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Survey on Image Segmentation Using Various Techniques.

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ABSTRACT

Image segmentation is a common problem which is being faced in image analysis. It is also considered as the first step in image analysis. The main aim of image segmentation is to partition the images into non overlapping regions and also to change the representation of the image in order to make it meaningful and making it easier for the humans to analyze. In spite of the great efforts done in the last two decades it still remains a challenging problem. Most of the methods which has been done in the previous decades utilize low level local features and high level contextual cues.Semantic segmentation and object detection are two most common tasks in the field of image processing, classification and segmentation .The goal of semantic image segmentation is to divide the images into semantically meaningful parts and classifying each part into one of the predefined class.The best results can be achieved by this proposed image segmentation and classification image. In this case there are various advantages such as the object regions can be segmented from the image accurately and time consumption is also less and no special hardware is required.

Keywords: survey, image, segmentation.

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INTRODUCTION

Objects in an image can be identified with the help of image processing techniques such as removal of noise, followed by (low-level) feature extraction in order to locate regions, lines and possibly areas with certain textures. It is better to interpret collections of these shapes as single objects, e.g. cars on a road, etc .If an object can appear very differently when viewed from different angles or under different lighting then is known as AI problem. Another problem decides what features belong to what object and which are background or shadows etc. Mostly the human visual system performs these tasks unconsciously but a computer requires skilful programming and lots of processing power in order to approach human performance Melissa, S, Srilatha, K et al [9]. Data can be manipulated in the form of an image through several possible techniques. A two-dimensional array of brightness values can be used to interpret the image, and is most commonly represented by such patterns as those of a slide, television screen, photographic print etc. An image can be processed optically or digitally with a computer.

In order process an image digitally, it is first important to reduce the image to a series of numbers that can be manipulated by the computer. Picture element, or pixel is the term used for representing the brightness value of the image at a particular location. A typical digitized image may have 512 × 512 or 250,000 pixels, although much larger images are becoming common. There are three basic operations that can be performed on it in the computer once the image has been digitalised. For a point operation, a pixel value in the output image completely depends on a single pixel value in the input image. For local operations, the output value can be determined with the help of several neighbouring pixels in the input image. In a global operation, all of the input image pixels contribute to an output image pixel value

LITERATURE REVIEW

Outdoor Scene Image Segmentation Based on Background Recognition and Perceptual Organization - C.Cheng, A.Koschan, C.-H. Chen, D. L. Page, and M. A. Abid

The Novel outdoor scene image segmentation algorithm based on background recognition and perceptual organization is proposed. The background objects such as the sky, the ground, and vegetation is recognised based on the colour and texture information. For the structurally challenging objects, which usually consists of multiple constituent parts, a perceptual organization model that can arrest the non accidental Structural relationships among the constituent parts of the structured objects is developed and, hence, group them together accordingly without depending on a priori knowledge of the specific objects. It has been long known that perceptual organization plays a powerful role in human visual perception. Perceptual organization, refers to the basic capability of the human visual system in order to derive relevant groupings and structures from an image without prior knowledge of its contents. The Gestalt psychologists summarized some of the principles that lead to human perceptual grouping. This proposed method outperformed two competing state of image segmentation.Fig.1.shows First row: regular shapes. Second row: irregular shapes. Notice that regular shape objects have smaller values than irregular shape objects.

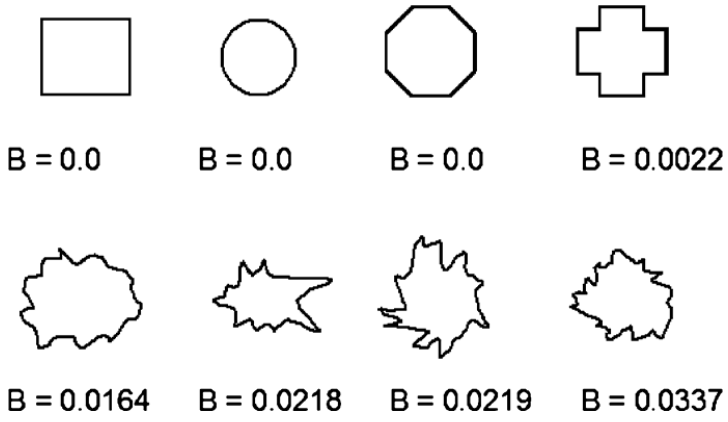

Fig. 1. Examples of shape regularity

Layered Object Models for Image Segmentation - Y.Yang, S.Hallman, D.Ramanan, and C.C.Fowlkes

A layered model for object detection and image segmentation is formulated. A probabilistic model that composites the output of the object detectors in order to define and explain the appearance, depth ordering, and labels of all pixels in an image is described. Notably, the system estimates both class labels and object instance labels. The previous benchmark criteria for object detection and image segmentation, a novel score that evaluates both class and instance segmentation is defined. This method produces rich output. The system is evaluated on the PASCAL 2009 and 2010 and shows good test results with state-of-the-art performance in several categories, including segmenting humans. The algorithm used in this technique works by integrating top-down shape information from the part masks with the help of bottom-up cues such as object color and boundary information. There is also a simple probabilistic model that captures the depth, appearance, and shape ordering of a collection of detections within an image. It explicitly represents the shapes of a collection of detected object in terms of a layered, per-pixel segmentation.

