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Usage of GBVS in Image Processing to Retrieve the Images

Bhagya Laxmi[1*], Pawan Kumar Mishra[2]

[1*]Department of Computer Science and Engineering, Faculty of Technology, Uttarakhand technical university, Dehradun, India
[2]Department of Computer Science and Engineering, Faculty of Technology, Uttarakhand technical university, Dehradun, India

**Corresponding Author: bhawanabhatt007@gmail.com, Tel.: 7017041871*

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Abstract—In the Modern world, the propensity of the detecting most Salient objects are trending on a large scale. In the era of Computer and science and specially in the Image Processing, we tend to find out most feasible techniques which can extract the most relevant and salient features of the selected image database. We are provided with a few most usable image retrieval methods however still we are not satisfied with the output extracted from the used method. With the advancement of the technology and the Image processing techniques, we have new methods to highlight the Salient features. One of them is Graph based Visual Saliency. GBVS is the technique which produces the salient features in a very accurate and faster way and in an elaborated way. It produces the data in the activation map and then extracts the features from the original image. We have here used a few different images and using our proposed method tried to depict the results in a graphical and pictorial way. Our effort main motive is to highlight the features of an image in a wider manner. In this paper, we would learn how to show Salient part of an image but in a large scale. In this paper, it shows 80% Salient part of an image of GBVS.

Keywords—Image Processing, Image Retrieval, Shape, Color, Graph based visual saliency, Content Based Image retrieval.

I. INTRODUCTION

In this theory, we are discussing about the functions of the GBVS to retrieve the image results. Also, we have to focus on the results which have been produced by the GBVS algorithm. We have used the steps to compute the images results and then applied to see the effective status of the given images. Our endeavour was to produce the result in such a way that the output of the image could easily be understood and analyzed. Further, during the course of this theory, we focused on saliency detection and its map. To make understand someone about the salient features on an image, it is necessary to understand the saliency detection. Also, we have provided the different methods of saliency detection which are being used in the current scenario. Also, we have given the important parameters and scales as to how the GBVS computes the vectors of an image and gives the output. Throughout the study of the subject, we tried to produce a very effective data and adding another substance to the GBVS knowledge. As it is a growing technique and will produce more effective sources.

II. RELATED WORK

L. Itti, C. Koch, E. Niebur, et al.(1999) in their paper titled on "A saliency-based search mechanism for overt and covert shifts of visual attention "Stated thatWe can understand the meaning of the selective visual attention in this way. As we know, selective means which can be selected. Attention means which is specified. So, we can say that if something has been, given at one particular time, needed to be chosen out of a huge amount of data. We use selective visual attention. It is a process which helps us in choosing the one which is the best out of many. The coherence theory of visual cognition, we recognize the specific information.

Ritendra DattaJia Li James Z. Wang (2005) in their paper titled on "Content-Based Image Retrieval - Approaches and Trends of the New Age" Stated that The last research showed that great interest in research on content-based image retrieval. This has paved the way for a large number of new techniques and systems, and a growing interest in associated fields to support such systems. We also discuss some of the key challenges involved in the adaptation of existing image retrieval techniques to build useful systems that can handle real-world data.

D. Walther and C. Koch. (2006) in their paper titled on "Modelling attention to salient proto-objects" Stated that When we try to find out the most specific location and we maintain it for next other locations too, we use the visual search. It may be either openly seen or internally selective. This complete process of search is called Saliency map. It has two dimensions which are explicit. We see a picture and we spot the most effective parts of that and then we start focusing on other parts of the picture.

Lin Zhang, ZhongyiGu, and Hongyu*Li*(2013) in their paper titled on "A novel saliency detection method by

combining simple priors" proposed that in this paper worked on novel conceptually simple salient region detection method. This paper is combining three simple priors. At first behaviour that the human visual system detects salient objects in a visual scene. Secondly people are focuses on the center of an image. Thirdly warms colors are very attractive to people than cold colors are, SDSP has a low computational.

Qiong Yan Li Xu Jianping Shi JiayaJia(2013) in their paper titled on "Hierarchical Saliency Detection" Stated that When we are dealing with objects with complex structures, saliency detection is effected if salient foreground or background is contains small-scale high-contrast patterns. This paper propose a multi-layer approach to analyse saliency clew.the final saliency map is produced in a hierarchical model and new dataset is also constructed.

