International Journal of advancement in electronics and computer engineering (IJAECE)
Volume 6, Issue 5, June2017, pp.531-534, ISSN 2278 -1412

Result Analysis Report of Video Object Co-segmentation Using Fast Fuzzy and Merge Tree

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Abstract – *Video Segmentation Using Hierarchical Merge Tree is analyzed in this paper by means of fast fuzzy c-means clustering algorithm and fuzzy membership function. Proposed work is completed for the color segmentation, as previous research presents a connected coherence tree algorithmic rule (CCTA) for Video segmentation with no prior information. It aims to search out regions of semantic coherence based on the projected ε-neighbor coherence segmentation criterion. Rgb Video is converted to Lab color space by taking average of each color component individually, then the average value of the color of small region selected is compared with all the pixels of the Video and finally the desired object gets segmented efficiently. This algorithm runs in small time with much accuracy since, FFCM avoids some unnecessary comparisons between the pixels.*

Keywords*: Video Segmentation, Clustering, Region-Based, RSST, Recursive Shortest-Spanning Tree, FFCM,*

I. Introduction

Video segmentation is critical for many computer vision and information retrieval systems, and has received significant attention from industry and academia over the last 30 years. Despite notable advances in the area, there's no customary technique for choosing a segmentation algorithmic rule to use in a specific application, nor even is there an agreed upon means of comparing the performance of one method with another.

Like many complex computer vision problems, Video segmentation is ill-defined. A common, if rather unconstrained, definition of segmentation is that it is the process of partitioning the set of pixels in an Video into several disjoint subsets, according to a set of pre-defined criteria. Although this definition admits and conforms to almost all other definitions found in the literature, the criteria itself is usually a source of debate.

It states Video segmentation because the technique of dividing a Video into completely different regions such that each region is, however the union of any 2 adjacent regions isn't, homogeneous . Similarly, Morris et. al.[9] describes segmentation because the method of partitioning a picture into regions that are in some sense homogeneous , however completely different from neighboring regions. Skarbek and Koschan[13] for a simpler interpretation: the identification of homogeneous regions. All these definition use the concept of homogeneity, which usually corresponds to identifying regions containing features that are relatively nearby according to a prescribed distance measure.

Segmentation may also be considered as an algorithmic attempt to mimic a human interpretation of an Video, known as perceptual grouping. Considering segmentation in this way substantially increases the scope and complexity of the problem. It also implies this interpretation in their work on comparing automatic segmentation algorithms with human generated ground truth. Fu and Mui [21] and assume this viewpoint, stating that “the Video segmentation problem is basically one of psychophysical perception, and therefore not susceptible to a purely analytical solution.” It both argues that perceptual grouping is hierarchical in nature, and consequentially a flat partitioning of an Video is insufficient for representing a perceptual segmentation.

It is clear from the above that there is considerable variation in what is understood to be the scope and definition of the Video segmentation problem. Video segmentation is usually one of several components in a larger information processing system, and the variation observed in the definition of Video segmentation is mirrored in the variation in requirements on the Video segmentation algorithms in these systems. For multimedia information retrieval systems,[5] Video segmentation algorithms capable of producing homogeneous regions usually suffice, since the purpose of Video segmentation in such systems is often simply to create a set of localized features. Object recognition systems, on the other hand, usually require semantic objects from which features can be extracted and processed by pattern recognition engine (a support vector machine, for example).[7] In some cases, a priori information about the object is available, or can be fed back into the segmentation algorithm; in other cases, no such information is available, and the segmentation algorithm is required to produce regions or objects based on the Video data alone..

