

SURVEY ON VARIOUS APPROACHES FOR INTERACTIVE IMAGE SEGMENTATION

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ABSTRACT

Image segmentation is the process of partitioning a digital image into multiple segments. Interactive image segmentation is a computer vision, medical imaging most important topic in. Image segmentation is typically used to locate objects and boundaries. The problem of image segmentation has a lot of attention since the early days of computer vision research found some weakness in the interactive image segmentation methods such as lack of intelligent ways to understand the user input. In this survey, we are discussing various methods and algorithms for image segmentation.

Key words: Image segmentation, Graph cut, Pixel, Boundaries.

I. INTRODUCTION

Image segmentation as the process of partitioning a picture into objects and their backgrounds. Both human and computer vision literature suggests the use of multiple cues for object perception and the task of Image segmentation is no exception, there has been a substantial amount of research on image segmentation including early techniques, e.g. clustering based methods [1], region growing methods, histogram based methods [2], and such as adaptive threshold methods, level set methods, graph based methods. For many years of research, some techniques without human interaction not produce satisfactory results. In order to do image segmentation meaningful, it is essential to take a priori information about the image into account. There are activities which have been increasing in the research to develop interactive image segmentation techniques. Interactive segmentation methods in the literature can be divided into boundary-based and region-based methods, Boundary based methods require the user to select an approximate boundary around the object and Region grow/merge type of methods starts from the interacted regions and try to enlarge this region by the help of measure using texture profile. Interactive systems have been treated as fully automatic systems [20].

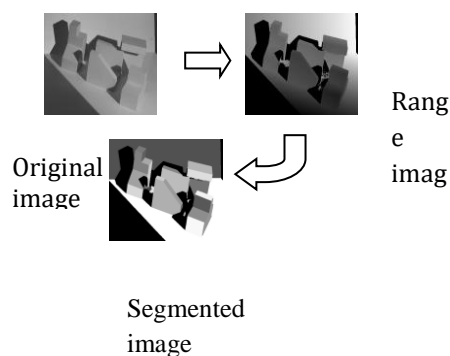


Figure1. Image segmentation

The problem of image segmentation has received a lot in the early days of computer vision research. In this paper, we survey interactive image segmentation using different methods.

A background subtract technique is a method which can be used to detect objects in a static background [1].

II. INTERACTIVE IMAGE SEGMENTATION

A. SEGMENTATION USING PROBABILISTIC HYPER GRAPHS

A Novel interactive framework, for segmenting images using probabilistic, the spatial model and appearance relations among image pixels. A hyper graph poses image segmentation as a machine learning problem. Probabilistic hypergraphs are used in [19]. Hyper graph based interpolation and showed its equivalence to an iterative procedure based on random walks on hyper graphs. The competitive results for Grab Cut dataset with probabilistic method both quantitatively and qualitatively. Comparing binary relations and proposed higher-order relations, the proposed one provides better result. So this is commonly adopted in a standard graph based approach. Besides, the probabilistic method exceeds several recent baselines in terms of the average error rate

B. SEGMENTATION USING DYNAMIC AND ITERATED GRAPH-CUTS

Interactive image segmentation is a method for mobile touch screen devices. As an interactive methodology, coloring is presented and a novel dynamic, graph cut solution is formulated in [3]. The method Efficiency and error tolerance are tested by using various sample images and Subjective evaluation by the algorithm for interactive segmentation on mobile touch screen. [4] is highly accurate to give very fine / subpixel segmentation. To improve the segmentation mean-shift method is used in [21]. Dynamic and iterated graph-cuts method is proposed to increase the speed of the algorithm without compromising on performance superior error robustness and

computational complexity. In addition to these, the performed suggests that algorithms results in poor. To segment the graph, [5] uses the normalized cut. Superpixels can be used either for graph-cuts or level sets segmentation [6].

C. SEGMENTATION BASED ON LEVEL SETS OF PROBABILITIES

Interactive Image Segmentation is used in [7] for still images; In which graph cut algorithm is used. Robust and accurate algorithm is used for interactive image segmentation in [8]. This method will avoid local minima and better snap to true object boundaries further in this they proposed a computational framework that improves the performance of both pixel wise classification and the level set method over multiple passes and the running time spent on the computation of pixel wise likelihood using the probabilistic classifier. Since computation is performed, independently over every pixel, the overall performance of the method can be significantly improved by parallelization on multi core CPUs. Experiments and comparisons have demonstrated the effectiveness of this method.

D. SEGMENTATION THROUGH UNIFIED COMBINATORIAL USER INPUTS

Min cut / Max flow algorithm is discussed in [9]. Region merging techniques using information theory statistical measures is discussed in [10]. Probabilistic approach is used in [11], to clustering by using non parametric representation as well as hybrid parametric and non parametric models. [12] studies the connection between seed based and hierarchical segmentation. The Oriented Watershet Transform and Ultrametric Contour Map are collectively used in [13]. The soft boundary brush and the hard boundary pixel selector are extremely useful to handle weak boundaries. The constrained random walks algorithm together with local editing algorithm supports the three types of user inputs the region prior term and included in the edge weights so that random walks algorithm does not lose the connectivity property and is less demanding on the positions and quantities of the user input strokes than the original random walks algorithm meaningful to conduct a user study to compare the method with different interactive image Segmentation algorithms in usability [14].