Table 1.A performance evaluation of our system using the held-out test set of the 2009 PASCAL Segmentation Challenge

OBJECT	MEAN	MAX	SYSTEM ON EVALUATION	RANK
Background	41.2	83.5	78.0	8
Aeroplane	18.8	56.3	32.8	7
Bicycle	10.4	26.6	29.4	1
Bird	11.0	40.0	3.2	17
Boat	11.5	36.1	5.0	16

Unsupervised Segmentation of Color –Texture Regions in Images and Videos -Yining Deng, B.S. Manjunath,

This work focuses on the spatial segmentation, where a criterion for good segmentation using the class-map is proposed. On applying the features to the class-map, results in the J-image in which high and low values correspond to possible interiors and boundaries of color-texture regions. The goal is to decompose the video into a set of objects in the spatiotemporal domain. In this each object contains a homogenous color-texture pattern. It can be seen that the overall approach for each video frame is similar to the image segmentation work with the exception of seed tracking and post-processing procedures After this a region growing method is used to segment the image that completely depends on the multi scale J-images. An approach similar to this is applied to video sequences. Even for scenes with non rigid object motion the experimental results shows an additional region based tracking scheme is embedded into region growing process in order to achieve consistent segmentation and tracking results. Experimental results shows the robustness of the JSEG algorithm on real images and video. This method shows the robustness of the JSEG algorithm on real images and videos. Major problem is caused by varying the shades of the illuminator.

Table 2. Window Size at Different Scales

SCALE	WINDOW (pixels)	SAMPLING (1/pixels)	REGION SIZE (pixels)	MIN SPEED (pixels)
1	9x9	1/(1x1)	64x64	32
2	17x17	1/(2x2)	128x128	128
3	33x33	1/(4x4)	256x256	512
4	65x65	1/(8x8)	512x512	2048

Mean shift: A robust approach toward feature space analysis - D.Comaniciu and P. Meer

A general non parameter technique is used for the complex multimodel feature and to delineate arbitrary shaped clusters in it. The basic computational module of the technique is an old pattern recognition

procedure, the mean shift. Algorithms for two low level vision tasks discontinuity preserving smoothing and image segmentation are described as applications. In these algorithms only the user set parameter is the resolution of the analysis and either gray level or colour images are accepted as input .It is used to develop vision algorithm for a wide variety of task. The basic computational module of the technique is an old pattern recognition procedure the mean shift. Algorithms for two level vision tasks discontinuity preserving and smoothing image segmentation as described as applications .In this algorithm the user set parameter is the resolution of the analysis. The complete solution towards autonomous image segmentation is to combine a bandwidth selection technique with top down task related high level information

