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Improved Method for Salient Region Detection

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Abstract: *Detection of visually salient image regions is useful for applications like object segmentation, adaptive compression, and object recognition. Visual saliency is the perceptual quality that makes an object, person, or pixel stand out relative to its neighbors and thus capture our attention. Visual attention results both from bottom-up visual saliency as well as top-down methods. Bottom-up salient region detection methods can be broadly classified into uniqueness, compactness and background based and furthermore uniqueness based methods can be roughly divided into local and global contrast based techniques. Thus bottom up salient region detection method is introduced that integrates compactness and local contrast cues. Furthermore, in order to produce a pixel accurate saliency map that more uniformly covers the salient objects output is propagated through the diffusion process.*

Keywords - Compactness, Local contrast ,saliency map.

I. Introduction

Saliency detection is a critical aspect in many of different applications containing salient object detection, salient object segmentation, content-aware image/video retargeting, content-based image/video compression and content-based image retrieval, etc. In human vision system, visual attention is an important mechanism which filters out redundant visual information and selects the salient objects which is nothing but the required portion of an image.

Visual attention which consist of two mechanisms that are stimulus driven and task driven these are also called as Bottom-up approach and top-down approach. The main goal of salient region detection is to completely highlight all object which are interested and adequately suppress background regions. Salient region detection output can be used for numerous vision problems which contains image segmentation, object recognition, image compression, content based image retrieval. Salient region detection is generally considered in computer vision as a process which contains two stages:

1) Detecting the most salient region.
2) Segmenting the accurate boundary of that object or region.

Fig 1: Salient Region Detection

By examination many of the bottom-up salient region detection methods depends upon the visual cues as well as it separate out the salient object from the background. It contain of different visual cues like uniqueness, compactness, background. Further, he uniqueness contains of local contrast and global contrast. So for finding required regions the salient region detection methods contains different cues like local contrast based methods, global contrast based methods, compactness based methods and background based methods.

For finding the contrast between image and its surrounding region the uniqueness based methods considers the low level features of image like colour, intensity and orientation. By examination the uniqueness based methods are further divided into two aspects that are local and global contrast based methods. In this the local contrast based methods which only consider the image regions with respect to their surrounding regions or

local neighbourhoods as well as uniqueness of pixels or super-pixels. Here, this method uses local contrast as well as doesn't consider the global relation is used to highlight the salient object edges instead of uniquely propagating saliency to while salient object interior. The second one that is global contrast based methods estimate the saliency of individual image regions or pixels by using its contrast relations upon the complete image. But the global contrast based methods mostly depends on colour information as well as highlight the background regions as salient for images with which is not much colour variation between foreground and background.

Compactness based methods mainly concentrate on spatial variance of image. Commonly, pixels or superpixels of image region contains small spatial variance in salient region and background. That will have more spatial variance that is distributed over complete image as well as have larger spread.

Background based methods instead of considering the contrast between the salient objects and as well as their surrounding regions it expose two general priors about backgrounds that are boundary and connectivity prior and consider both foreground and background cues in a different ways. By graph-based ranking it ranks the similarity of the image elements which is pixels or regions with its foreground or background cues. Structuring of remaining paper is as follows. Section II focuses on related work for salient region detection. Section III provide methods used for salient region detection. Section IV concludes the paper.

II. Related Work

Many of the research on focuses on bottom-up salient region detection. By the survey bottom-up salient region detection methods can be classified into uniqueness, compactness, and background based. The uniqueness-based methods can be divided into two mechanism local and global contrast-based techniques.

Itti et al.[2] provided a local contrast based model, . For finding the contrast between image and its surrounding region the uniqueness based methods considers the low level features of image like colour, intensity and orientation. It uses the Gaussian based approach to develop model which is called as dynamic routing model. For computing the center-surround differences this information then used to define saliency.

Harel et al.[3] proposed Graph based Visual Saliency model. In this method, visual saliency models are divided into three different steps that are as in Extraction stage, the feature vectors are extracted from different location over the image plane. Secondly in Activation stage,to create activation map it uses the feature vectors from previous stage.

Finally in Normalization stage**,** by combining one or more activation maps into single map perform the normalization over activation map. In this graph based visual saliency model, this second and final stages are used to treat the equilibrium distribution over map locations as activation and saliency values as well as define edge weights on graphs.