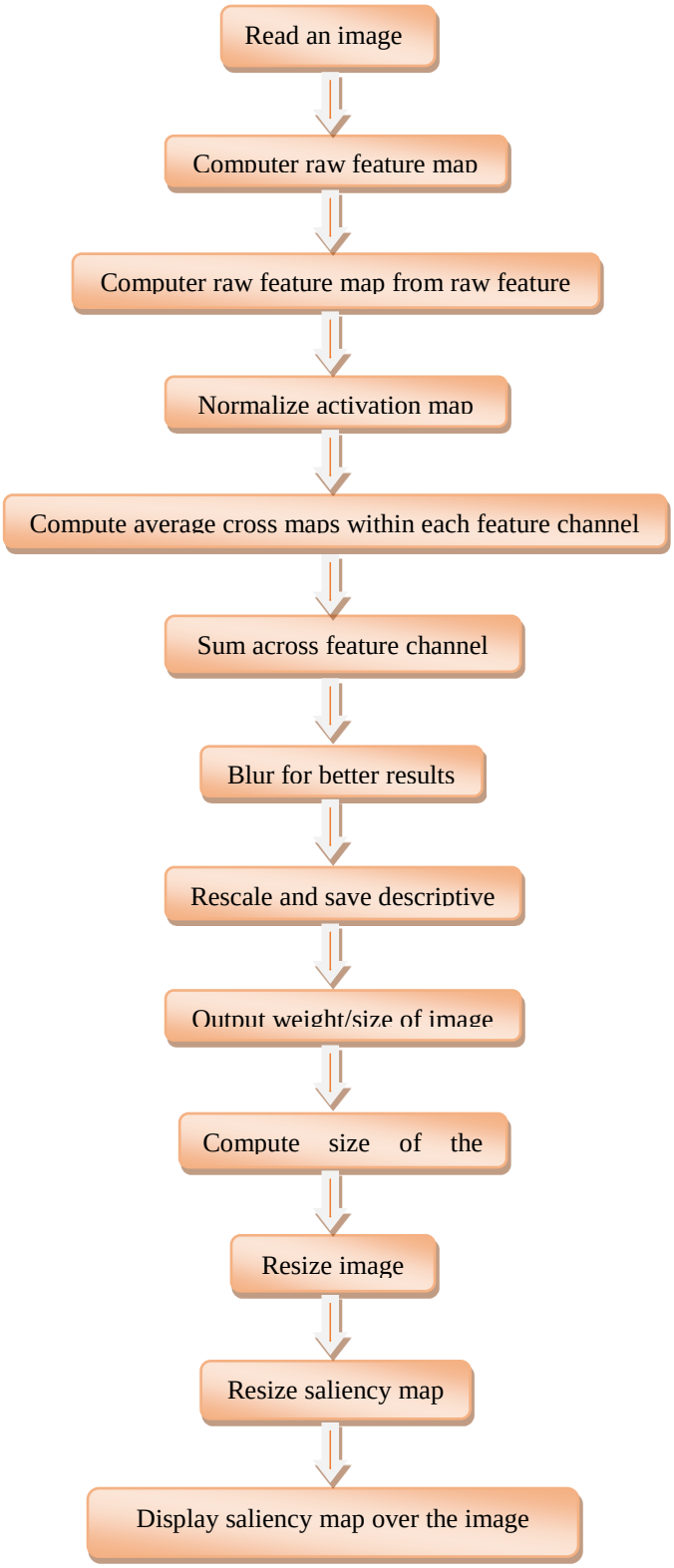
Anita N. Ligade, Manisha R. Patil (2014) in their paper titled on "Content Based Image Retrieval Using Interactive Genetic Algorithm with Relevance Feedback" Stated that CBIR and image processing create a problem to rapid growth in capturing and storing multimedia data with digital devices this paper provides an review of the interactive genetic algorithm, relevance feedback, and neural network in CBIR. Relevance feedback reduced the semantic gap between low level features and high level features and it is helpful to enhance the capacity of CBIR.

Chesti Altaff Hussaina*, D. Venkata Raob, S. Aruna Masthanic(2016) in their paper titled on Robust Pre-processing technique based on saliency detection for content based image retrieval stated that used to retrieve relevant image from large selection of digital image collection. Visual saliency is nothing but highlights some of the objects in such a way that it becomes different from its neighbours and available for viewers. They focuses on the region of interest. This paper use the state of the art Quaternion transform for detect the saliency and focuses on the content based image retrieval systems based on scale invariant feature transform and region segmentation.

III. METHODOLOGY

Graph Based Visual Saliency is mainly of three stages extraction of features to feature vectors, generating activation maps from feature vectors and normalization and combination of activation maps into a single saliency map. Both activation and normalization phases use Markov chain interpretation of the image. Using the Graph Based Visual Saliency algorithm we can determine the accurate and fast result. It detects salient objects as well as its surroundings. It is too much efficient in terms of computational calculations. When it comes to usage of the method, it is easy to implement. It gives the result in a fast manner and doesn't take much time. All in all, GBVS produces the most effective result of the images and useful to locate the most interesting part of an image.