In [7] this they have proposed an interactive image segmentation framework that consists of constrained random walks and local contour deformation, the foreground and background brushes are the most commonly used interaction tools as they are easy to use and instructive to the algorithms. To improve the performance of learning algorithm cotraining is introduced in [15]. The [16] discusses SVM package, which is

used for classification, regression and distribution estimation. Extraction and combination of features in the context of active vision are considered for figure ground segmentation [17]. The combination of superpixels and hypergraphs give more efficiency in [18]. To train and evaluate interactive systems, user interaction models can be used [20].

III. CATEGORIES OF IMAGE SEGMENTATION METHODS

TABLE1. SEGMENTATION METHODS

Methods	Description
Clustering Methods	Divides the image into a number of separations, which are volumes in the n-dimensional feature space.
Histogram-Based Methods	Believes that images are arranged in sections with different gray (or color) collections, and divides it into a number of peaks, each in proportion to one region.
Edge Detection Methods	Utilize edge detection operators, for instance Sobel, Laplacian etc. follow-on regions may not be attached; therefore edges need to be connected.
Region Growing Methods	It is based on correspondence of regional image data.
Level Set Methods	Utilized to capably deal with the problem of curvature/facade/etc.. Dissemination in an implicit manner.
Graph Partitioning Methods	The image is formed as a weighted, undirected graph. The graph (image) is then separated consistent with a principle considered to form clusters.
Watershed Transformation	Believes the gradient magnitude of an image as a topographic facade. Pixels draining to a regular minimum form a catch sink that represents a segment.
Neural Networks Segmentation	Relies on handing out small areas of an image with an artificial neural network or a set of neural networks.
Multi-scale	Image segmentations are divided at multiple scales in scale space and

Segmentation	at times disseminated from rude to fine scales
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IV. MODERN METHODS FOR IMAGE SEGMENTATION

TABLE 2. MODERN SEGMENTATION METHODS

Methods	Description
Multi-resolution and multi-channel features	A fascinating feature of such multichannel, the multiresolution imaging system is so as to a range of image processing algorithms can be functional at different segments of the image sensor.
Feature fusion technique	Dissimilar features are extorted, multi features are fused and classified by clustering, and the image can be segmented rapidly
Multi-classifier decision combination	Decisions by the classifiers can be symbolized as rankings of classifiers and different instances of a difficulty.
HMM, GMM, CRF- and GMRF-based techniques	Best optimized instantiation of the classical pattern recognition approach
Artificial Neural Networks – SVM and FFNN	Generated highly accurate classification and encouraging segmentation calculation.
Neuro-fuzzy and soft-computing (SA) techniques	Importance of the theoretical features of covered methodologies, in addition to experiential observations and confirmations of a variety of applications
Active contours, watershed transform	The watershed-based segmentation on a down-sampled image is employed to obtain the initial contours for the dynamic contour models.
Decision Trees and hierarchical analysis	The advance of combining object-based image analysis with decision trees was a superb data reduction tool for the abundant object features.
Probabilistic approaches	To pass up building hard decisions in the low-level image segmentation procedure

V .APPROACHES

TABLE 3. EXPERIMENTAL RESULTS

S. No	Refer ence	Scheme Name	Experimental Results
Segmentation Using Probabilistic Hyper Graphs			
1	Learning an Interactive Segmentation System (20)	Restricted GCS system with 3 parameters	This paper showed,how a robot user can be used to train and evaluate interactive systems
Segmentation Using Dynamic and Iterated Graph-Cuts			
2	Color image segmentation based on adaptive local thresholds (3)	Adaptive local threshold	The algorithm integrates edges and region based techniques while local information is considered, which enables to derive local thresholds adaptively.
3	Normalized cuts and image segmentation (5)	Normalized cut	This method has been developed and applied to segmentation of brightness, color and texture images. Experimental results shows that very encouraging on synthetic and real images.
Segmentation Based on Level Sets of Probabilities			
4	Interactive Image Segmentation using an adaptive GMMRF model (7)	-Adaptive GMMRF (foreground/background segmentation) -pseudo likelihood algorithm (parameter learning)	Results show that parameter learning for the GMMRF by pseudo likelihood is effective.

Segmentation through Unified Combinatorial user Inputs			
5	An Experimental Comparison of Min-Cut/Max-Flow Algorithms for Energy Minimization in Vision (9)	Min-cut/Max-flow algorithm	Results show that this algorithm is consistently several times faster in all applications where graphs are 2D grids.
6	Iterated Graph cuts for Image segmentation (21)	Iterated Graph cut method	More robust segmentation can be obtained.

V. CONCLUSION

This survey consists of various methods and approaches for interactive image segmentation and with the help of these methods and algorithm the segmentation process can use in different datasets to get a clear image, accuracy. Dirichlet process - based non liner classification and the multiple views that include both color appearance and salient boundary information, in addition to smoothness constraints in segment labels. In future the boundary information for image segmentation video-based object can also be implemented by using any one of these methods.

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