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Image Classification Scheme for the Salient Region Extraction

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***Abstract*— Image classification is one of the techniques for abnormal state semantic analysis. There are numerous procedures for semantic analysis for instance - image data mining, learning revelation and shrewd data analysis. An image by and large contains numerous semantic objects, so it's not satisfactory to apply image classification as per the worldwide highlights. Subsequently, image division ought to be performed before image classification. Be that as it may, exact semantic division is still out of certain semantic protest regions in a single image, as one semantic question with unmistakable regions would be fragmented into a few superfluous regions by current most image segmentation algorithms in light of low level shading or surface highlights, i.e. the various hierarchical clustering based approach (HCBA), the Eigen regions based system (EBS) and the novel regions based strategies (NRBM). This outcomes in the loss of productivity for these locale based image classification plans, as a bigger number of understood regions will be accomplished. In the interim, these individual regions are for the most part significant and surprising outcome would be caused by these classification systems, albeit some salient regions are extricated to diminish the unpredictability of district based image classifications. Moreover, these plans are the subjective classification schemes, and couldn't show the data about other certain objects. In this venture, we propose salient regions based fluffy classification (SrFC) techniques. Right off the bat we give a salient area extraction calculation in view of prevailing hues and Gabor surface highlights. At that point, as per the proposed classification conspire the salient regions from all the hopeful images are grouped into disjoint classes. These classifications are additionally utilized with respect to those applicant images, and for every hopeful image its number of salient regions having a place with a similar classification would be utilized to assess the level of the images having a place with the class. With correlation with the HCBA plot for singular salient regions, the classification exactness is enhanced by around 16% by the proposed SrFC scheme.**

Keywords—Image segmentation, classification, Clustering.

I. INTRODUCTION

Retrieving images through matching images solely on that basis of global similarities is often too crude to produce satisfactory results. On the other hand, semantic object-based image retrieval is still far too rudimentary and fragile to produce reliable results. Intermediate-level processing between high and low-level processing for content-based image retrieval is required. Therefore, it is necessary to identify the perceptually salient and semantically meaningful regions in images. However, it is difficult to isolate the meaningful region of interest from the scene without a prior knowledge. In a common case, the regions with many abrupt changes or some unpredictable characteristics often attract the human's attention, are considered as the salient regions of images in this paper. Thus, salient regions of one image are those regions that could present the main contents of the image, which were detected according to local features as such as colors, textures and shapes [17]. Moreover, we believe that these salient regions are potentially more effective for image indexing, retrieval and classification. There are many approaches like hierarchical clustering based approach (HCBA) [1], and the Eigen regions based strategy [2]. These all are the unsupervised approaches. Unsupervised approaches increase the complexity. They are more complicated and take long time to give results. Also the new regions which cannot be detected by these approaches will continue to go unnoticed. Actually, as the complexity of practical image analysis, ones could not deal with every region for different sizes, and it's very important to exclude those implicit regions smaller than the specified size. As the regions to present the main content of one image, the salient regions should be larger than the given region sizes and with rich semantic information to human being.

Consequently, we propose a novel salient region detection method, which could take account of the implicit region sizes and their saliency relative to other regions. The edges of the region are detected as the local gradient [3] i.e. local maxima in the given region of the images. The detected local gradients are edges. These edges are not always continuous so overcoming this we will detect the continuous edged which will definitely give us the regions in the image. Further all the regions smaller than a threshold region say N0 are ignored as they are no implicit regions. Also the regions which are inside the larger regions are found so that they can be merged.

For clustering the images low level histogram based technique [4] is used so that the features of low and high level image analysis can be combined without losing the simplicity. Although color histograms are very old technique they are simple and fast which is necessity of image indexing and retrieval.

The rest of the paper is organized as follows: Section 2 describes the related work done in the field of image processing. Section 3 describes the experimental setup. Section 4 presents the results. In section 6, conclusion and directions of future work are presented.

II. RELATED WORK

Here a brief description is given which is done in the field of image processing. Zhang et al.[5] presented a novel saliency metric coupled with color and texture features, and its corresponding salient region extraction methods. Results showed that the proposed saliency metric can achieve more robust performance than those common saliency metrics. Chapelle et al.[6] showed that support vector machine algorithm can generalize on difficult image classification problem. Das and Ray[7] proposed a compact feature representation based on the elements of Color Co-occurrence Matrices (CCM) in Hue, Saturation, Value (HSV) color space. They achieved the improvement of 3% in precision. Kadir et al.[8] compared the performance of the saliency detector to other standard detectors including an affine invariance interest point detector. Flickner et al.[12] developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. Mai et al[10] presented the hierarchical technique for the fast and robust extraction of ellipses from the images. This method outperformed in handling occlusion and overlapping ellipses. Meakawa et al.[11] defined eleven web images categories. They extracted the features of images according to the defined categories and devised an automated Web image Classification technique. They achieved the accuracy of 83.1% in classification. Caeli and Reye proposed the unified approach to how colour, texture and shape can be encoded in a single spatio-chromatic feature space. They also showed the use of spatio-chromatic features in difficult classification problems. Berens et al.[13] made use of the standard transform encoding method to compress the color histograms and showed that the opponent color histogram can be compressed more readily than the conventional color space. Lee et al.[14] conducted categorical and rank based experiments to measure the image similarity. They also showed that on increasing the number of bins, predictability of similar images increases. Huang and Chang[15] presented the image mining approach. They used fuzzy clustering method and data mining model to design an image retrieval model. Achanta et al.[16] proposed the method to determine the salient regions in images. They also used the algorithm for image segmentation.

