ISSN 2229-5518

Color Image Segmentation – An Approach

S.Pradeesh Hosea, S. Ranichandra, T.K.P.Rajagopal

Abstract— The literature on the color image segmentation is very large and it has been delimited to review some important literature to trace the core issues. On the basis of the identified issues, objectives were drawn to prosecute a fresh study in the color image segmentation. This Literature review helps researcher to understand various techniques, themes, methodologies, approaches and controversies so for applied for color image segmentation. The algorithm combining color and texture information for the segmentation of color images. The algorithm uses maximum likelihood classification combined with a certainty based fusion criterion. It was validated using mosaics of real color textures presented in Color and texture fusion: application to aerial image segmentation.

Index Terms— color images, segmentation, image processing.

1 INTRODUCTION

H D. Cheng, X. H. Jiang, Y. Sun, Jingli Wang in 2001, described the concept of monochrome image segmentation approaches operating in different color spaces such as histogram thresholding, characteristic feature clustering, edge detection, region-based methods, fuzzy techniques, neural networks in Color image segmentation [2].

In 2001, F.Kurugollu, B.Sankur and A.E. Harmanci proposed the techniques of multiband image segmentation based on segmentation of subsets of bands using multithresholding followed by the fusion of the resulting segmentation “channels”. For color images the band subsets are chosen as the RB, RG and BG pairs, whose two-dimensional histograms are processed via a peak-picking algorithm to effect multithresholding is present in Color image segmentation using histogram multithresholding and fusion [3].

The method of simple and efficient implementation of Lloyd's k-means clustering algorithm, which we call the filtering algorithm. This algorithm is easy to implement, requiring a kd-tree as the only major data structure is present in an efficient k-means clustering algorithm. It was proposed by T. Kanungo, D. M. Mount, N. Netanyahu, C. Piatko, R. Silverman, and A. Y Wu in 2002[4].

Chi zhang, P. Wang in 2002, described the concept based on K-means algorithm in HSI space and has the advantage over those based on the RGB space. Both the hue and the intensity components are fully utilized. In the process of hue clustering, the special cyclic property of the hue component is taken into consideration is present in A New Method of Color Image Segmentation Based on Intensity and Hue Clustering[5].

The method of a color image segmentation system that performs color, clustering in a color space followed by color region segmentation in the image domain. The region segmentation algorithm merges clusters in the image domain based on color similarity and spatial adjacency is present in Color Image Segmentation in the Color and Spatial Domains. It was proposed by Tie Qi Chen', Yi L. Murphey', Robert Karlsen and Grant Gerhartd in 2002[6].

Faguo Yang and Tianzi Jiang in 2003, described the concept of a novel pixon-based adaptive scale method for image segmentation. The key idea of our approach is that a pixon-based image model is combined with a Markov random field (MRF) model under a Bayesian framework is present in Pixon-Based Image Segmentation With Markov Random Fields.[7].

The method to split colox information is the image to be segmented. Hence, this is a blind colour image segmentation method. It consists of four subsystems: preprocessing, cluster detection, cluster fusion and postprocessing is present in A four-stage system for blind colour image segmentation. It was proposed by Ezequiel López-Rubio, José Muñoz-Pérez, José Antonio Gómez-Ruiz in 2003[8].

Dmitriy Fradkin, Ilya Muchnik in 2004, described the concept to constructing hierarchical classifiers us- ing cluster analysis and suggests new methods and improvements in each of these approaches. We also suggest a new method for constructing features that improve classification accuracy is present in A Study of K-Means Clustering for Improving Classification Accuracy of Multi-Class SVM [9].

Cheolha Pedro Lee in 2005, described the concept based on the statistics of image intensity where the statistical information is represented as a mixture of probability density functions defined in a multi-dimensional image intensity space. Depending on the method to estimate the mixture density functions, three active contour models are proposed: unsupervised multi-dimensional histogram method, half-supervised multivariate Gaussian mixture

density method, and supervised multivariate Gaussian mixture density method is present in Robust Image Segmentation using Active Contours [10].

