Re-Ranking Based Image Categorization Using Saliency Driven Nonlinear Diffusion Filtering -A Review

Ms. Nisha Barsagade[1], Prof. Mr. Mayur Dhait[2]

[1] Department of Computer Science and Engineering,
RTMNU University , A.C.E. Wardha , Maharashtra , India.
nbarsagade15@gmail.com

[2] Department of Electronics and Communication,
RTMNU University , A.C.E. Wardha , Maharashtra , India.
mayursdhait@gmail.com

Abstract: *The new technique is proposed for Re-ranking based image categorization using saliency driven nonlinear diffusion filtering. The image categorize based on Re-ranking, using multi-scale information fusion based on the original image. The foreground features, which are important for image categorization and the background image regions, whether considered as contexts of the foreground or noise to the foreground, can be globally handled by fusing information from different scales. To preserve the foreground feature and deal effectively with background use saliency driven nonlinear diffusion filtering and Re-ranking categorize the image.*
Keywords: Re-ranking, image categorization, Saliency detection, nonlinear diffusion, multiscale information fusion.

1. Introduction

Image categorization is a very active research topic which has developed researches in many important areas of computer vision. It is an important but difficult task to deal with the background information. The background is often treated as noise; nevertheless, in some cases the background provides a context, which may increase the performance of image categorization.

Zhang et al. [11] experimentally analyzed the influence of the background on image classification. They demonstrated that although the background may have correlations with the foreground objects, using both the background and foreground features for learning and recognition yields less accurate results than using the foreground features alone. Overall, the background information was not relevant to image classification.

The effect of background on image categorization varies. Only semantically important contexts, such as object co-occurrence, or particular object spatial relations are helpful for image categorization. Backgrounds which contain only clutter provide no information to support image categorization. It is interesting to filter out background clutter and simultaneously use the background context to increase the performance of image categorization.

To deal effectively with the background information use a saliency driven nonlinear diffusion filtering to generate a multi-scale space, in which the information at a scale is complementary to the information at other scales and merging of information from different scales. After this apply Re-ranking which categorize the image. A nonlinear diffusion [12] which has been widely used in image de-noising, enhancement, etc, can preserve or even enhance the semantically important image structures, such as edges and lines.

Saliency detection techniques [4] can be used to estimate the foreground and background regions according to the saliency distribution. During the diffusion process, the image gradients in the salient regions are increased while those in non-salient regions are decreased. The background information gradually fades out while the foreground information is preserved and important structures in the foreground are enhanced. The saliency driven multi-scale space of an image can be used to handle uncertain background information. After saliency driven nonlinear diffusion, an image is represented by the set of its multiscale images and the fusion of information from different scales. Then apply re-ranking to categorize image. Re-ranking will improve the image categorization using saliency driven nonlinear diffusion filtering.

2. Review Of Literature:

Weiming Hu[1]proposed saliency driven image multi-scale nonlinear diffusion filtering. The resulting scale space in general preserves or even enhances semantically important structures such as edges, lines, or flow-like structures in the foreground, and inhibits and smoothes clutter in the background. The image is classified using multi-scale information fusion based on the original image, the image at the final scale at which the diffusion process converges, and the image at a midscale.

Huaizu Jiang[2] proposed saliency map computation as a regression problem. This method, which is based on multi-level image segmentation, uses the supervised learning approach to map the regional feature vector to a saliency score, and finally

fuses the saliency scores across multiple levels, yielding the saliency map. Saliency estimation as a regression problem and learned a regresses that directly maps the regional feature vector to a saliency score. Address the salient object detection problem using a discriminative regional feature integration approach. To integrate a lot of regional descriptors to compute the saliency scores, rather than heuristically compute saliency maps from different types of features and combine them to get the saliency map.

Koen E.A. van de Sande[3] Image category recognition is important to access visual information on the level of objects and scene types. So far, intensity-based descriptors have been widely used for feature extraction at salient points. To increase illumination invariance and discriminative power, color descriptors have been proposed. Because many different descriptors exist, a structured overview is required of color invariant descriptors in the context of image category recognition. Proposed the invariance properties and the distinctiveness of color descriptors in a structured way, it can be derived that invariance to light intensity changes and light color changes affects object and scene category recognition.