FLOW CHART



ALGORITHM:

Algorithm Image Retrieval Saliency detection-GBVS
Setup - Initialize required variables
Start
Step1. I←read an image
Step2. Compute raw feature map
Form image pyramid
Loop from 1 to number of computation levels (parameters)
If color image
Get R.G.B, samples
Else
Get Gray scale sample
End if
End loop
Compute raw feature map using level, motion estimation and shifting
Step3. Compute activation map from raw feature map
Form a graph over locations of feature map (lattice of a hierarchy)
Connects the nodes with weighted edges
Make it a Markova matrix
Compute the eigenvector
Compute the equilibrium distribution over states.
Arrange the map back to rectangular map
Step4. Normalize Activation map
Step5. Compute average cross maps within each feature channel
Step6. Sum across feature channel
Step7. Blur for better results
Step8. Rescale and save descriptive
Step9. s←Output weight/size of image
Step10. sz← compute size of the image
Step11. Resize image
Step12. Resize saliency map
Step13. Display saliency map over the image

DESCRIPTION OF THE ALGORITHM

The Algorithm we have used to produce the result has been described in this way. Firstly, to start up, we will initialize required variables and then in the first step the method would read the given image.
On the next step, it will compute the raw feature map from the image pyramid. It will compute levels if it gets the RGB samples otherwise if it gets Gray scale sample and then it uses end if, end loop, compute raw feature map using level, motion estimation and shifting.
On the next step, it computes the activation map from raw feature map from a graph over locations of feature map, connects the nodes when weighted edges. It makes it a Markov matrix. It computes the eigenvector and then computes the equilibrium distribution over states.
On the very next step, it normalizes the activation map to exactly show the specific locations. It computes the average cross maps within each feature channel on the next step.
On the sixth step, it sums across the feature channel. It blurs for better results on the sevenths step. It rescales and saves descriptive for further usage. It gives the out result of the image and computes the size of the image. It resizes the saliency map and displays the saliency map over the image.

IV. RESULTS AND DISCUSSION

TEST IMAGE

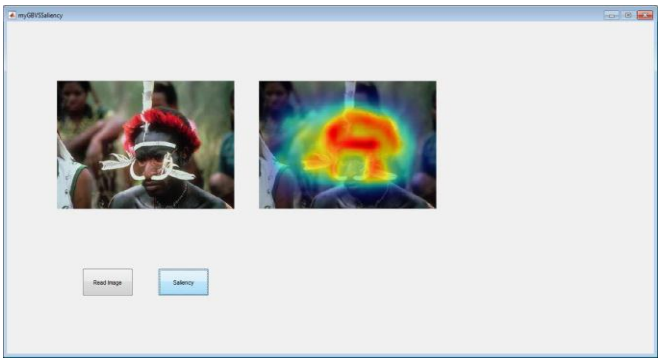


Figure 1 Original image of Saliency Detection

Figure 1 above describes the Salient features in the adjacent image. After applying the algorithm on the original image, we have the highlighted points which are specially focused by the algorithm. In this way, the algorithm described the Salient features in a different ways so that the one can focus on the locations and detects the exact values out of the original image.

Figure 2 Different results of original image

Figure 2 describes that the original image can be shown in different parts of salient features using the algorithm. The original image has the multiple features through which it can be focused and watched. In this way, the algorithm described the Salient features in a different ways so that the one can

focus on the locations and detects the exact values out of the original image.

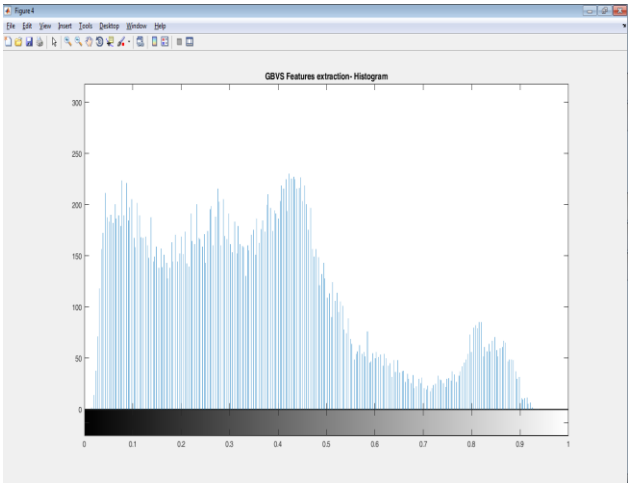


Figure 3 GBVS feature extraction histogram

Figure 3 above shows the graph of the original image when the features were located and extracted. The graph shows the intensity and the propensity of the features extraction as to how the image features were extracted. The image depicts the bars from the beginning to the end. In this way the GBVS depicts the propensity of the feature extraction.

