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Salient Region Detection in Natural Images

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Abstract: ***Salient region detection in natural images is very useful for image processing applications like image compressing, image segmentation, object detection and recognition. The proposed method generates saliency map model and extracts salient regions with precise boundaries. The goal of saliency detection is to locate important regions in natural image which attracts humans' visual attention the most. In this paper algorithm consists of four steps: first it abstracts unnecessary details and then defines two contrast measures per element based on uniqueness and distribution and finally saliency is obtained. Our experiment shows the best salient object detection results such that overall salient object detection performance is better than individual method.***

Keywords: salient region detection, saliency map, image processing, local saliency and global saliency.

I. INTRODUCTION

Saliency detection plays an important role for human or machine vision that extracts visual attention of a human observer. Detecting salient regions aims to locate region of interest which are distinct when compared to rest of the scene. Fig 1 shows example of natural image where the flower is visually unique and draws observer's attention from surrounding environment. Due to its wide applicability, the research area of saliency detection has gained tremendous interest in the field of computer vision and searched applications in image segmentation, object detection, image compression and object recognition

(a) Source image. (b) Abstraction. (c) Uniqueness. (d) Distribution. (e) Saliency.

The input image is first abstracted into homogeneous elements. We then define two contrast measures per element based on uniqueness and distribution. Finally a saliency value is assigned to each pixel.

An important step towards salient region detection is the definition of visual attributes such as structure, intensity, texture, color, size or shape. We focus on bottom-up approach for salient region detection. We propose following observations based on saliency maps:

1) Saliency of a region depends on its contrast to nearby regions, while contrast to far regions is less significant.
2) Saliency maps should be very fast and easy to generate to allow processing of large image collections and efficient image retrieval.
3) A global contrast based method is widely used over local based method producing high saliency values.
4) Global considerations can uniformly highlight entire objects.

II. Related Work

Existing saliency approaches are either biologically inspired or computational oriented and aim to detect salient regions in natural images by performing local or global analysis of image based on different features such as intensity, color, structure or texture. We often treated as an image processing operation, saliency has its roots within human view or observation. While observing a scene, it has been noticed that humans focus on selected regions, for efficient recognition and better understanding. These regions where mainly only attention is focused are known as salient regions.

Since providing a survey on all existing approaches is far beyond the scope of this paper, we wish to mainly focus on approaches made to salient region detection that are mainly related to evaluate bottom-up manner. Our research is situated in the highly active field of visual attention modeling.

Borji et al. [16] published a survey on salient region detection recently and also reviewed a visual attention modeling for the purpose of salient region detection in natural images. Here we mainly focus on bottom-up approach, low level salient object region detection methods and efficient or reliable output. Our approach is unsupervised and does not rely on trained background or any high level attributes such as color, structure or semantic.

III. Improved Approach for Salient Region Detection

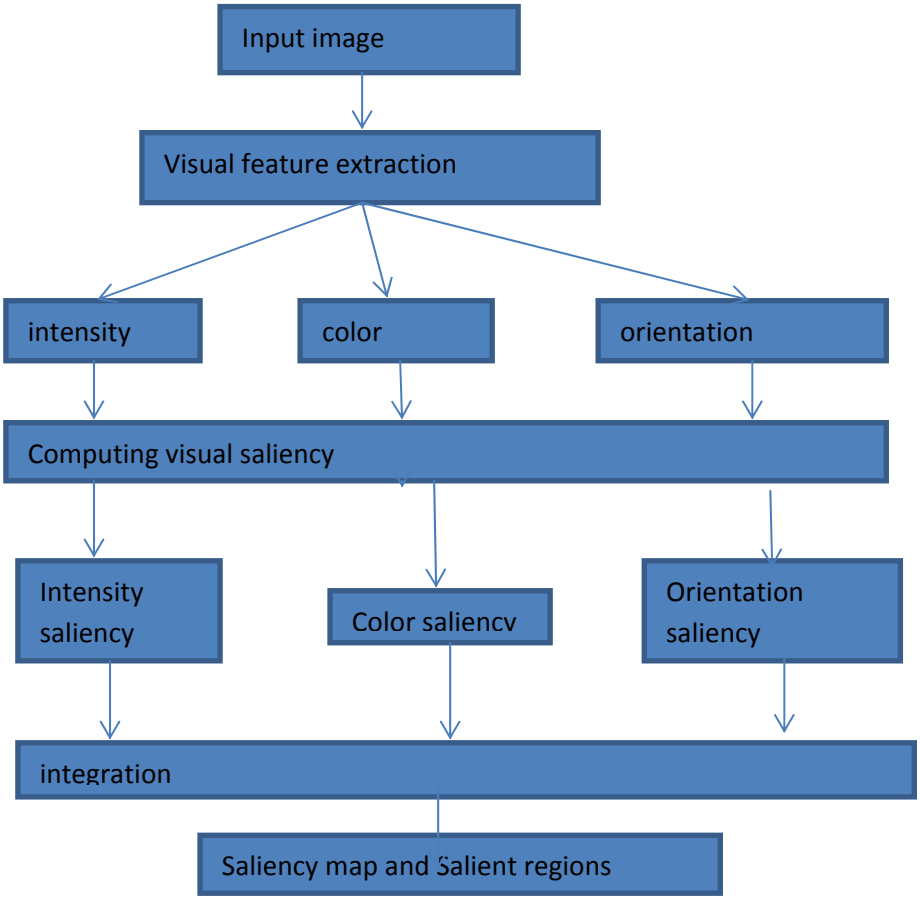

Figure shows framework for salient region detection. Firstly low level visual features like intensity, color and orientation are extracted. Then they are computed to get some saliency map and these maps are integrated and binary image is generated which finally extracts salient regions.

IV. Types of Saliency

1) Local saliency: local saliency refers salient with respect to local background.

2) Global saliency: global saliency refers salient with respect to entire visual scene.

3) Rarity saliency: rarity saliency refers to more salient area.

V. Advantages of Salient Region Detection over Ground Truth

1) Uniformly highlighted salient region.
2) Full resolution
3) Computational efficiency
4) High precision.
5) Good results.

VI. Conclusion

A new method is introduced in this paper with features like intensity, color and orientation. It computes local saliency, global saliency and rarity saliency to generate saliency map and finally extract salient region. The limitations are related to only bottom-up visual attention saliency map and threshold to get image. The more research on top-down to improve saliency map will be included in future work.

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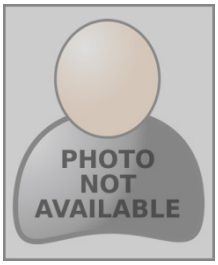

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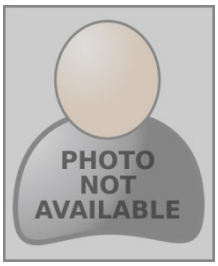

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