the same time, it acknowledges that the single density of the target will change the average brightness in half of the permitted levels and, if no agreement is reached on the average intensity of the original image, undesirable artifacts will appear. The researchers then started looking for procedures that would

ISSN: 2005-4238 IJAST

keep the original mean light [17]. In the original work, the pixels are isolated to a lower group in accordance with their means that the values in light. The two sub-images are applied to a uniform density. It also emphasized that it means to remain with some extent. However, a perfect retention of the mean value is not possible even for the image of symnof intensity density.

An attempt was made to reduce the variances between input and improved image media brightness. The input image is first separated by the average light, and then the tops of the input image histograms are trimmed using the median of each subframe [18]. Although the average brightness error could shrink, there was no fixed justification for selecting the median value as the clipping limit. A method of limiting the scope was later developed [19]. Instead of aligning the image to cover the entire allowable brightness, the narrow limits are emitted for brightness, so that the resulting brightness was approximate to the original image. An alternative method introduced a weighted sum method that would solve the average brightness problem [12]. Lower and higher intensity pixel groups were created based on the average brightness value. Unlike other methods, tiated group groups were aggregated with supplementary groups and then weighed to create an enhanced image. However, since weighting factors are not always feasible, the requirement to perfectly minimise the average brightness error was relaxed to compensate for the possible weights. A variation of the histogram trimming principle [20] was further proposed. The clipping Limit was specified as the minimum value for the histogram, median, and mean values. When working in it, there is a potential problem when the median is very low and provides a low cropping size, the pixel functions with the corresponding subgroup can be destroyed. Based on the available methods, a comparative evaluation of the commonly used color space of color images was performed [21]. The work of reporting suggested that when leveling the histogram, a green color space is used, where this channel approximates the brightness of the image.

In addition to separating the image into high and low brightness sub-images as aforementioned, contrast enhancement could also be accomplished by modifying and specifying a target density profile in histogram equalization. For instance, the input histogram was smoothed using an intensity-based window width [22]. Additionally, you can extend the policies that are listed in it to return the brightness of the output image that is adjusted to the input image. This work proposes a new way to reduce the difficulties encountered in areas that occur in the doors and in the dispensing departments. Based on the ratio of half the maximum strength, the target histogram shows the square surface balance above the desired middle level. The input image is then corrected to ensure that the average brightness is close to the input image.

METHODOLOGY

A. *K-MEANS ALGORITHM*

Here we discuss clearly about the basic structure of K-means clustering. Let $A=\{ai|\ i=1,\ldots,f\}$ be attributes of f-dimensional vectors and $X=\{xi\ |\ i=1,\ldots,N\}$ be each data of A. K-means clusters which X is SK = {Si | I 1, b..., = k} where M is mi εx = {M = 1, n (SI), the... J |} SI members, where $n(si)$ is number of members for si. Each cluster has cluster center of $C=\{ci\ |\ i=1,\ldots,k\}$. The following steps will be involved in the K-means clustering algorithm [20-21]

1. Generate the random starting points with centroids C.
2. By utilizing the Euclidean separation discover the separation d between X to C.
3. Ascertain the base d(xi,C) from the partition of xi for i=1...N into.
4. Ascertain the new centre ci for i=1...k characterized as:

$$\mathrm{Ci}=\frac{1}{ni}\sum_{j=1}^{n(si)} mij \in si$$

5. Rehash the procedure stage 2 until the point that all centroids are concurrent.

The centroids, in case if they do not change their position then they will be said as converged in a particular cycle. It additionally may stop in the t emphasis with a threshold ε if those positions have been refreshed by the separation underneath ε:

$$\left|\frac{c^t-c^{t-1}}{c^t}\right|<\varepsilon$$

ISSN: 2005-4238 IJAST

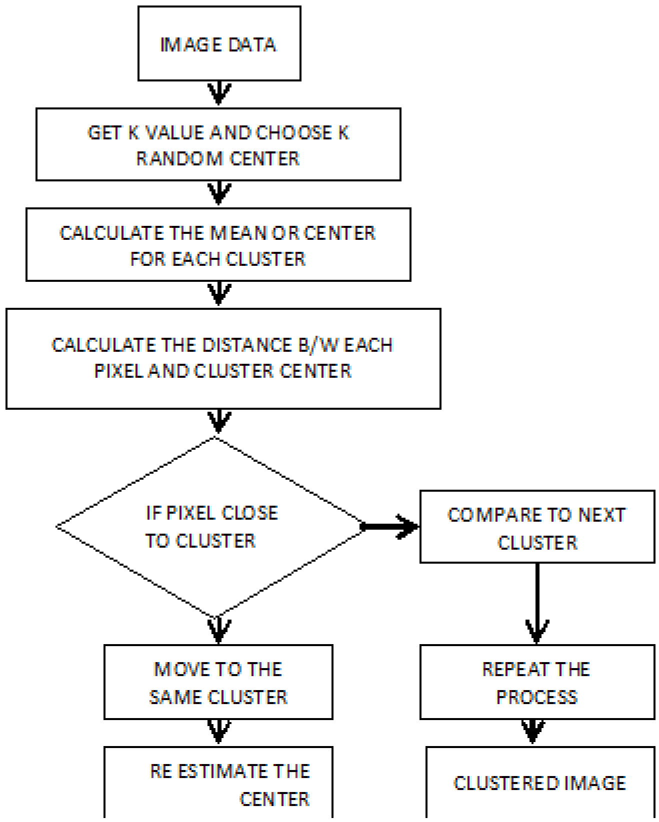

Fig. 2. K –means clustering algorithm

B. FUZZY C-MEANS CLUSTERING

Fuzzy logic to process data through partial membership in reflection is a method of each pixel value. Fuzzy membership in the set value is 0 1 ranges. The fuzzy cluster basically allows a multi-value logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets blurred picture. Full membership, non-membership is between any bad transfer. An image of a fosaniss function, in the form of a Buddha-figure and also a membership in information to define. The membership function that is involved includes three main primary attributes. They have support, restrictions. The core member is set to be completely opaque. The subscription is supported by a non-intermediate or partial subscription, and is a border that is set to value between 0 and 1 [23].

Obscure logic, fuzzy clusters, in each cluster location entirely, just one degree from a cluster. The cluster is on the periphery of the cluster, with fewer points than points. Each point x is given status as we are in the kth cluster$uk(x)$ digital head. The contribution coefficient for any given x 1 is usually clear:

$$\forall x \left(\sum_{k=1}^{\text{num. clusters}} u_k(x) \ = 1 \right).$$

Fuzzy c-means clustering, which kantroad all points with a cluster of his degree of leverage over it, means:

$$\text{center}_k = \frac{\sum_x u_k(x)^m x}{\sum_x u_k(x)^m}.$$

The distance to the cluster center is related to the inverse state:

$$u_k(x) = \frac{1}{d(\text{center}_k, x)},$$

Then coefficients is a true parameter to fosifed distribution > 1 So their is 1.

$$u_k(x) = \frac{1}{\sum_j \left(\frac{d(\text{center}_k, x)}{d(\text{center}_j, x)} \right)^{2/(m-1)}}.$$

The equivalent of 2 m for coefficients to equal their money to 1 along a linear normalizing. When 1 m is close, and the cluster closest to the center at this point is much more weighted than others, and it is similar to the K-means algorithm.

Fuzzy c-means the algorithm K-means that is similar to the algorithm:

- Select the number of clusters.
- Clusters assigned to go to each endpoint are Lakki coefficients.
- Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two atratance is from someone else): • Calculate kanterwads for each cluster using the formula above.
- Using the formula above, calculate their coefficients for each location in the clusters.

Intra-cluster analytics K-means are less than the algorithm, however there are problems, in the same way that there is at least one local minimum depending on weights and the initial selection of results. In a more orderly way, the statistics algorithms Mksmyazaon expect some of the following to be views:

Partial membership in classes. They know they've given precedence to properties and simple fuzzy-C-means.

I. PROPOSED SEGMENTATION METHOD

Here in this section we proposed that our hybrid fuzzy K-means cluster acronym (AFKM). First, what the average used for preprocessing will be to remove from digital photos using filter noise and improve image quality. The product of the first phase will then be able to identify the margins of the image, and then it's K-i.e. the Segmented generated mines of the cluster: image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer of the capsule will be applied to the product of MR images with the improve K-roots. Size of the tumor will be detected. The algorithm that steps up for the proposed system is shown in the diagram of a block.