II. Thoery

II.1. Hierarchical merge tree

First, Consider a graph, in which each node corresponds to a super pixel and an edge is defined between two nodes that share boundary pixels with each other. Starting with the primary over-segmentation so, finding a final segmentation, which is essentially the merging of initial super pixels, can be considered as combining nodes and removing edges between them. This super pixel merging can be done in an iterative fashion: each time pair of neighboring nodes is combined in the graph, and corresponding edges are updated. To represent the order of such merging, we use a full binary tree structure, that we call the hierarchical merge tree (or merge tree for short) throughout this paper. In a merge tree, node ∈ υ represents an Video segment si ∈ 2 P, where d denotes the depth in Tree at which this node occurs. Leaf nodes correspond to initial super pixels in So. A non-leaf node corresponds to an Video region formed by merging super pixels, and the root node corresponds to the whole Video as one single region. An undirected edge eij ∈ E between nodes and its child exists when sj ⊂ si, and a local structure $(\{\upsilon_i^d, \upsilon_j^{d+1}, \upsilon_k^{d+1}\})$ represents si = sj ∪sk. In this way, finding final segmentation becomes finding a subset of nodes in Tree.

II.2. *Fuzzy membership function*

One of the key issues in all fuzzy sets is how to determine fuzzy membership functions. The membership function fully defines the fuzzy set. A membership function provides a measure of the degree of similarity of an element to a fuzzy the degree of similarity of an element to a fuzzy set. Membership functions can take any form, but there are some common examples that appear in real applications

- Membership functions can

– Either be chosen by the user randomly, based on the user's experience (MF chosen by 2 users might be completely different depending upon their experiences, views, etc.)

– Or be designed using machine learning methods (e.g., artificial neural networks, genetic algorithms, etc.) genetic algorithms, etc.)

- There are completely different shapes of membership functions; triangular, trapezoidal, functions; triangular, trapezoidal, piecewise-linear, Gaussian, bell-shaped, etc.

III. Method

In this paper, we present a hierarchical merge tree algorithm for color Video segmentation. The three different ideas are incorporated in this algorithm to perform better segmentation. The input color Video is first over-segmented into pixels. These pixels are grouped into some clusters according to the distance between the pixels. The clusters are formed using fast fuzzy c-mean clustering technique FFCM.

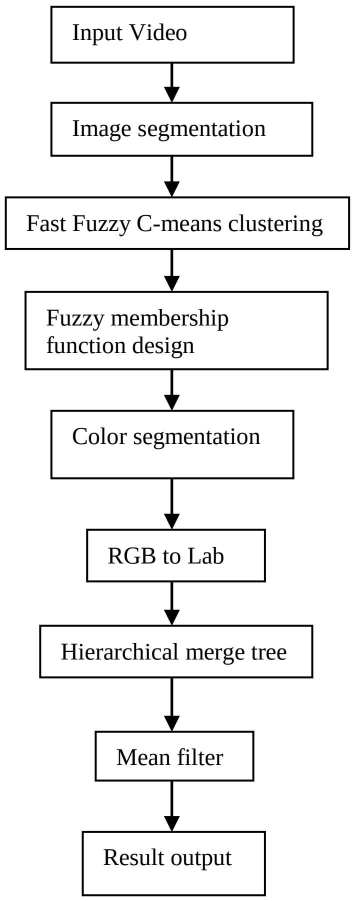

Fig.1 Flow of proposed method

Initially, centroids are fixed randomly between thee pixels of whole Video at proper distance. The distance between each pixel to its nearest neighbour cluster center is calculated and the pixels with minimum distance are grouped into one cluster. Now, the average of the distance for each group is calculated new centroids are fixed. Again distance between pixels and centroids are calculated until no new centroid can be placed. The pixels of cluster are called members of the cluster with membership value lies between 0 and 1. For FFCM a threshold value is fixed between 0 and 1 and the distance calculation for the pixels whose membership values are less than T can be skipped. Each color present in the Video are separated into R, G and B. The rgb Video is converted to Lab color space. The rgb color space contains all attainable colours which will be created by the mix of red, green and blue light. it's a famous model in photography, tv and computer graphics. laboratory color space is outlined by lightness and therefore the color-opponent dimensions a and b. Lab is particularly notable for its use in delta-E calculations. When a small region contain, the color difference (delta-E) in Lab color space is calculated for each pixel in the Video between that pixel's color and the average of the Lab of selected region. All the pixels with color close to the average of selected region is then segmented from the whole Video. After this process hhierarchical merge tree algorithm is applied on converted Video. This segmented Video is passed through the mean filter for noise reduction..