In 2007, Chris Vutsinas described the concept of Image Segmentation: K-Means and EM Algorithms. In this method, two algorithms for image segmentation are studied. K-means and an Expectation Maximization algorithm are each considered for their speed, complexity, and utility. Implementation of each algorithm is then discussed [11].

Ahmed REKIK, Mourad Zribi, Ahmed Ben Hamida, Mohammed Benjelloun in 2007, described the concept of Image analysis, usually, refers to a process of images provided by a computer in order to find the objects within the image. . It consists of subdividing an image into its constituent parts as well as extracting them, is present in the Review of satellite image segmentation for an optimal fusion system based on the edge and region approaches [12].

In 2008, Milind M. Mushrifand Ajoy K. Ray introduced the method of a new color image segmentation algorithm using the concept of histon, based on Rough-set theory, is presented in Color image segmentation: Rough-set theoretic approach. The histon is an encrustation of histogram such that the elements in the histon are the set of all the pixels that can be classified as possibly belonging to the same segment. In rough-set theoretic sense, the histogram correlates with the lower approximation and the histon correlates with upper approximation [13].

The concept of Fusion of multispectral image with a hyperspectral image generates a composite image which preserves the spatial quality from the high resolution (MS) data and the spectral characteristics from the hyperspectral data , is presented in Performance analysis of high-resolution and hyperspectral data fusion for classification and linear feature extraction. It was proposed by Shashi Dobhal in 2008[14].

Sheng-xian Tu, Su Zhang, Ya-zhu Chen, Chang-yan Xiao and Lei Zhang in 2008, a new hierarchical approach called bintree energy segmentation was presented for color image segmentation. The image features are extracted by adaptive clustering on multi-channel data at each level and used as the criteria to dynamically select the best chromatic channel, where the segmentation is carried out. In this approach, an extended direct energy computation method based on the Chan-Vese model was proposed to segment the selected channel, and the segmentation outputs are then fused with other channels into new images, from which a new channel with better features is selected for the second round segmentation. This procedure is repeated until the preset condition is met. Finally, a binary segmentation tree is formed, in which each leaf represents a class of objects with a distinctive color [15].

A novel method of colour image segmentation based on fuzzy homogeneity and data fusion techniques is presented. The general idea of mass function estimation in the Dempsteri-Shafer evidence theory of the histogram is extended to the homogeneity domain. The fuzzy homogeneity vector is used to determine the fuzzy region in each primitive colour, whereas, the evidence theory is employed to merge different data sources in order to increase the quality of the information and to obtain an optimal segmented image. Segmentation results from the proposed method are validated and the classification accuracy for the test data available is evaluated, and then a comparative study versus existing techniques is presented. It was described by Salim Ben Chaabane, Mouniri Sayadi, Farhat Fnaiech and Eric Brassart in 2009[16].

Fahimeh Salimi, Mohammad T. Sadeghi in 2009, introduced a new histogram based lip segmentation technique is proposed considering local kernel histograms in different illumination invariant colour spaces. The histogram is computed in local areas using two Gaussian kernels; one in the colour space and the other in the spatial domain. Using the estimated histogram, the posterior probability associated to non-lip class is then computed for each pixel. This process is performed considering different colour spaces. A weighted averaging method is then used for fusing the posterior probability values. As the result a new score is obtained which is used for labeling the pixels as lip or non-lip. The advantage of the proposed method is that the segmentation process is totally unsupervised [17].

In 2009, Damir Krstinic, Darko Stipanicev, Toni Jakovcevic described a pixel level analysis and segmentation of smoke colored pixels for the automated forest fire detection. Variations in the smoke color tones, environmental illumination, atmospheric conditions and low quality of the images of wide outdoor area make smoke detection a complex task. In order to find an efficient combination of a color space and pixel level smoke segmentation algorithm, several color space transformations are evaluated by measuring separability between smoke and non-smoke classes of pixels [18].

The concept of a new color thresholding method for detecting and tracking multiple faces in video sequence. The proposed method calculates the color centroids of image in RGB color space and segments the centroids region to get ideal binary image at first. Then analyze the facial features structure character of wait-face region to fix face region. The novel contribution of this paper is creating the color triangle from RGB color space and analyzing the character of centroids region for color segmenting. It was proposed by Jun Zhang, Qieshi Zhang, and Jinglu Hu in 2009[19].

