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A Survey on Feature Analysis and Classification for Image Annotation using Saliency Map

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Abstract:- With the advances in multimedia technologies collections of digital images is growing rapidly. Due to the popularity of various digital cameras and the rapid growth of social media tools, internet based photo sharing have increase in daily life. As the database have huge amount of images and other files, it is difficult to retrieve the required images. Supervised dictionary learning feature based image retrieval is very important area of research in the field of image retrieval. The feature based image annotation paradigm aims to tackle the automated image annotation by exploiting feature based image retrieval. Aim of this research work is to extract features related to the image in the form of annotation and develop system for clustering of data user define clusters with the help of image processing. To solve the problem of data classification into large dataset, to get an efficient system which classify data not only on basis of the dataset but also on basis of the image specified class.

Keywords- *Supervised dictionary learning, Feature selection, Image annotation, Saliency map.*

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I. INTRODUCTION

Now a days due to increase in digital media like camera, mobile phones, collection of digital images is growing rapidly. The growing scale of visual data requires an effective retrieval mechanism to obtain the content of such data. Even though the visual search has been studied for years, the search engines retrieve relevant images still mainly based on textual queries instead of raw images. Therefore, the image annotation that associates images with provided labels has received much research interest. Labeling is the process of attaching a descriptive word or phrase to someone or something.

In the existing scheme when user want to search the required image and give keyword as input to the system it gives relevant images as output as well as gives some irrelevant images also. It is inefficient and less accurate. The two problems for the existing image annotation techniques need to be concerned, How to obtain the discriminative image representations and how to effectively use the correlations between the co-occurrence' s labels. In weakly supervised setting, training data is partially labeled and it will affect the testing data.

The novel scheme overcomes the drawback of existing scheme i.e. inaccuracy and inefficiency. It solves the problem of inconsistent label combinations between training and testing data. The annotation can act as an intermediate step for wide range of applications such as image/video content management and retrieval. As the popularity of photo and video sharing sites, a large number of weakly labeled or unlabeled visual data are spread. The method named as label propagation for image annotation is proposed with the goal of proper image labeling.

Feature analysis and classification propose a novel approach for dictionary learning and classifier training are combined into a single objective function aiming at enhancing the discrimination of the dictionary. This method uses the segmentation, clustering and classification techniques for accurate labeling of image. In our proposed work first training the system with labels and create a training. Set once the training set is ready then applying evaluation based on the trained system and testing will be applied. Firstly, given a set of weakly labeled images then applying segmentation technique like saliency map which divide image into foreground part and background part. The clustering algorithm is then used to discover the exclusive feature group. Afterwards, classification algorithm is applied for feature classifications which improve efficiency via optimize feature selection and then train the system for the label-specific dictionaries. So far, each visual word is related with at least one label. In the test time, since each dictionary visual word has the corresponding labels, a saliency reconstruction based framework is developed. Then the test image is annotated through our proposed research with speed and accuracy.

II. RELEVANT WORK

In this, we present a review on existing image annotation methods

A. Image Annotation

Image annotation aims to assign images with labels, which is usually viewed as a typical multi-label learning problem. The existing methods can be roughly divided into three categories

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including classification based [5], [9], probabilistic modeling-based [10], [8], and reconstruction-based methods [2], [3]. The classification based scheme annotates the images by training the semantic label classifiers. The main limitation of classification based method is that they need the supervised label information of the training images to train the classification model. The probabilistic modeling-based methods focus on modeling the distribution each label based on the visual features and attempt to infer the joint probability between images and annotation keywords. The computation efficient and accuracy are two limitations for modeling the semantic distributions. The third category makes use of the sparse reconstruction framework to accomplish task. One of the drawback is that the existed methods are based on the raw low-level features, which cause the annotation results to be sensitive to the noisy feature representation.

B. *Dictionary Learning*

Recent embracing work on dictionary learning can be generally classified into two categories, say unsupervised and supervised dictionary learning. The former one focuses on simultaneously minimizing the reconstruction error. In [6], the k-SVD clustering techniques are used to learn an over-complete dictionary from image patches. Lee et al. [7] treat the dictionary learning problem as a least squares problem, and solve it by an iterative algorithm to minimize the reconstruction error. Wright et al. [4] directly employ the training samples of the whole training set as the dictionary, and then they compute the least residual errors for face recognition. The dictionaries generated via unsupervised learning are expected to be of low reconstruction error and better generalization. Due to the lack of the label information, these methods have limited discriminative power.

