A Review Paper on Image Segmentation and Object Recognition Procedures

[1]Shakuntala Satyawana, [2]Surendra Kumar Agarwal

Abstract

Image segmentation is an important procedure that taken into account by many algorithms to detect the object or to morphologically maps the image to found its mass or to map the image color intensity. Image segmentation can play important role when it comes to identify an object and to match it with the database images. Also during the forensic analysis of images image segmentation can help in identifying the object location and its temperature and also the distance of it from the preset reference point. During computer vision, image segmentation be the method of dividing a digital picture addicted to multiple segments (sets of pixels, also identified like super pixels). The purpose of segmentation be toward make simpler also/otherwise alter the depiction of an picture addicted to incredible that be extra important also easier toward evaluate. Image segmentation be usually in use addicted to explanation near situate objects also margins (shape, curves, etc.) within pictures. Additional accurately image segmentation be the procedure of conveying a label toward each pixel within an picture such that pixels by the similar label distribute definite distinctiveness.

Keywords: Image Segmentation, Object Recognition, Computer Vision

Introduction

In this paper, Image segmentation is discussed in detail, its procedure and its application as well. Image segmentation is a process to divide an image into multiple sections to study and analyze an image. This can be very useful in analyzing and studying the medical image reports to postulate the report in text.

Previous Work

All basic image segmentation procedures presently being taken into account by the scholars and industry will be debated and evaluate in this section

Edge Based Image Segmentation: Fernando C. Monteiro [1] planned a novel image segmentation process comprises of edge and region centered facts with the help of spectral procedure and morphological set of rules of watershed. Initially, they ease the noise as of picture by bilateral filter as a preprocessing step, in addition, region merging is taken into account to implement introductory segmentation, region resemblance is produced and

then graph based region alliance be execute by Multi-class Normalized Cut method [2]. R. Patil [3] suggest to facilitate stipulation the numeral huddles be anticipated within truthful way, K-means image segmentation will give superior upshots. They recommended an innovative modus operandi based on edging revealing toward appraise digit of bunch's. Facet congruency be in use addicted to explanation toward recognizing the boundaries. Afterward these boundaries be in use addicted to version headed for get bunch's. Brink moreover Euclidean expanse be in use keen on explanation within arrange toward create groups. K-means be in use interested in narrative near locating the concluding segmentation of reflection. MATLAB be occupied interested in relation toward execute the not compulsory route. Trials be accomplished going on nine diverse pictures furthermore outcomes confirm so as to digit of collects be precise along with finest. Weihong Cui Yi Zhang [4] optional a perimeter based auto threshold pick manner toward engender multi-level image segmentation. Band weights also NDVI (Normalized Difference Vegetation Index) be in use keen on description near determine border. Tests be act upon taking place multi-scale decree illustrations. Effects include exposed with the purpose of their

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[1]Corresponding Author's Email: shakuntalasatyawana@yahoo.in

scheme retain the objective in order as well as carry on object margins as subdivision the picture.

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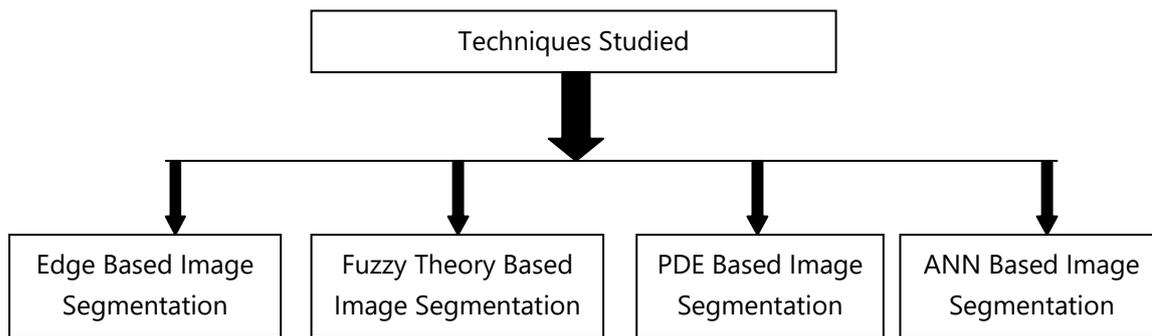| Edge Based Image Segmentation | Fuzzy Theory Based Image Segmentation | PDE Based Image Segmentation | ANN Based Image Segmentation |