REFERENCES

[1] M. -P. Dubuisson-Jollyand A. Gupta, Color and texture fusion: application to aerial image segmentation and GIS updating, Volume 18, Issue 10, July 2000, Pages 823-832.

[2] H. D. Cheng, X. H. Jiang, Y. Sun, Jingli Wang, Color image segmentation: advances and prospects Vol. 34, No. 12. (December 2001), pp. 2259-2281.

[3] F. Kurugollu, B. Sankur and A. E. Harmanci (2001) Color image segmentation using histogram multithresholding and fusion Volume 19, Issue 13, 1 November 2001, Pages 915-928

[4] T. Kanungo, D. M. Mount, N. Netanyahu, C. Piatko, R. Silverman, and A. Y. Wu, An efficient k-means clustering algorithm: Analysis and implementation, IEEE Trans. Pattern Analysis and Machine Intelligence, 24 (2002), 881-892.

[5] Chi zhang, P. Wang, A New Method of Color Image Segmentation Based on Intensity and Hue Clustering, volume 3 2002.

[6] Tie Qi Chen', Yi L. Murphey', Robert Karlsen 2, and Grant Gerhartd were present the method of Color Image Segmentation in the Color and Spatial Domains, 2002.

[7] Faguo Yang and Tianzi Jiang, Pixon-Based Image Segmentation, With Markov Random Fields, VOL. 12, NO. 12, DECEMBER 2003.

[8] Ezequiel López-Rubio, José Muñoz-Pérez, José Antonio Gómez-Ruiz. A four-stage system for blind colour image segmentation. Volume 10, Number 2 / 2003 Pages127-137.

[9] Dmitriy Fradkin, Ilya Muchnik, A Study of K-Means Clustering for Improving Classification Accuracy of Multi-Class SVM, DIMACS Technical Report 2004-02 April 2004.

[10] Cheolha Pedro Lee, Robust Image Segmentation using Active Contours: Level Set Approaches. 2005.

[11] Chris Vutsinas, Image Segmentation: K-Means and EM Algorithms, 2007.

[12] Ahmed REKIK, Mourad Zribi, Ahmed Ben Hamida, Mohammed Benjelloun (2007) Review of satellite image segmentation for an optimal fusion system based on the edge and region approaches.Vol.7 No.10, October 2007.

[13] Milind M. Mushrifand Ajoy K. Ray Color image segmentation: Rough-set theoretic approach Volume 29, Issue 4, 1 March 2008, Pages 483-493.

[14] Shashi Dobhal, Performance analysis of high-resolution and hyperspectral data fusion for classification and linear feature extraction. January, 2008.

[15] Sheng-xian Tu, Su Zhang, Ya-zhu Chen, Chang-yan Xiao and Lei Zhang, A bintree energy approach for colour image segmentation using adaptive channel selection, in February 2008.

[16] Salim Ben Chaabane, Mounir Sayadi, Farhat Fnaiech and Eric Brassart, Colour Image Segmentation Using Homogeneity Method and Data Fusion Techniques from Hindawi Publishing Corporation in may 2009.

[17] Fahimeh Salimi, Mohammad T. Sadeghi, Decision Level Fusion of Colour Histogram Based Classifiers for Clustering of Mouth Area Images from International Conference on Digital Image Processing in 2009.

[18] Damir Krstinic, Darko Stipanicev, Toni Jakovcevic, HISTOGRAM-BASED SMOKE SEGMENTATION IN FOREST FIRE DETECTION SYSTEM, ISSN 1392 – 124X INFORMATION TECHNOLOGY AND CONTROL, 2009, Vol.38, No.3.

[19] Jun Zhang, Qieshi Zhang, and Jinglu Hu, RGB Color Centroids Segmentation (CCS) for Face Detection, ICGST-GVIP Journal, ISSN 1687-398X, Volume (9), Issue (II), April 2009.