III. EXPERIMENTAL SETUP

We connected the proposed classification methodology to a few ordinary regular images, and every one of them has one or numerous salient regions or objects. Here, the mean move based image division scheme was utilized to direct image divisions. Plainly, with respect to the extensive number of certain regions, it's helpful and effectual to choose those most illustrative or salient regions for the many-sided quality diminishment of image classification. Dissimilar to the established locale based classification plans, i.e., the hierarchical clustering based approach (HCBA), the Eigen regions based technique (EBS), and the novel region based strategies (NRBM), the proposed salient regions based fluffy classification methodology accomplished the classification comes about by bunching all the salient regions from these images into various disjoint salient area sets. The salient locale sets were accomplished by bunching their component vectors of overwhelming hues, straightforward Gabor multi-determination highlights, and geometric shading minute invariants, where the progressive grouping calculation. For every salient area, its comparing class hail is set apart by the name at right of its number.

The classical HCBA, NRBM, EBS schemes and the proposed salient region-based fuzzy classification approach are considered for classification in the databases. The classification accuracies for these schemes are 73%, 52%, 61% and 89% for the HCBA, NRBM, EBS and SrFC schemes respectively. As an alternative scheme for the HCBA, the proposed SrFC could obtain better performance by the combination of multiple salient regions. Furthermore, with comparison to the HCBA scheme for individual salient regions, the classification accuracy is improved about 16% by the proposed SrFC scheme, while the EBS scheme are effective for the images with single semantic objects.

Hence we have developed a scheme for image classification that merges both the high level and low level features of image. The natural images are generally with many semantic objects and we propose a multiple salient region based classification scheme. As this scheme uses histogram it is very fast and simple. Also it gives near about accurate result. This classification strategy could reflect the main content of the image which are consistent with human being semantic vision. With this we also propose a salient region extraction algorithm.

The working of the project occurs in 2 parts:

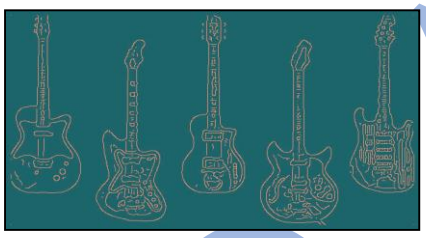
Learning Phase – In the learning phase the system learn all the details for further working. The learning phase adds details to the system and works as a center of information or usually known as database.

Classification Phase – In this phase, the system itself classifies the components of the image. It labels each and every segment while comparing them with the information been fed into the system earlier.

IV. RESULTS

Following images are the screenshot of the results that were displayed as the result of the proposed scheme:

Original image

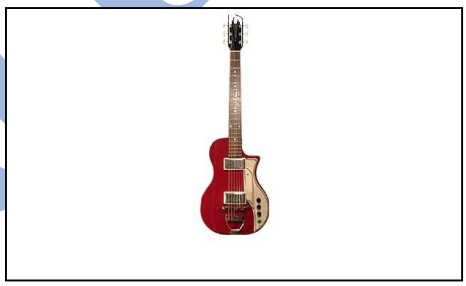


Edged Image

Figure 2 shows the effect of canny edge algorithm after applying it to the original image and hence forming a edge image of detected original image.

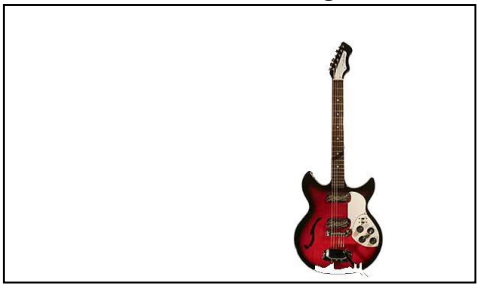
Segmented Image 1

Figure 3 shows the one of the segmented image from the original image given as input and the detected image carrying out process is separated out of the original image as an individual image itself.



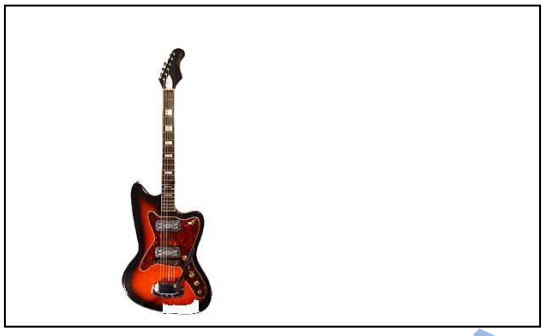
Segmented Image 2

Figure 4 shows the effect of the process carried out with the image and obtaining subsequent results with it.



Segmented Image 3

Figure 5 shows the segmented image from the original image itself.



Segmented Image 4

V. CONCLUSION

In this research, we have developed a scheme for image classification that merges both the high level and low level features of image. The natural images are generally with many semantic objects and we propose a multiple salient region based classification scheme. As this scheme uses histogram it is very fast and simple. Also it gives near about accurate result. This classification strategy could reflect the main content of the image which is consistent with human being semantic vision. With this we also propose a salient region extraction algorithm. The performance of the proposed scheme has been compared with existing techniques.

VI. FUTURE SCOPE

Image segmentation can be utilized as a part of PCs moreover. In PC, segmentation is procedure of dividing an advanced image into different sections. The objective of segmentation is to just/as well as change the portrayal of an image into something that is more important and less demanding to investigate. Image segmentation is regularly used to find question and limits.

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