Zhai and Shah [4] proposed, Global contrast-based methods estimate the saliency of individual pixels or image regions using contrast relationships upon the complete image. In this, using the contrast with all other pixels it computed pixel-level saliency. . But the global contrast based methods mostly depends on colour information as well as highlight the background regions as salient for images with which is not much colour variation between foreground and background. In case of video sequences, it mainly focuses on human's first sight which is nothing but the salient region instead of surrounding neighbours. Here, it also have a spatiotemporal video attention detection technique which detects both objects that are we interested in and actions in video sequences. To produce final spatiotemporal attention model it combines both temporal and spatial features of saliency maps .In this method, Colour histogram is used which can be apply on several video sequences as well as many different images to detect the interesting objects and motions which are present in sequences with high satisfactory rate of user.

Achanta et al. [6] here, it present the results based on a frequency-tuned method, using the difference from the average image color which directly defines pixel saliency. It also provides a saliency map with well defined boundaries.

Goferman et al. [7] here, by concurrently modeling local low-level clues, visual organization rules, global considerations, and high -level features it highlighted salient objects with their contexts.

Cheng et al. [8] proposed a regional contrast-based saliency extraction algorithm, it is used to compute a saliency map. By considering the global region contrast over the whole image in the Lab color space as well as the spatial coherence.

Lang et al. [9] here it detected salient positions also determining the consistently sparse elements from the whole image.

Zhu et al. [10] proposed a tag-saliency model, according to the global contrast of low- and high-level information in the scene which is computing the probability that each over-segmented region is salient.

Gopalakrishnan et al. [11] Compactness based methods mainly concentrate on spatial variance of image. Commonly, pixels or superpixels of image region contains small spatial variance in salient region and

background. That will have more spatial variance that is distributed over complete image as well as have larger spread. It only considered the low-level features in the background which have a larger spread than the salient regions. Here, it has a saliency region detection method which only considering colour and orientation that are two most important cues of image.

Perazzi et al. [12] gives a pixel-accurate saliency map concurrently exploiting color and position to rate a region's uniqueness and spatial distribution. Using high-dimensional Gaussian filters these are formulated in a unified way.

Shi et al. [13] proposed a generic and fast computational framework called PISA, which contains spatial prior terms on the color and structure contrast measures, because of this the salient pixels are to be centered in the image and compact. By concluding that significantly it improved the effectiveness of the detection process.

Cheng et al. [14] considered that a spatially compact distribution which is another critical saliency indicator as well as cue to the contrast. To produce accurate salient region detection results they used the appearance similarity and spatial distribution of image pixels.It proposed a soft image abstraction approach, which captures large-scale which is homogeneous elements .It calculating global saliency cues.

III. Methodology

In this system, we are performing salient region detection. At first image is extracted into superpixels , next we form saliency maps using diffusion-based compactness and local contrast and then we fuse or integrate these saliency maps to get final saliency map as shown in Fig.1.In these way different methods detects salient region considering different cues of image like uniqueness, compactness, background. But every method has certain limitations thus method based on integrating local contrast and compactness provides better result compared to previous methods. Previously global contrast and compactness based method has combined together but it have difficulty regarding distinguishing between similar colours in the foreground and background of image and fails when image have the similar background and foreground colours.

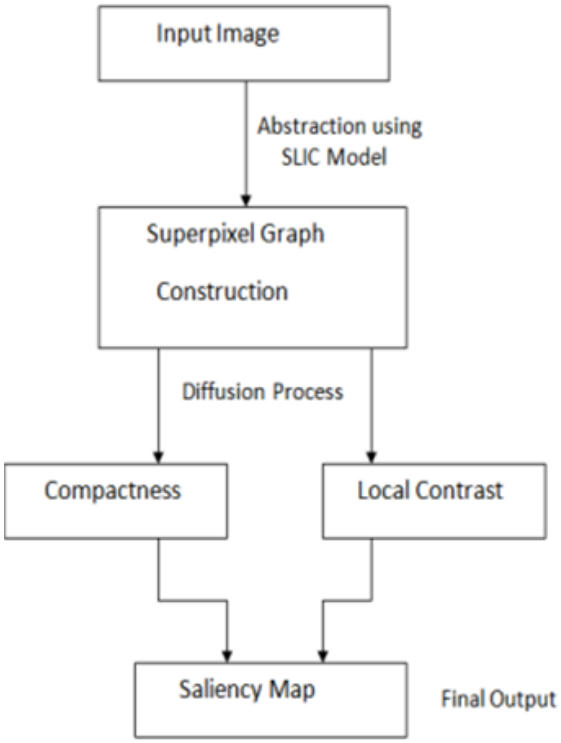

Figure 2: Proposed System

Thus this method have been introduced in which compared to global contrast, local contrast method is more appropriate complement to compactness which may properly highlight the foreground region based on contrast with its neighbouring region whereas global contrast and compactness based methods may wrongly suppress the foreground region. In addition to this diffusion based local contrast is implemented to mitigate limitation of local contrast based method, which tends to highlight object boundaries rather than the entire area of image.