C. *Discussion*

Our work is basically different from the previous studies on discriminative dictionary learning and image annotation. The key differences lie in the following aspects. First, considering that the supervised methods [2], [3] needs the weakly labeled training data by introducing the feature representation. Then to construct the semantic label dictionary learning method. Our learning method harnesses the exclusive label groups to overcome the lack of location information in weakly supervised manner. In addition, our feature extraction based image annotation method integrates the label correlation information by exploring the semantic meaning of each visual word in the dictionary. Finally, the weighting scheme is introduced into the phase of label propagation to guarantee that the related label achieve higher responses than the unrelated ones.

III. PROPOSED METHOD

Proposed system is Image annotation with correlation. Annotation cannot be only label the image but it can also be related information of that image. In the proposed system, first standard dataset is used which contains images and labels. First step to achieve image annotation is identification of image. It can be achieved by applying segmentation of image. The best method used for segmentation is saliency map technique which initially segments the image. Next step is to apply extraction of features for image clustering and for that k-mean clustering algorithm will be used, aims to partition n observations into k clusters in which each observation belongs to the cluster with nearest mean. Third step feature extraction using morphological features. It is a tool for extracting image components that are useful in the representation and description of region shape. Final step is implementation of classification algorithm which trains a multi-label classifier from the data of each cluster.

A. *Segmentation of Image*

The novel approach used saliency map technique for image segmentation in which input image is segmented by using saliency map technique is the computational modeling for rapid analysis. It has its root feature integration theory which integrate image into foreground and background part. The key idea of saliency map is to extract local spatial discontinuities in the modalities of colour, intensity and orientation. Saliency map have been widely used in computer graphics applications.

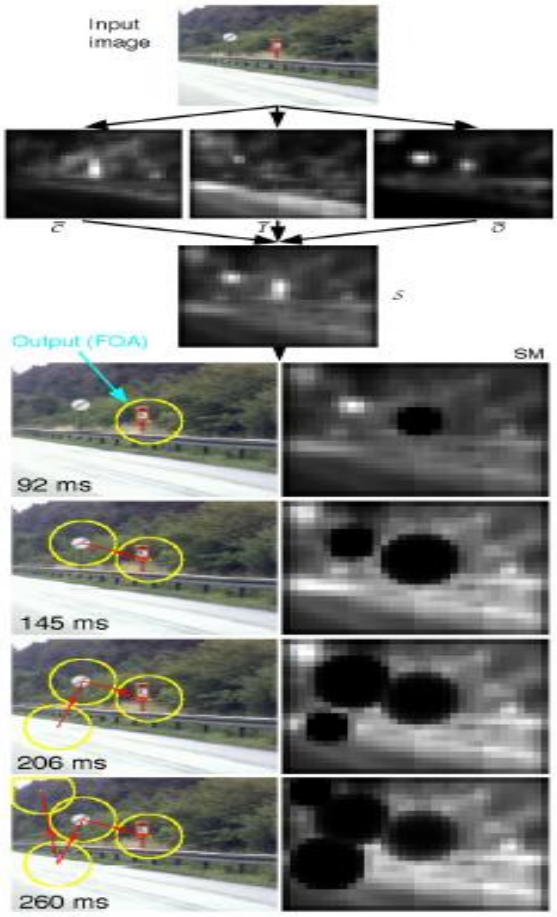

Figure 1 : Example of Saliency map technique

B. Extraction of Features For Image Clustering

Clustering is defined as an organization technique where the partitioning a set of data, that have some similarity along a dimension of interest, are kept close while the data that differ from each other, are kept further apart. Image clustering consists of two steps the first part is feature extraction and second part is grouping. For each image in a dataset, a feature based capturing certain essential properties of the image is computed and stored in a feature base. Feature clusters are formed by clustering algorithm is applied over this extracted feature to form the group.

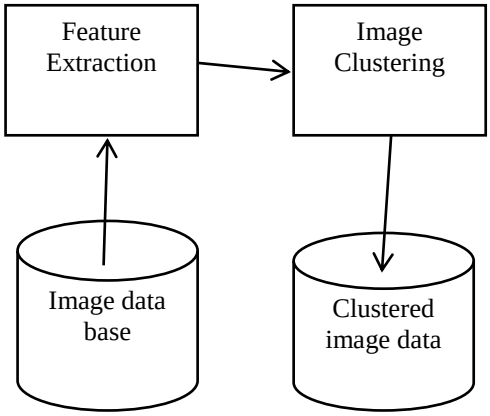

Figure 2 : Clustering the Features of Images

C. Feature Extraction Using Morphological Features

It is a tool for extracting image components that are useful in the representation and description of region shape. To avoid content based image retrieval and shape of images. To provide a best result, we are implementing feature extraction methods based on morphological color and gray level features.