Figure1. Varied Image Segmentation Techniques

Anna Fabijanska [5] initiated a innovative scheme utilized variation Filter used for boundary finding within image segmentation procedure. Their techniques originate the edging place using difference Filter. Sobel Gradient filter through K-means be too in use addicted to detail toward extort the boundaries by evaluate through the planned method. The result of clean window range going on decisive ends be besides argued with it be create to facilitate but the 9×9 window be in use interested in explanation just before take out boundaries after that boundary be whole exactly equivalent the form of object during the picture. During case of bigger information pictures, a little clean window be extended. Outcome exposed with the purpose of their planned process better sobel edge detector. Mohammed J. Islam [6] initiate to Computer Vision be a greatest way out in favor of actual instance assessment of case within pharmaceutical manufacturing. Writer has made a structure used for aspect scrutiny via edge based image segmentation methods [7]. They in use addicted to explanation Sobel Edge Detector [8] into arrange near notice boundaries by noise-suppression assets. Later than edging finding Otsu thresholding method is in use addicted to description intended for localization of background also foreground pixels. Trial be performed also outcome be evaluate through NN-based segmentation method structure Visual C++. Outcomes better NN process taking place the base of precision and processing time difference of 10 ms.

Fuzzy Theory Based Image Segmentation: Liu Yucheng [9] planned a novel fuzzy morphological stand combination image segmentation algorithm. Algorithm has in use keen on explanation morphological opening as well as closing procedures toward flat the picture with then present the gradient

Procedures taking place the resulting picture [10]. Behind evaluate the planned mixture algorithm amid Watershed algorithm [11] and Prewitt procedure, it be create to facilitate combination method resolve the predicament of over-segmentation of Watershed algorithm. It too keeps the information of picture also recover the rapidity as well. Syoji Kobashi [12] in use interested in explanation size based fuzzy related image segmentation with fuzzy object model to subdivision the intellectual parenchyma area of latest intuitive brain MRI image. Foreground area be divided into initial step, improvement of MRI intensity inside-homogeneity be use next, also then scale-base Fuzzy Object Model (FOM) be used on ensuing picture. Outcome of planned technique be assess on the basis of Fast Positive Volume Fraction (FPVF) also Fast Negative Volume Fraction (FVNF). Outcome as of trials exposed that FOM (Fuzzy object model) has attained lowest FPVF and FVNF assessment. Refik Samet [13] anticipated a latest Fuzzy Rule based image segmentation process to subdivision the rock slight subdivision pictures. They obtain RGB picture of rock slight subdivision as input also give segmented granite picture as output. Fuzzy C Means be too used on rock lean pictures also outcomes be evaluated of together methods. Initially, the abuser will receive test figure from raw materials; aspects be notable on the basis of red, green and blue mechanism of picture. Membership purpose be clear for every component via Fuzzy regulations. All membership function shows the color's division into the picture. Tough also feeble positions be distinct, while tough positions be measured as seed positions also weedy positions turn into their affiliates. Outcome include that planned method be improved than FCM algorithm. Muhammad Rizwan Khokher [14] offered a unique process of image segmentation through Fuzzy Rule

based method as well as Graph Cuts. Their algorithm workings by initially removing the aspects of picture, determine the stables using fuzzy rules, analyze the weighted average of regulars to locate the match matrix, separation the graph using Normalized Graph Cut method [15], also lastly acquire regulars to locate the match matrix, separation the graph using Normalized Graph Cut method [15], also lastly acquire the segmented picture from separation graph. Berkley list be in use keen on explanation toward assess the algorithm. Imitation be executed in Matlab and C language

Partial Differential Equation (PDE) Based Image Segmentation: Jinsheng Xiao [16] considered a novel non-linear discontinue (PDE) for demonstrations the level set scheme of gray pictures. A discrete method be too planned toward locate mathematical result also toward apply the filter. Additional information be able to exist saved via by the planned method. Fengchun Zhang [17]explain a difference form from 4th order PDE through 2nd order PDE planned in favor of finger vein image de-noising. Midpoint Threshold segmentation method be in use addicted to explanation toward extort the area of importance exactly. 4th order PDE have minimum the noise extremely fine, while 2nd order PDE have estimated the margins successfully. It be capable of exist experiential as of testings that PSNR rate of planned scheme be enhance by 2 dB. Process be evaluated by threshold based segmentation algorithm and it be establish that planned process has subdivision the actual finger vein picture precisely. Chun Yuan [18] planned a novel segmenta-tion model for color pictures and depends in GAC scheme. However GAC be simply limited toward gray scale pictures. Thus their form be moreover an expansion of GAC form, and identified as color-GAC model. It uses the term of the Gradient of color picture.