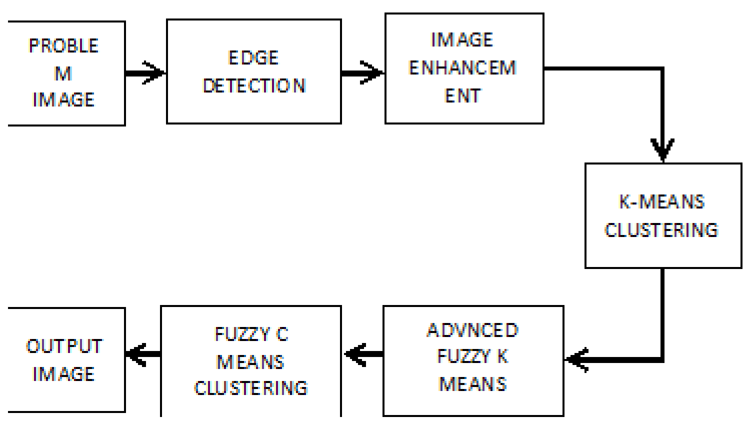

Fig. 3. Proposed system block diagram

II. SIMULATION RESULTS

Simulation has been done in Matlab. Fig. 4 represents the edges found in the image, Fig. 5 shows the original image and Fig. 6, Fig. 7, Fig 8 shows the segmented images of K-means clustering, Fuzzy C-means clustering and proposed segmented method.

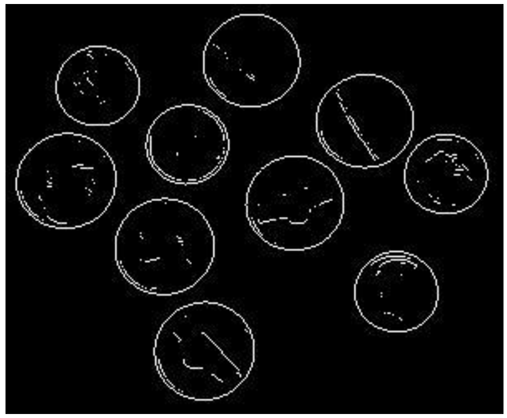

Fig. 4. Edges detection

TABLE I. COMPARISION WITH OTHER METHODS

S.NO.	**SEGMENTATION METHOD**	**TIME(Sec)**
1	K-MEANS CLUSTERING	3.625
2	FUZZY C-MEANS CLUSTERING	4.0625
3	AFKM ALGORITHM	2.8433
4	EELCS ALGORITHM	1.0692

Above table I shows the comparison results with K-means clustering and C-Means clustering, which have produced the better results in terms of time.