S. Goferman, L. Zelnik-Manor, and A. Tal [4] proposed a new type of saliency – context-aware saliency– which aims at detecting the image regions that represent the scene. This definition differs from previous definitions whose goal is to either identify fixation points or detect the dominant object. The benefits of the benefits of the proposed approach are evaluated in two applications where the context of the dominant objects is just as essential as the objects themselves. In image retargeting, demonstrate that using our saliency prevents distortions in the important regions. Approach are evaluated in two applications where the context of the dominant objects is just as essential as the objects themselves. In image retargeting we demonstrate that using our saliency prevents distortions in the important regions.

Y. Chai [5] proposed the unsupervised segmentation of image training sets into foreground and background in order to improve image classification performance. Multi-task modification of BiCoS for co-segmenting multiple images sets each corresponding to a different class. BiCoS seems to concur with the well-known fact that devising appropriate feature representations has a higher impact on the performance of computer vision systems.

X.-H. Shen and Y. Wu [6] proposed a unified model to incorporate traditional low-level features with higher-level guidance to detect salient objects. An image is represented as a low-rank matrix plus sparse noises in a certain feature space, where the non-salient regions can be explained by the low-rank matrix, and the salient regions are indicated by the sparse noises. Saliency is then jointly determined by low-level and high-level cues in a unified way.

Zhang et al. [7] experimentally analyzed the influence of the background on image classification. They demonstrated that although the background may have correlations with the foreground objects, using both the background and foreground features for learning and recognition yields less accurate results than using the foreground features alone. Overall, the background information was not relevant to image classification.

X. Hou and L. Zhang [8] proposed a method for the visual saliency detection. It is independent of features, categories, or other forms of prior knowledge of the objects. Analyzed the log spectrum of an input image, extract the spectral residual of an image in spectral domain, and propose a fast method to construct the corresponding saliency map in spatial domain.

Shotton et al. [9] proposed an algorithm for recognizing and segmenting objects in images, using appearance, shape, and context information. They assumed that the background is useful for classification and there are correlations between foreground and background in their test data.

3. Proposed Scheme:

The phases of proposed method are shown by following flow diagram.
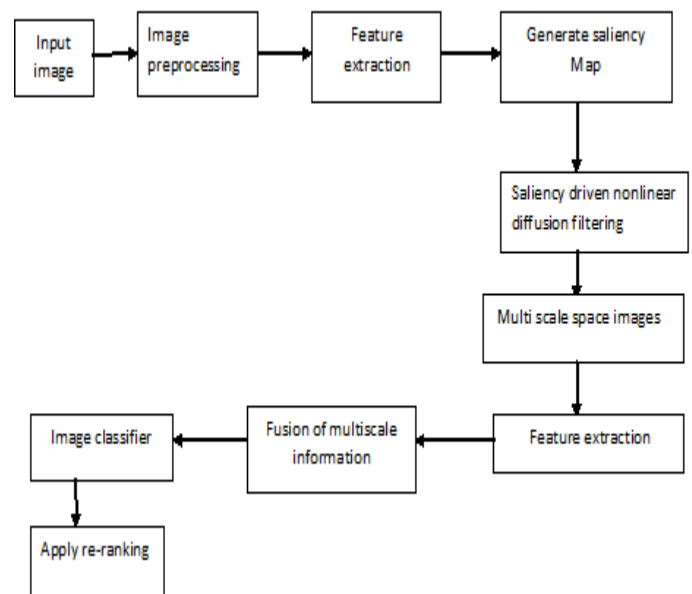
Figure.1. Block Diagram of Proposed Method

In first phase take input image and preprocess the image. In second phase extract feature to generate saliency map using diffusion. During the diffusion process, the image gradients in the salient regions are increased while those in non-salient regions are decreased. Saliency driven nonlinear diffusion filtering, it is clear that, based on the saliency map, the background regions corresponding to non-salient regions are smoothed and the foreground corresponding to salient regions with important image structures is preserved. After saliency driven nonlinear diffusion, in next phase an image is represented by the set of its multiscale images. The fusion of information from different scales and after this use classifier for image categorization. In next phase to improve the performance of image categorization apply re-ranking. Images will be suggested on the basis of re-ranking.