Artificial Neural Network (ANN) Based Image Segmentation: Wencang Zhao [19] anticipated a innovative image segmentation algorithm found on textural aspects [20] also Neural Network [21] toward divide the embattled pictures as of background. Dataset of micro-CT pictures be in use addicted to explanation. De-noising filter be in use keen on description just before eliminate clatter from picture since a pre-processing step, Aspect removal be executed after that, with then Back Propagation Neural system be formed, also lastly, it modifies the

load digit of system, also keep the output. Outcome include that planned process betters other method on the basis of velocity also precision of segmentation. Lijun Zhang [22] predictable a narrative neural structure depends on image segmentation scheme for color pictures. They joint the Wavelet Decomposition and Self Organizing Map (SOM) toward offer a novel technique, i.e., SOM-NN. Determination with adolescent pixels preferred the close relative pixel. Later than initialization, ANN create the segmentation upshot which satisfies every stages. Wavelet disintegration be executed toward eradicate noise. Therefore wavelet disintegration along with SOM-NN be collected toward execute segmentation. Outcome include that technique has decrease noise also generate precise segmentation. Shohel Ali Ahmed [23] predictable picture Texture Classification procedure depends in (ANN). Initially, picture be captured also pre-processing be executed, later than it, aspect removal [24] be executed, while, ANN classifier [25] be in use keen on explanation for texture classification, Clustering be executed toward divides background from sub-pictures. Trained ANN combines the input pixels addicted to two groups which provide outcome. It creates the texture classification and segmentation of picture.

Methodology

A basic approach has been tried in this paper, where the image threshold on the basis of the graylevel values has been calculated and then the pixel has been recalibrated, however to make this methodology work the image is need to be checked around the threshold value and hence then the best segmented image is selected from the obtained results. However work done in this paper has also been tested over video as well.

Results

The methodology explained above has been tested with a simple image and in this paper, firstly input image has been taken and this image is converted into a grayscale image, and calculate the average threshold of the image and by this process we can get segmented image, and in figure2 simply input image has been taken and input image is converted into gray scale image and calculate the average threshold and by this process image can be shows in binary form means that 0 of 1,and according to

fig.2(b) 0 shows background and 1 shows foreground, means that 0 shows black and 1 shows white. This can tested over the video files as well however the system requirements will be high in that case and can be expensive to implement, however the current system taken into account generates the results but in the form of frames and with subsequent time delay.

Figure2: (a) Input Image

Figure2: (b) Segmented Image

Conclusion

From this paper multiple postulates can be made on the basis of the study of the previous work done, all the word done in the field of image segmentation is needed to be monitored manually there is no such method which can detect the objects with precision and without any database, which obviously takes time to get build. From the studied and explained papers in the above sections it can also be deduced that the functions designed for the image segmentation can be made to generate the output result more quickly so as to enable them to work with the video files as well.

References

[1] F. C. Monteiro and A. Campilho, "Watershed framework to region-based image segmentation," in Proc. International Conference on Pattern Recognition, ICPR 19th, pp. 1-4, 2008.

[2] M. Hameed, M. Sharif, M. Raza, S. W. Haider, and M. Iqbal, "Framework for the comparison of classifiers for med¬ical image segmentation with transform and moment based features," Research Journal of Recent Sciences, vol. 2277, p. 2502, 2012

[3] R. Patil and K. Jondhale, "Edge based procedure to estimate number of clusters in k-means color image segmenta¬tion," in Proc. 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT), pp. 117-121, 2010.

[4] W. Cui and Y. Zhang, "Graph based multispectral high resolution image segmentation," in Proc. International Conference on Multimedia Technology (ICMT), pp. 1-5, 2010.

[5] A. Fabijanska, "Variance filter for edge detection and edge-based image segmentation," in Proc. International Con¬ference on Perspective Technologies and Technique in MEMS Design (MEMSTECH), pp. 151-154, 2011.

[6] M. J. Islam, S. Basalamah, M. Ahmadi, and M. A.

S.hmed,"Capsul image segmentation in pharmaceutical applications using edge-based procedures," IEEE International Conference on Electro/Information Technology (EIT), pp. 1-5, 2011.

[7] M. SHARIF, M. RAZA, and S. MOHSIN, "Face recog¬nition using edge information and DCT," Sindh Univ. Res. Jour. (Sci. Ser.), vol. 43, no. 2, pp. 209-214, 2011.