IV. Analysis

Thus we have studied the saliency region detection methods mainly fall into two categories stimulus driven and task driven and are also called as bottom-up [2-4] method and top-down[5] method respectively. In top-down method trained objects are used to identify salient object and in case of bottom-up approach different visual cues are considered such as compactness,local contrast, global contrast, uniqueness as well as background of the image to identify salient object.These different methods had certain advantages and disadvantages when they are implemented individually such as in case of contrast based methods only color contrast of the image is taken into consideration for identifying salient object but this method fails when color of the background and foreground is similar to each other. In case of compactness based methods spatial variance of the pixels are considered to define salient object that is generally pixels having less spatial variance are the part of salient object and remaining pixels will define background. But, for the image in which salient object have large spread this method fails. Background based methods emphasis more on background instead of foreground to detect salient object. But when these methods are combined together then it provides better result than the individual methods. Thus in this work local contrast and compactness methods are combined together to form final saliency map.

- The saliency region detection method that integrates di_usion-based compactness and local contrast.
- Firstly, abstract the image into super pixels and construct a graph.
- Next, compute two complementary saliency maps using the compactness visual cue and local contrast.
- saliency maps are propagated using a di_usion process and the constructed graph.
- Finally, integrate the two computed saliency maps to generate a pixel-wise saliency map.

V. Conclusion

Humans routinely and effortlessly judge the importance of image regions, and focus attention on important parts. Computationally detecting such salient image regions remains a significant goal, as it allows preferential allocation of computational resources in subsequent image analysis and synthesis. Extracted saliency maps are widely used in many computer vision applications such as adaptive content delivery, adaptive regionof-interest based image compression, image segmentation, object recognition, and content aware image resizing. So bottom-up method for detecting salient regions in images can be used by integrating two complementary visual cues compactness and local contrast with diffusion processes. After considering the advantages and limitations of different visual cues local contrast can effectively recover the incorrectly suppressed salient regions using compactness cues

References

[1] Li Zhou, Zhaohui Yang and Qing Yuan "Salient Region Detection via Integrating Diffusion-Based Compactness and Local Contrast," IEEE Trans. Image processing, vol. 24, no. 11, Nov. 2015

[2] L. Itti, C. Koch, and E. Niebur, "A model of saliency-based visual attention for rapid scene analysis," *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 20, no. 11, pp. 1254–1259, Nov. 1998.

[3] J. Harel, C. Koch, and P. Perona, "Graph-based visual saliency," in *Proc. Adv. Neural Inf. Process. Syst.*, 2006, pp. 545–552.

[4] Y. Zhai and M. Shah, "Visual attention detection in video sequences using spatiotemporal cues," in *Proc. 14th Annu. ACM Int. Conf.Multimedia*, 2006, pp. 815–824.

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

[6] R. Achanta, S. Hemami, F. Estrada, and S. Süsstrunk, "Frequency-tuned salient region detection," in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2009, pp. 1597–1604.

[7] 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.

[8] M.-M. Cheng, G.-X. Zhang, N. J. Mitra, X. Huang, and S.-M. Hu,"Global contrast based salient region detection,"in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2011, pp. 409–416.

[9] C. Lang, G. Liu, J. Yu, and S. Yan, "Saliency detection by multitask sparsity pursuit," *IEEE Trans. Image Process.*, vol. 21, no. 3, pp. 1327–1338, Mar. 2012

[10] G.-K. Zhu, Q. Wang, and Y. Yuan, "Tag-Saliency: Combining bottom-up and top-down information for saliency detection," *Comput. Vis. Image Understand.*, vol. 118, pp. 40–49, Jan. 2014.

[11] V. Gopalakrishnan, Y. Hu, and D. Rajan, "Salient region detection by modeling distributions of color and orientation," *IEEE Trans. Multimedia*, vol. 11, no. 5, pp. 892–905, Aug. 2009.

[12] F. Perazzi, P. Krahenbuhl, Y. Pritch, and A. Hornung, "Saliency filters: Contrast based filtering for salient region detection," in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2012, pp. 733–740.

[13] K. Shi, K. Wang, J. Lu, and L. Lin, "PISA: Pixelwise image saliency by aggregating complementary appearance contrast measures with spatial priors," in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2013, pp. 2115–2122.

[14] M.-M. Cheng, G.-X. Zhang, N. J. Mitra, X. Huang, and S.-M. Hu, "Global contrast based salient region detection," in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2011, pp. 409–416