Image Segmentation Using Dense Region Approach Of Clustering

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ABSTRACT - Image segmentation is an interesting and developing concept in the field of computer vision. The application of different graph theoretic technique became more useful in image segmentation process. In this paper a dense region method of clustering is used for image segmentation. Here the concept of dense region algorithm is used to find out the maximum dense region of the image by applying gaussian filter and some morphological operators. By using the constraint retrieved images that are located close to each other in the feature space, Image retrieval is done. This approach is experimented with real world images which show the effectiveness of the method.

Keywords: Clustering, Images, Maximum, Segmentation

I. INTRODUCTION

Image segmentation is very important and challenging problem and a necessary role in image analysis as well as in high-level image interpretation and understanding such as robot vision, object recognition, and medical imaging. The goal of image segmentation is to partition an image into a set of disjoint regions with uniform and homogeneous attributes such as intensity, color, tone or texture, etc. Many different segmentation techniques have been developed till now. In this paper, a clustering based method for image segmentation will be considered. Classification can be of two types i.e. supervised and unsupervised. Unsupervised classification is known as clustering. In supervised classification we need some prior information about the classification. But in the unsupervised classification no prior information about the classification is needed. i.e. It automatically generates the clusters.

Clustering is a process by which we can group together the objects such that the objects belongs to the same cluster will have same property but objects belongs to different cluster will have different property. There are mainly two types of clustering namely partitioning and hierarchical. At present other technique has been developed. Many of them are hybrid in nature. Nevertheless, based on the basic architecture, clustering can be classified as density-based, grid based, model-based, sample-based etc. Density-based clustering methods are done based on density. It is believed that density-based clustering methods have the potential to reveal the structure of a spatial data set in which different point processes overlap.

Clustering techniques are a standout amongst the most utilized calculations as a part of Image segmentation, uniquely used to think about a new proposition with them. There are basically two types of method of clustering in graph theoretic approach 1) Hierarchical clustering 2) Partitional clustering algorithm. Where the primary contrast between them is that Hierarchical strategies create a settled arrangement of partitions , while partitional strategies deliver stand out allotment. Even though Hierarchical strategies can be more exact, partitional strategies are utilized as a part of utilizations including extensive information sets, similar to the ones related with pictures, because of the reality the development of a tree structure is computationally restrictive. The complexity of Hierarchical algorithm is $O(n^3d)$ where n is the number of pixels of the image and d is the number of features. Whereas the complexity of partitional algorithm is $O(n^2d)$.

The basic issue for picture division inspirations driving most partitional bunching calculation is that they don't use spatial information , alternately in the methodologies which utilizes the area use themselves, such information (in truth spatial information is the reason of these procedures). Something else, bunching calculation acknowledges that pixels having a spot with the same gathering have a tantamount behavior, which is illuminated by uniform components like faint levels, surface or shading. Checking the correlative way of grouping

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and district systems, our approach bets for the coordination of both procedures with a particular final objective to handle the issues that both strategies bear when are used freely. In composing there are assorted suggestions for this joining. For example, one of the first works organizing both systems is that in which spatial goals are fused by the usage of a Gibbs Random Field, which hunt down neighborhood power assortments. Of course, the essential plan contains on including the pixels encourages as artificial components in the bunching procedure. In this paper an experimental study of density-based image clustering is done.

II. LITERATURE REVIEW

Guoping Qiu proposed a method which simultaneously models and clusters, large sets of images and their low-level visual features. A computational energy function suited for co-clustering images and their features is first constructed and a Hopfield model based stochastic algorithm is then developed for its optimization. We apply the method to cluster, digital color photographs and present results to demonstrate its usefulness and effectiveness[1].

Yixin Chen et.al proposed a new technique, CLUster-based retrieval of images by unsupervisedlearning (CLUE), for improving user interaction with image retrieval systems by fully exploiting the similarity information. CLUE retrieves image clusters by applying a graph-theoretic clustering algorithm to a collection of images in the vicinity of the query. Clustering in CLUE is dynamic. In particular, clusters formed depend on which images are retrieved in response to the query. CLUE can be combined with any real-valued symmetric similar measure (metric or nonmetric). Thus, it may be embedded in many current CBIR systems, including relevance feedback systems. The performance of an experimental image retrieval system using CLUE is evaluated on a database of around 60, 000 images from COREL. Empirical results demonstrate improved performance compared with a CBIR system using the same image similarity measure. In addition, results in images returned by Google's Image Search reveal the potential of applying CLUE to real world image data and integrating CLUE as a part of the interface for keyword-based image retrieval systems[2].

Muthu Kumaravel proposed an approach in which a novel image retrieval scheme CLUster-based retrieval of images by unsupervised learning which tackles the semantic gap problem based on a hypothesis: semantically images tend to be clustered in some feature space. CLUE attempts to capture semantic concepts by learning the way that images of the same semantics are similar and retrieving image clusters instead of a set of ordered images. Clustering in CLUE is dynamic. In particular, clusters formed depend on which images are retrieved in response to the query therefore; clusters give the algorithm as well as the user's semantic relevant clues as to where to navigate. CLUE is a general approach that can be combined with any real-valued symmetric similarity measure. Thus, it may be embedded in many current CBIR systems. Experimental results based on a database of about 60,000 images from COREL demonstrate improved performance[3].

Arpan Garai et.al proposed an approach in which the density based fuzzy c means (DBFCM) clustering is presented. It is divided into two steps, first different dense region is found using kth nearest neighbour then fuzzy c means segmentation is done on each dense region. The DBFCM is implemented upon some of the satellite images to get the segments as experimental results. Then it is compared with the conventional fuzzy c means approach[4].