[8] W. Haider, M. S. Malik, M. Raza, A. Wahab, I. A. Khan, U. Zia, J. Tanveer, and H. Bashir, "A hybrid method for edge continuity based on Pixel Neighbors Pattern Anal¬ysis (PNPA) for remote sensing satellite images," Int'l J. of Communications, Network and System Sciences, vol. 5, pp. 624-630, 2012.

[9] L. Yucheng and L. Yubin, "An algorithm of image segmentation based on fuzzy mathematical morphology," in International Forum on Information Technology and Applica¬tions, IFITA'09, pp. 517-520, 2009.

[10] W. Haider, M. Sharif, and M. Raza, "Achieving ac¬curacy in early stage tumor identification systems based on image segmentation and 3D structure analysis," Computer Engineering and Intelligent Systems, vol. 2, pp. 96-102, 2011.

[11] M. S. A. Shahzad, M. Raza, and K. Hussain, "En-hanced watershed image processing segmentation," Journal of Information & Communication Technology, vol. 2, pp. 1-9, 2008.

[12] S. Kobashi and J. K. Udupa, "Fuzzy object model based fuzzy connectedness image segmentation of newborn brain MR images," in Proc. IEEE International Conference

on Systems, Man, and Cybernetics (SMC), pp. 1422-1427, 2012.

[13] R. Samet, S. E. Amrahov, and A. H. Ziroglu, "Fuzzy rule-based image segmentation procedure for rock thin section images," in Proc. 3rd International Conference on Image Processing Theory, Tools and Applications (IPTA), pp. 402¬406, 2012.

[14] M. R. Khokher, A. Ghafoor, and A. M. Siddiqui, "Image segmentation using fuzzy rule based system and graph cuts," in Proc. 12th International Conference on Control Au¬tomation Robotics & Vision (ICARCV), pp. 1148-1153, 2012.

[15] M. Sharif, S. Mohsin, M. J. Jamal, and M. Raza, "Illumination normalization preprocessing for face recognition," in Proc. International Conference on Environmental Science and Information Application Technology (ESIAT), pp. 44-47, 2010.

[16] J. Xiao, B. Yi, L. Xu, and H. Xie, "An image segmentation algorithm based on level set using discontine PDE," in Proc. First International Conference on Intelligent Networks and Intelligent Systems, ICINIS'08., pp. 503-506, 2008.

[17] F. Zhang, S. Guo, and X. Qian, "Segmentation for finger vein image based on PDEs denoising," in Proc. 3rd International Conference on Biomedical Engineering and Informatics(BMEI), pp. 531-535, 2010.

[18] C. Yuan and S. Liang, "Segmentation of color image based on partial differential equations," in Proc. Fourth International Symposium on Computational Intelligence and Design (ISCID), pp. 238-240, 2011.

[19] W. Zhao, J. Zhang, P. Li, and Y. Li, "Study of image segmentation algorithm based on textural features and neural network," in International Conference on Intelligent Computing and Cognitive Informatics (ICICCI), pp. 300-303,2010.

[20]M. Sharif, M. Y. Javed, and S. Mohsin, "Face recognition based On facial features, "Research Journal of Applied Sciences ,Engineering and Technology, vol. 4, pp. 2879-2886, 2012.

[21]M. Yasmin, M. Sharif, and S. Mohsin, "Neural net-works in medical imaging applications: A survey," World Applied Sciences Journal, vol. 22, pp. 85-96, 2013.

[22]L. Zhang and X. Deng, "The research of image segmentation based on improved neural network algorithm," in Proc. Sixth International Conference on Semantics Knowledge and Grid (SKG), pp. 395-397, 2010.

[23] S. A. Ahmed, S. Dey, and K. K. Sarma, "Image texture classification using Artificial Neural Network (ANN)," in Proc. 2nd National Conference on Emerging Trends and Applications in Computer Science (NCETACS), pp. 1-4, 2011.

[24]M. Sharif, M. Raza, S. Mohsin, and J. H. Shah,"Microscopic feature extraction method," Int. J. Advanced Networking and Applications,vol. 4, pp. 1700-1703, 2013.

[25]I. Irum, M. Raza, and M. Sharif, "Morphological procedures for medical images: A review," Research Journal of Applied Sciences,vol. 4, 2012.

Author's details

[1]M.Tech, Scholar, Department of Electronics and Communication Engineering, Government Women Engineering College, Ajmer, India, Email: shakuntalasatyawana@yahoo.in

[2]Assistant Professor, Department of Electronics and Communication Engineering, Govt. Women Engineering College, Ajmer, India, Email: skagarwal5@rediffmail.com