III.1. Fast Fuzzy C-means clustering

This algorithm aims at decreasing the number of distance calculations of the FCM by computing the distances between data points and the nearest cluster centers. This is done to examine the points with membership values greater than a threshold, T, where the value of T is less than 1 and greater than 0.
In this case, there is no need to calculate distances for points with membership values less than T. since, these values don't severely have an effect on the results and thus, some distance calculations will be saved. The Fuzzy C-means clustering (FCM) algorithmic rule could be a information clustering algorithmic rule within which every data point belongs to a cluster to a degree specified by a membership grade. FCM partitions a set of n information points xi, i = 1… n into c fuzzy teams, and finds a cluster center in every cluster specified a price function of unsimilarity evaluate is compact. The most important measures of the sixth WSEAS Int. Conf. on Artificial Intelligence. The membership matrix U is allowed to have components with values between zero and one. Though, commanding normalization specifies that the summarize of degrees of belongingness for information set constantly be capable unity:

$$\sum_{i=1}^{c} u_{ij} = 1, \forall j = 1 \quad (1)$$

The cost function (or objective function) for FCM is:

$$J(U, c_1, ..., c_c) = \sum_{i=1}^{c} j_i = \sum_{j}^{n} u_{ij}^m d_{ij}^2$$

(2)

where u_{ij} uij is between 0 and 1; c_i is the cluster center of fuzzy group i; $d_{ij} = \| c_i - x_j \|$ is the Euclidean distance between i[th] cluster and j[th] data point; and m $\in[1,\infty)$ is weighting exponent.
The essential circumstances for Equation (2) to attain its least amount are:

$$c_i = \frac{\sum_{j=1}^{n} u_{ij}^m x_j}{\sum_{j=1}^{n} u_{ij}^m} \quad (3)$$

$$u_{ij} = \frac{1}{\sum_{k=1}^{c} \left(\frac{d_{ij}}{d_{kj}} \right)^{2/(m-1)}} \quad (4)$$

The fuzzy C-means algorithm is simply an iterated procedure through the preceding two necessary conditions.

IV. Result

The proposed hierarchical merge tree algorithm is carried out on a color Video. Segmentation of color Video is done on the basis of color intensity values of the selected portion. The original color Video consists of rgb components as in fig.2.

fig.2 original input Video.

A small portion of Video has been selected for segmentation.

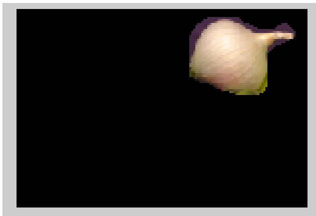

Fig. 3 crop the region from original Video

Delta E calculation has been done for the converted Lab color space and the selected portion is shown in the form of gray Video.

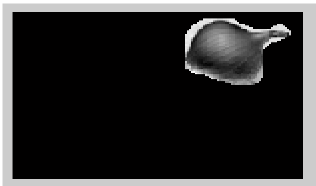

Fig.4 Video masked region

Fig.5 dark Video

Histogram of entire Video and the masked region shows the number of pixels in intensity range.

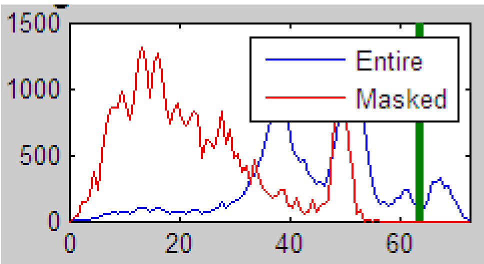

Fig.6 histograms of Videos

The color of selected portion is matched with the color of pixels in entire Video, pixels having color close to the object's color masked.