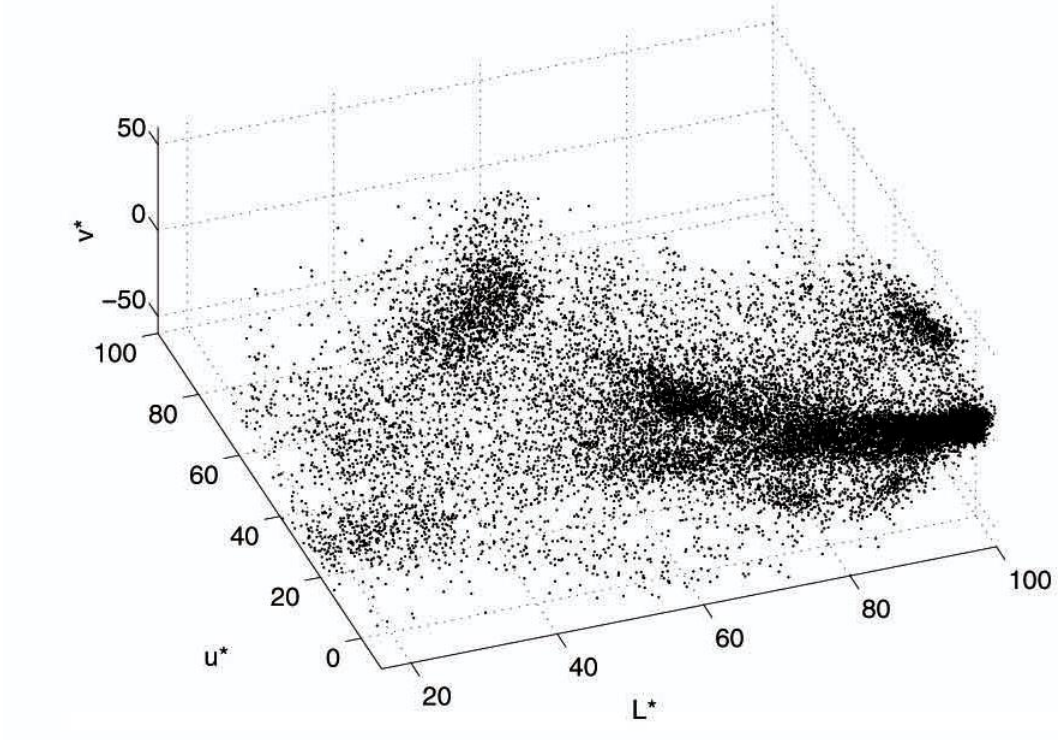

Fig. 2. Corresponding to L*u*v*color space with 110,400 data points

Ontology based semantic image segmentation using mixture models and multiple crf's - Mohsenz and, Shyamala Doraisamy Alfian Abdul Halin and Mas Rina Mustaffa

The Ontology-based semantic image segmentation (OBSIS) technique that jointly models image segmentation and object detection is proposed in this paper. A Dirichlet process mixture model is used to transform the low-level visual space into an intermediate semantic space, which drastically reduces the feature dimensionality. The main aim of this model is to make the humans understand the images through the combination of context models, different cues, and rule-based learning of the ontologies. The results show that the proposed approach performs relatively when compared to the state of art. It fails to segment touching objects with similar features. A semantic ontology is constructed from the higher level features in which the semantic concepts, intermediate space and their relationships, where the final inference performed by this ontology model. Clustering the visual space with the help of Dirichlet process, and learning the cluster representations using CRFs offer considerable advantages over existing methods.

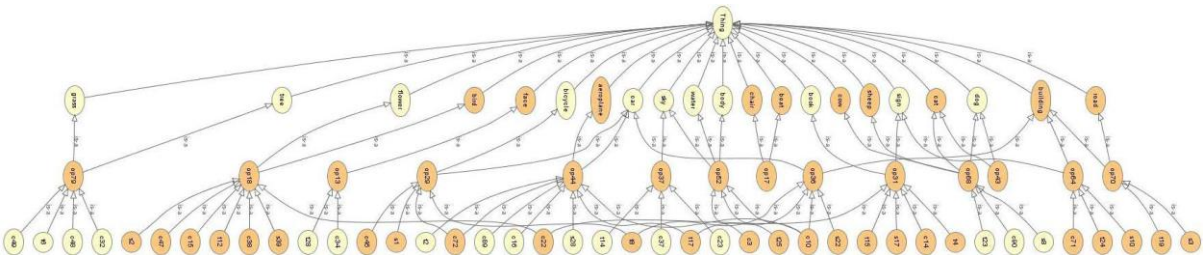

Fig. 3. Three-layered ontological representation of the domain knowledge in the proposed OBSIS.

A novel method to segment blood vessels and optic disc in the fundus retinal Images-Siva Kumar, B., Srilatha.K

Retinal automated study images disputing research region. It proposes to give automated method to support in initial diagnosis and detection of eye infections like as macular degeneration and diabetic retinopathy. In the recent ophthalmology, study of retinal image is well well-known nonintrusive diagnosis procedure. This proposes hessian filtering algorithm to extract the vessel in retinal image. So that remove noisy appearances and restore detached vessel lines in initial vessel network apply hessian filter method in first step. In additional, multi scale hessian filter technique lets to perceive all vessels which have similar dimensions on preferred scale. In this proposed method bilateral filter smoothing for optic disk segmentation. This proposed algorithm test on DRIVE database to validate that and it works better than counterparts. These filters used to succeed accuracy image.

Table 3: Performance comparison of DRIVE Dataset

Methods	Average O ratio	Average MAD	Average Sensitivity	Methods
Hessian and Bilateral Filter	0.9240	3.29	0.9919	Hessian and Bilateral Filter
Graph cut	0.5532	9.97	0.7398	Graph cut
Otsu	0.4253	5.27	0.6412	Otsu

CONCLUSION

This paper proposes a survey on various image segmentation techniques which efficiently employs different types of information at the proper levels. It bridges low level and high-level features by incorporating semantic knowledge in a gradual process from the very beginning. With the help of semantic segmentation various applications are possible. Applications such as object detection, video surveillance, people counting, military application are possible. The overall results show that the proposed approach performs relatively well compared to the previous approaches.

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