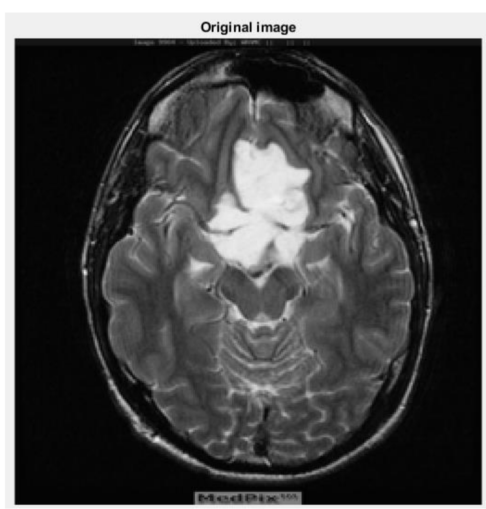

Fig. 5. Original image

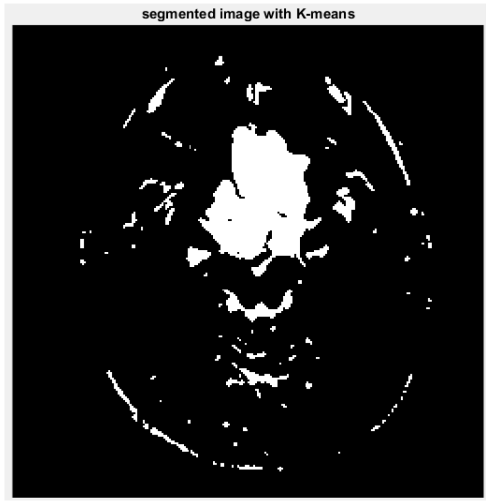

Fig. 6. Segmented image with K-means clustering

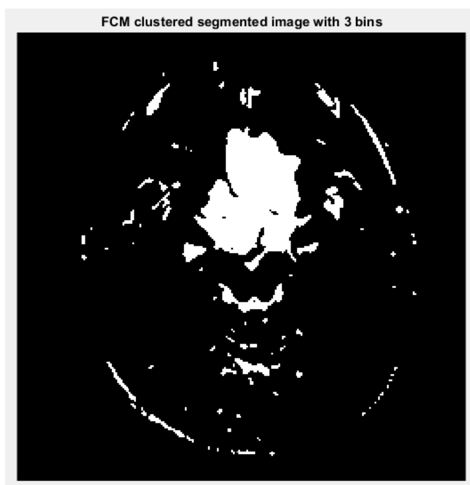

Fig. 7. Segmented image with Fuzzy C-means clustering

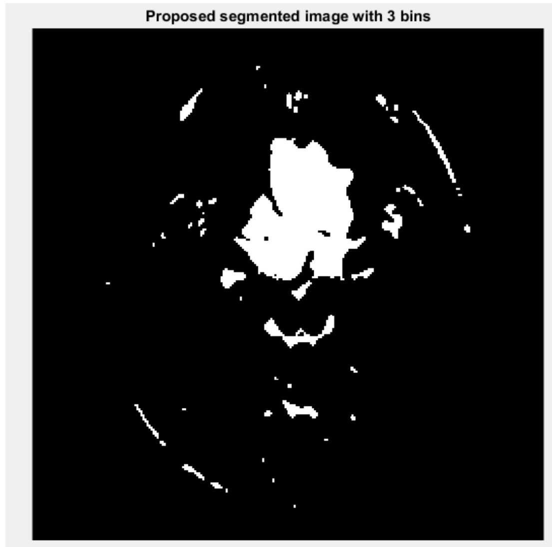

Fig. 8. Segmented image with Proposed Structure algorithm

CONCLUSION

An approach had been presented in this paper that directly specifies a profile for histogram equalization-based image contrast enhancement. The proposed method makes use of a linear adjustment of the target histogram taking into account to minimize the difference between the mean brightness between the input and enhanced image. This method removes the need to separate the image into sub-groups and simplifies the equalization process to a single run. Furthermore, a rationalized choice of threshold was formulated where a balancing condition was met. Thus, fulfilling the requirement for minimum input-output brightness error. Experiments on a large data set of natural images reveals that although there is no single technique that can perform best in all performance criteria.

REFERENCES

[1] Y. Zheng, M.P. Wachowiak, A.S. Elmaghraby, Resolution improvement and detail enhancement for computed tomography scout images, J. Electron. Imaging 14 (1) (2005) 013003.

[2] G. Zhang, X. Jia, N.M. Kwok, Super pixel based remote sensing image classification with histogram descriptors on spectral and spatial data, in: 2012 IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 2012, pp. 4335–4338.

[3] T. Wu, H. Wu, Y. Du, N. Kwok, Z. Peng, Imaged wear debris separation for online monitoring using gray level and integrated morphological features, Wear 316 (1–2) (2014) 19–29.

[4] J. Zhao, Y. Chen, H. Feng, Z. Xu, Q. Li, Fast image enhancement using multi-scale saliency extraction in infrared imagery, Optik 125 (2014) 4039–4042.

[5] F. Su, G. Fang, N.M. Kwok, Adaptive colour feature identification in image for object tracking, Math. Probl. Eng. (2012), http://dx.doi.org/10.1155/2012/509597, article ID 509597, 18 pp.

[6] Y.-H. Yu, N.M. Kwok, Q.P. Ha, Color tracking for multiple robot control using a system-on-programmable-chip, Autom. Constr. 20 (6) (2011) 669–676.