Nikhil R Pal et.al proposed an approach in which various attempts have been made to cover both fuzzy and non-fuzzy techniques including color image segmentation and neural network based approaches. Adequate attention is paid to segmentation of range images and magnetic resonance images. It also addresses the issue of quantitative evaluation of segmentation results[5].

III. EXISTING SYSTEM

In the Existing System, the Image Grouping and Retrieval is done by using the Minimum Spanning Tree and Modified hierarchical Clustering Algorithm. One of the drawbacks of hierarchical clustering algorithm is that the time complexity is high, generally it's in the order of O(n 2 logn), n being the number of data points.Another setback in the hierarc hical clustering algorithm is that it is not easy to define levels of clusters. Only the images which are close to the feature space, image retrieval is done. The image retrievel which is based on finding the maximum dense region in an image has not been addressed and implemented.

IV. PROPOSED SYSTEM

In the proposed system, we are going to address the drawbacks which are faced in the existing system. (i.e) The image retrieval which is based on finding the maximum dense region for an image has been found out by using dense region algorithm.

We are going to find the maximum dense region for the lattice image by using the following steps.The First step is to load the image.The image is loaded by using the image data function.Then the image is shown by using imshow function.After the image is loaded, the next step is to create a gaussian filter.In this we are creating Gaussian-Filter to remove the noise which is present in the image.The Gaussian-Filter is helpful to get the very clear and predefined image.

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The FSPECIAL function is used to create the predefined 2-D filter and it also creates the parameters for it.

After the Gaussian-Filter is added to the image, then the morphological operation is performed.The morphological operation is done by using STREL function.It creates a disk-shaped structuring element of the given input image. Based on the closed image, the maximum dense region is found by using the IMREGIONALMAX and IMDILATE function. The image returned from IMREGIONALMAX doesn't always have just single pixels set to 1 (to indicate a maximum). The output image often contains clusters of pixels because the neighboring pixels in the input image can have equal values, and are therefore both counted as maxima. To avoid this IMDILATE function is used. To dilate these points with IMDILATE just to make them easier to observe the image, which makes an even bigger cluster of pixels centered on the maximum region in an image.

Algorithm for Dense-Region:

The following are the steps to be followed in Dense Region Algorithm.

Step 1:Label all points as core, border, or noise points.
Step 2:Eliminate noise points
Step3:Adding the Gaussian-Filter to get the predefined Image.
Step 4:Perform the Morphological Operation
Step5:Find the Region where localmaxima is occurred
Step6:Getting the maximum dense region present in the image.

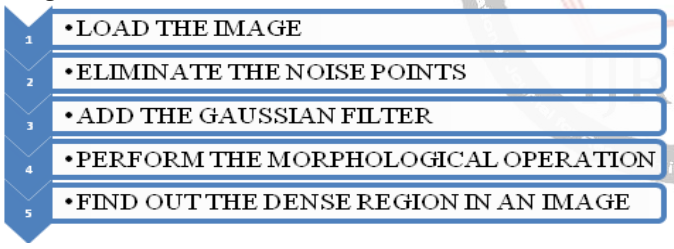

Figure1: Flowchart for finding the dense region in an image

V. EXPERIMENTS AND RESULTS

Coding:

```
imageData = imread('lattice.jpg');
subplot(221);
imshow(imageData);
title('Original image');
gaussFilter = fspecial('gaussian',[31 31],9);
filteredData= imfilter(imageData,gaussFilter);
subplot(222);
imshow(filteredData);
title('Gaussian-filtered image');
 closeElement = strel('disk',31);
closedData = imclose(filteredData,closeElement);
subplot(223);
imshow(closedData);
title('Closed image');
maxImage = imregionalmax(closedData);
maxImage=P imdilate(maxImage,strel('disk',5));
subplot(224);
imshow(maxImage);
title('Maxima locations');
```

The experiment performed using matlab to assess the performance of dense-region clustering algorithm.

The Figure 2. shows the lattice image for which the maximum dense region is going to be find out.

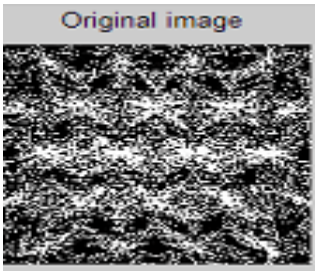

Figure 2: Original Lattice Image

The Figure3. shows the Gaussian-Filter Image.After adding the Gaussian-Filter the predefined image has been created.

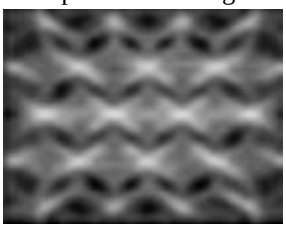

Figure 3:Gaussian-Filter Image

The Figure4 shows the Closed Image.The closed image is created by using STREL function in morphological operation.

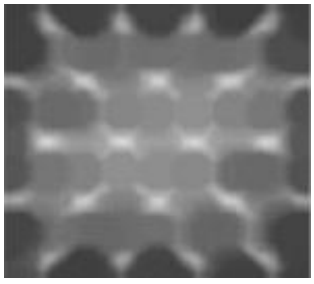

Figure 4 :Closed Image

The Figure5 finally shows a maximum dense region in a lattice image.The maximum dense region image is created by using IMREGIONALMAX function.

Figure 5 :Maximum Dense Region in an Image

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VI. CONCLUSION

These methods of proposed algorithm are discussed the representative methods of dense region clustering. In this paper, segmentation an image into displace areas, such that each region satisfies a certain predefined partition criterion. In this paper, the problem of finding the maximum dense region in an image has been resolved by applying the Gaussian-Filter. The proposed approach improves accuracy rate compared to existed methods which are used to retrieve the maximum dense region for an Image.

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