D. Implementation of Classification Algorithm

Our proposed method presents a novel label classification for image annotation. The proposed system comprises an initial clustering phase into several disjoint clusters of data. It then trains a multilabel classifier from the data of each other cluster. Given a new instance, the system first finds the nearest cluster then applies the corresponding model. For classification KNN will be used which can improve the performance and reduced the training time of standard label classification algorithm.

IV. CONCLUSION

In the novel scheme, feature from the image is retrieved using saliency map technique. It solves the problem of inconsistent label combinations between training and testing data. The main contribution lies in feature extraction and classification of images and explicitly fusing the label information into dictionary representation, exploring the correlations between co-occurrence labels. Label annotation is used to annotate the image. Using this system user can annotate image, which will have accurate annotations and will consume less delay than the existing system. The image annotation is system that could provide labeled images which are learned from the input dataset with speed and accuracy.

V. REFERENCES

[1] Xiaochun Cao, Hua Zhang, Xiaojie Guo, Si Liu, and Dan Meng, " SLED: Semantic Label Embedding Dictionary Representation For Multilabel Image Annotation," IEEE Transactions On Image Processing, Vol. 24, No. 9, September 2015.

[2] X. Chen, X.-T. Yuan, Q. Chen, S. Yan, and T.-S. Chua, " Multilabel visual classification with label exclusive context," in Proc. ICCV, pp. 834– 841. November. 2011.

[3] C. Wang, S. Yan, L. Zhang, and H. J. Zhang, " Multi-label sparse coding for automatic image annotation," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit. (CVPR), June 2009, pp. 1643– 1650.

[4] J. Wright, A. Y. Yang, A. Ganesh, S. S. Sastry, and Y. Ma, " Robust face recognition via sparse representation," IEEE Trans. Pattern Anal. Mach. Intell., vol. 31, no. 2, pp. 210– 227, February 2009.

[5] G. Carneiro, A. B. Chan, P. J. Moreno, and N. Vasconcelos, " Supervisedlearning of semantic classes for image annotation and retrieval," IEEE Trans. Pattern Anal. Mach. Intell., vol. 29, no. 3, pp. 394– 410, March 2007.

[6] M. Aharon, M. Elad, and A. Bruckstein, " K-SVD: An algorithm for designing overcomplete dictionaries for sparse representation," IEEE Trans. Signal Process., vol. 54, no. 11, pp. 4311– 4322, November 2006.

[7] H. Lee, A. Battle, R. Raina, and A. Y. Ng, " Efficient sparse coding algorithms," in Proc. NIPS, 2006, pp. 801– 808.

[8] T. Griffiths and Z. Ghahramani, " Infinite latent feature models and the Indian buffet process," in Proc. NIPS, 2005, pp. 475– 482.

[9] C. Cusano, G. Ciocca, and R. Schettini, " Image annotation using SVM," Proc. SPIE, vol. 5304, pp. 330– 338, 2004.

[10] N. Ueda and K. Saito, " Parametric mixture models for multi-labeled text," in Proc. NIPS, 2002, pp. 721– 728.

[11] M. Yang, L. Zhang, X. Feng, and D. Zhang, " Sparse representation based Fisher discrimination dictionary learning for image classification," Int. J. Comput. Vis., vol. 109, no. 3, pp. 209– 232, September 2014.

[12] L. Wu, R. Jin, and A. K. Jain, " Tag completion for image retrieval," IEEE Trans. Pattern Anal. Mach. Intell. , vol. 35, no. 3, pp. 716– 727, March 2013.

[13] Y. G. Jiang, Q. Dai, J. Wang, C. W. Ngo, X. Xue, and S. F. Chang, " Fast semantic diffusion for large-scale context-based image and video annotation," IEEE Trans. Image Process., vol. 21, no. 6, pp. 3080– 3091, June 2012.

[14] M. Zheng et al., " Graph regularized sparse coding for image representation," IEEE Trans. Image Process., vol. 20, no. 5, pp. 1327– 1336, May 2011.

[15] X. Chen, Y. Mu, S. Yan, and T.-S. Chua, " Efficient large-scale image annotation by prob-abilistic collaborative multi-label propagation," in Proc. Int. Conf. Multimedia, 2010, pp. 35– 44.