[7] K.-L. Chung, W.-J.Yang, W.-M. Yan, Efficient edge-preserving algorithm for color contrast enhancement with application to color image segmentation, J. Vis. Commun. Image Represent. 19 (5) (2008) 299–310.

[8] T.A. Mahmoud, S. Marshall, Edge-detected guided morphological filter for image sharpening, EURASIP J. Image Video Process. 2008 (2008).

[9] J.-Y. Kim, L.-S.Kim, S.-H. Hwang, An advanced contrast enhancement using partially overlapped sub-block histogram equalization, IEEE Trans. Circuits Syst. Video Technol. 11 (4) (2001) 475–484.

[10] N.S.P. Kong, H. Ibrahim, Multiple layers block overlapped histogram equalization for local content emphasis, Comput. Electr. Eng. 37 (5) (2011) 631–643.

[11] R.C. Gonzalez, R.E. Woods, Digital Image Processing, 3rd ed., Prentice-Hall, Inc., Upper

Saddle River, NJ, USA, 2006.

[12] L. Lu, Y. Zhou, K. Panetta, S. Agaian, Comparative study of histogram equalization algorithms for image enhancement, in: SPIE Defense, Security, and Sensing, International Society for Optics and Photonics, 2010, p. 770811.

[13] B.-W. Yoon, W.-J.Song, Image contrast enhancement based on the generalized histogram, J. Electron. Imaging 16 (3) (2007) 033005.

[14] J.A. Stark, Adaptive image contrast enhancement using generalizations of histogram equalization, IEEE Trans. Image Process. 9 (5) (2000) 889–896.

[15] S. Poddar, S. Tewary, D. Sharma, V. Karar, A. Ghosh, S.K. Pal, Non-parametric modified histogram equalisation for contrast enhancement, IET Image Process. 7 (7) (2013) 641–652.

[16] C. Wang, J. Peng, Z. Ye, Flattest histogram specification with accurate brightness preservation, IET Image Process. 2 (5) (2008) 249–262.

[17] Y.-T. Kim, Contrast enhancement using brightness preserving bi-histogram equalization, IEEE Trans. Consum.Electron. 43 (1) (1997) 1–8.

[18] C.H. Ooi, N.A.M. Isa, Adaptive contrast enhancement methods with brightness preserving, IEEE Trans. Consum. Electron. 56 (4) (2010) 2543–2551.

[19] C. Zuo, Q. Chen, X. Sui, Range limited bi-histogram equalization for image contrast enhancement, Optik 124 (5) (2013) 425–431.

[20] J.R. Tang, N.A.M. Isa, Adaptive image enhancement based on bi-histogram equalization with a clipping limit, Comput. Electr.Eng. (2014), http://dx.doi.org/10.1016/j.compeleceng.2014.05.017.

[21] N.S.P. Kong, H. Ibrahim, Color image enhancement using brightness preserving dynamic histogram equalization, IEEE Trans. Consum. Electron. 54 (4) (2008) 1962–1968.

[22] N.M. Kwok, X. Jia, D. Wang, S.Y. Chen, G. Fang, Q.P. Ha, Visual impact enhancement via image histogram smoothing and continuous intensity relocation, Comput. Electr. Eng. 37 (5) (2011) 681–694.

[23] N.M. Kwok, Q.P. Ha, D. Liu, G. Fang, Contrast enhancement and intensity preservation for gray-level images using multi-objective particle swarm optimization, IEEE Trans. Autom. Sci. Eng. 6 (1) (2009) 145–155.

[24] Z. Lu, Brightness-preserving weighted sub images for contrast enhancement of gray-level images, J. Electron. Imaging 21 (3) (2012) 033001–33011.

[25] Y. Yao, B. Abidi, N. Doggaz, M. Abidi, Evaluation of sharpness measures and search algorithms for the auto focusing of high-magnification images, in: Defense and Security Symposium, International Society for Optics and Photonics, 2006, p. 62460G.

[26] D. Hasler, S.E. Suesstrunk, Measuring colourfulness in natural images, in: Electronic Imaging 2003, International Society for Optics and Photonics, 2003, pp. 87–95.

ISSN: 2005-4238 IJAST