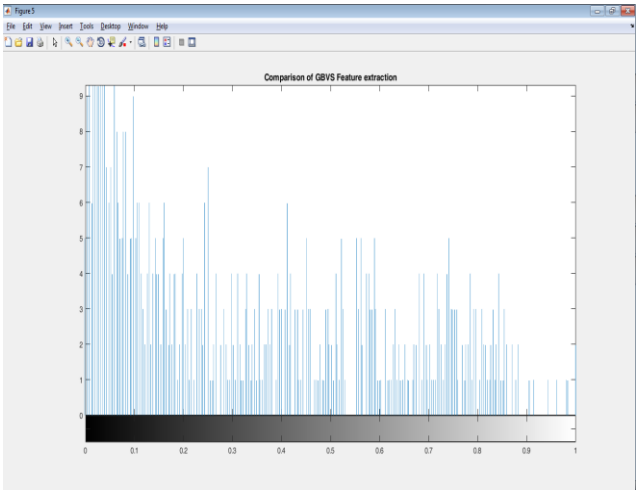


Figure 4 Comparison of GBVS Feature extraction

Figure 4 above shows the graph of the original image when the features were located and extracted. The graph shows the intensity and the propensity of the features extraction as to how the image features were extracted. The image depicts the bars from the beginning to the end. In this way the GBVS depicts the propensity of the feature extraction.

Table 1 Comparison of Values of MSEs for both the scheme:

S. No	Base	Proposed	D= (Base-Proposed)	P=$\frac{D}{Base}$*100	Result=(100-P)	Image Code
1	0.025344	0.000018	0.025326	99.9289773	0.0710227	0
2	0.042054	0.000012	0.042042	99.9714653	0.0285347	4
3	0.026980	0.000012	0.026968	99.9555226	0.0444774	8
4	0.022058	0.000019	0.022039	99.9138635	0.0861365	16
5	0.022058	0.000010	0.022048	99.954665	0.045335	12
6	0.022058	0.000016	0.022042	99.927464	0.072536	20
7	0.022058	0.000012	0.022046	99.945598	0.054402	24
8	0.022058	0.000011	0.022047	99.9501315	0.0498685	28
9	0.022058	0.000011	0.022047	99.9501315	0.0498685	36
10	0.022058	0.000011	0.022047	99.9501315	0.0498685	37

Avg (Result) of MSE = 0.05520498

Table 2 Comparison of values of PSNR for both schemes:

S.No	Base	Proposed	D=(Proposed-Base)	Result=$\frac{D}{Base}$*100	Image Code
1	26.032613	47.375013	21.3424	7.806	0
2	25.241219	49.379453	24.138234	7.837	4
3	30.407652	49.379453	18.971801	8.020	8
4	17.658680	47.253203	29.594523	7.901	16
5	17.658680	50.063146	32.404466	7.891	12
6	17.658680	47.860944	30.202264	7.756	20
7	17.658680	49.070288	31.411608	7.824	24
8	17.658680	49.526046	31.867366	7.887	28
9	17.658680	49.526046	31.867366	7.924	36
10	17.658680	49.679577	32.020897	7.898	37

Avg (Result) of PSNR= 148.02541

V. CONCLUSION AND FUTURE SCOPE

So, we are at the bottom of our topic. Now, we are going to discuss the last but not least, important points about our paper and the results, we have produced using the GBVS. We have understood image retrieval and after knowing the fact that we in our daily life retrieve number of information and always we want the information to be accurate, correct and within a minimal time. Image Retrieval with reference to computational and mathematical point of view is necessary to be kept accurate and salient. We have got some methods and using them we get our intentional results from the object whatever we tend to choose or we choose depending upon the situation. If we are talking about CBIR method to retrieve the image results from a large database this helps us to get the desired results. We used GBVS as it is easier to use and it is accurate and faster. In this paper, we succeeded to show

80% salient part of GBVS. With the advancement of image Retrieval techniques, As on future work we can use naive Bayes Algorithm for classification.

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Authors Profile

Ms. Bhagya Laxmi completed Bachelor of computer science from Uttarakhand technical university Dehradun in 2015 and she is currently pursuing Master of technology under Uttarakhand technical university Dehradun, India.

Mr. Pawan Kumar Mishra is working as an Assistant Professor and Head of the Department, Computer Science and Engineering, Faculty of Technology, Uttarakhand Technical University, Dehradun, India.