Fig.7 matching colors mask

Fig.8 matching colors

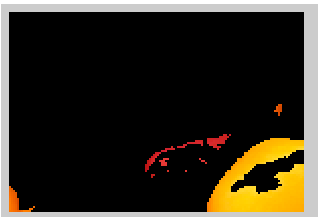

Fig.9 non-matching colors

V. Conclusion

We have proposed a modification of hierarchical merge tree model that iteratively trains a new boundary classifier with accumulated samples for merge tree construction and merging probability prediction and accumulates segmentation to generate contour maps. As proposed work has been done for color segmentation by means of three different algorithms fast fuzzy c-means clustering algorithm and fuzzy membership function and Hierarchal merge tree. This gives efficient segmentation which is shown by the result of Matching and non-matching colors.

References

[1] T. Liu, M. Seyedhosseini, and T. Tasdizen "Video Segmentation Using Hierarchical Merge Tree" IEEE trans. on Video proc., vol. 25, no. 10, october 2016

[2] J.M.Gauch "Video Segmentation and Analysis via Multiscale Gradient Watershed Hierarchies" IEEE trans. on Video proc., vol. 8, no. 1, January 1999

[3] K. Haris, S. N. Efstratiadis, N. M. Aggelos K. Katsaggelos "Hybrid Video Segmentation Using Watersheds and Fast Region Merging" IEEE trans. on Video proc., vol. 7, no. 12, december 1998

[4] J. Shi, J. Malik "Normalized Cuts and Video Segmentation" IEEE Trans. on Pattern Ana. and Machine Intell., Volume 22, Issue 8, August 2000, pages 888-905.

[5] C.Shann Fuh, S.W. Cho, and K. Essig "Hierarchical Color Video Region Segmentation for Content-Based Video Retrieval System" IEEE trans. on Video proc., vol. 9, no. 1, January 2000

[6] M. Seyedhosseini and T. Tasdizen, "Semantic Video segmentation with contextual hierarchical models" IEEE Trans. Pattern Anal. Mach. Intell.,vol. 38, no. 5, pp. 951–964, May 2015.

[7] S. Belongie, C. Carson, H. Greenspan, and J. Malik, "Color- and texturebased Video segmentation using EM and its application to contentbased Video retrieval" in Proc. Int. Conf. Comput. Vis., Jan. 1998, pp. 675–682.

[8] D. Comaniciu and P. Meer, "Mean shift: A robust approach toward feature space analysis" IEEE Trans. Pattern Anal. Mach. Intell., vol. 24, no. 5, pp. 603–619, May 2002.

[9] O.J. Morris, M.de J.Lee, and A.G. Constantinides, 1986. "A unified method for segmentation and edge detection using graph theory" Proc. ICASSP, pp. 2051-2054.

[10] A. Vedaldi and S. Soatto, "Quick shift and kernel methods for mode seeking" in Proc. Eur. Conf. Comput. Vis., 2008, pp. 705–718.

[11] P. F. Felzenszwalb and D. P. Huttenlocher, "Efficient graph-based Video segmentation" Int. J. Comput. Vis., vol. 59, no. 2, pp. 167–181, Sep. 2004.

[12] W. Skarbek, A. Koschan, "Colour Video Segmentation A Survey", Techn.l Report 94-32, Technical University Berlin, October 1994.

[13] H. Zhu, F. Meng, J. Cai, and S. Lu, "Beyond pixels: A comprehensive survey from bottom-up to semantic Video segmentation and cosegmentation" J. Vis. Commun. Video Represent., vol. 34, pp. 12–27, Jan. 2016.

[14] Dipti Patra. "Brain MR Video segmentation using Markov random field model and Tabu search strategy" PhD thesis, NIT, Rourkela, India, Department of Electrical Engineering, 2005.

[15] D. Martin, C. Fowlkes, D. Tal, and J. Malik, "A database of human segmented natural Videos and its application to evaluating segmentation algorithms and measuring ecological statistics" in Proc. 8th IEEE Int. Conf. Comput. Vis. (ICCV), vol. 2. Jul. 2001, pp. 416–423.