4. Conclusion:

In this paper, propose Re-ranking based image categorization using saliency driven nonlinear diffusion filtering. The saliency driven nonlinear multi-scale space preserves and even enhances important image local structures, such as lines and edges, at large scales. Multi-scale information has been fusing and Re-ranking will improve the image categorization.

References

[1] Weiming Hu, Ruiguang Hu, NianhuaXie, Haibin Ling, and Stephen Maybank," Image Classification Using Multiscale Information Fusion Based on Saliency Driven NonlinearDiffusion Filtering" in IEEE transactions on image processing, vol. 23, no. 4, april 2014

[2] H. Jiang, J. Wang, Z. Yuan, Y. Wu, N. Zheng, and S. Li, "Salient object detection: A discriminative regional feature integration approach," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., Jun. 2013, pp. 2083–2090.

[3] K. E. A. van de Sande, T. Gevers, and C. G. M. Snoek, "Evaluation of color descriptors for object and scene recognition," IEEE Trans. Pattern Anal. Mach. Intell., vol. 32, no. 9, pp. 1582–1596, Sep. 2010.

[4]S. Goferman, L. Zelnik-Manor, and A. Tal, "Context-aware saliency detection," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., Jun. 2010, pp. 2376–2383.

[5] Y. Chai, V. Lempitsky, and A. Zisserman, "BiCoS: A Bi-level co segmentation method for image classification," in Proc. IEEE Int. Conf.Comput. Vis., Nov. 2011, pp. 2579–2586.

[6] X.-H. Shen and Y. Wu, "A unified approach to salient object detection via low rank matrix recovery," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., Jan. 2012, pp. 853–860.

[7]J. Zhang, M. Marszalek, S. Lazebnik, and C. Schmid, "Local features and kernels for classification of texture and object categories: A comprehensive study," *Int. J. Comput. Vis.*, vol. 73, no. 2, pp. 213–238, Jun. 2007.

[8]X. Hou and L. Zhang, "Saliency detection: A spectral residual approach," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., Jun. 2007, pp. 1–8.

[9] J. Shotton, J. Winn, C. Rother, and A. Criminisi, "Text on boost: Joint appearance, shape and context modeling for multi-class object recognition and segmentation," in Proc. Eur. Conf. Comput. Vis., 2006, pp.

[10] M.-E. Nilsback and A. Zisserman, "A visual vocabulary for flower classification," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit.vol. 2. Jun. 2006, pp. 1447–1454

[11] J. Zhang, M. Marszalek, S. Lazebnik, and C. Schmid, "Local featuresand kernels for classification of texture and object categories: A comprehensive study," Int. J. Comput. Vis., vol. 73, no. 2, pp. 213–238,Jun. 2007.

[12] M.T. Mahmood and T.-S. Choi, "Nonlinear approach for enhancement of image focus volume in shape from focus," IEEE Trans. Image Process., vol. 21, no. 5, pp. 2866–2873, May 2012.

[13] B. Abdollahi, A. El-Baz, and A. A. Amini, "A multi-scale non-linear vessel enhancement technique," in Proc. Annu. Int. Conf. IEEE Eng.Med. Biol. Soc., May 2011, pp. 3925–3929.

Author Profile

Nisha Barsagade pursuing M.Tech from Agnihotri College Of Engineering, Wardha, in Computer Science and Engineering, from RTMNU University.

Prof. Mayur Dhait completed M.tech in Embedded system design, from international institute of information technology, Pune, currently working as a assistant professor in Agnihotri College Of Engineering, in department of Electronics and Communication, Wardha.