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Implementation of Saliency Detection in Motion Fields

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Abstract— *This paper proposes Extracting salient objects from motion fields using Region Growing Segmentation Technique. Region growing segmentation Process is iterated for each boundary pixel in region. The proposed saliency measure is formulated using a statistical framework and local feature contrast in illumination, color, and motion information. For improving image contrast and illumination, Principle Component Analysis (PCA) technique is used. Salient object detection is an important technique for many content-based applications, but it becomes a challenging job when handling the cluttered saliency maps, which cannot completely highlight primary object regions and cannot suppress background regions. The proposed method used for removing random noise has been researched extensively due to its effectiveness and simplicity.*

Index Terms—: Region growing segmentation, Principle Component Analysis (PCA), illumination, contrast, saliency detection.color, random noise.

1 Introduction

Saliency detection plays an important role in a variety of applications including salient Object detection, content –aware image and video. Generally, saliency is defined as the captures from human perceptual attention. Human vision system (HVS) has the power to effortlessly identify salient objects even in a complex scene by exploiting the inherent visual attention [18] mechanism.

Visual saliency detection was processed in various concurrent methods by applying different techniques of visual saliency detection were proposed by other researches. The basic idea underlying saliency detection is that ganglion cells are insensitive to uniform signals. Due to this reason color contrast, luminance contrast, as well as orientation dissimilarity are natural features for saliency detection [16], thereby they are employed by the majority of saliency detection models. These features are responsible for bottom-up attention model. In the pattern based on multi-scale contrast was proposed. The peculiarity of this method is that the final saliency map is created using a segmentation map, by assigning each segment a saliency value using thresholding. Another group of methods use statistics of the image to compute saliency.

This method computes saliency as a local likelihood of each image patch considering the basis function learned from natural images. The most recent methods take advantages of modern machine learning techniques and employ sophisticated feature spaces. There are four levels of features for saliency detection: low-level, mid-level, high-level and prior information. The low level employs features proposed; the mid-level includes a horizon line detector the high-level includes face and person detectors; prior information includes the dependence of saliency on the distance from the center of the image.

(A)QUALITY IMPROVED VIDEO

The principal objective of image enhancement is to process a given image so that the result will be more suitable than the original image for a special application. It accentuates or sharpens image features such as edges, boundaries or contrast [7] to make a graphic display more helpful for display and analysis. The enhancement doesn't grow the inherent information content of the data, but it propagates the dynamic range of the chosen features so that they can be detected easily.

(*B*) *SPATIAL DOMAIN IMAGE ENHANCEMENT*

Spatial domain techniques directly deal with the image pixels [9]. The pixel values are manipulated to achieve desired enhancement [19]. Spatial domain techniques like the power law transforms, logarithmic transforms, histogram equalization are based on the direct manipulation of the pixels in the image.

(C)ADAPTIVE COLOR QUANTIZATION

Many image display devices allow only a limited number of colors to be simultaneously displayed. Usually, this horde of available colors called as color palette, may be chooses by a user from a wide variety of available colors. Such device restrictions devise it particularly difficult to display natural color images since these images usually contain a wide range of colors which must be quantized by a palette with obligatory size. This color quantization problem is considered in two parts: the selection of an optimal color palette and the optimal mapping of each pixel of the image to a color from the palette.

2 METHODOLOGY

The proposed block diagram is shown in Fig (1).

- Video to frame conversion
- Frame Enhancement
- Adaptive Color Clustering using K means clustering Technique

Frames can be obtained from a video and converted into images. To convert a video frame into an image, the MATLAB function is used to modulate the video to frame conversion. To read a video in .avi format, the function 'aviread' is used. The original format of the video that we are using as an example is .JPG file format. The .jpg file format image is converted into an .AVI format video.

In digital image processing,the process of improving the quality of a digitally stored image by manipulating the image with MATLAB coding. It is quite easy, for example, to make an image lighter/darker, or to increase/decrease contrast. Advanced image enhancement MATLAB algorithm also supports many filters for altering images in various ways. Low-contrast images

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can result from poor illumination, lack of dynamic range in the image sensor or even wrong setting of a lens aperture during image acquisition. The idea behind contrast stretching is to increase the dynamic range of the gray levels in the image being processed.

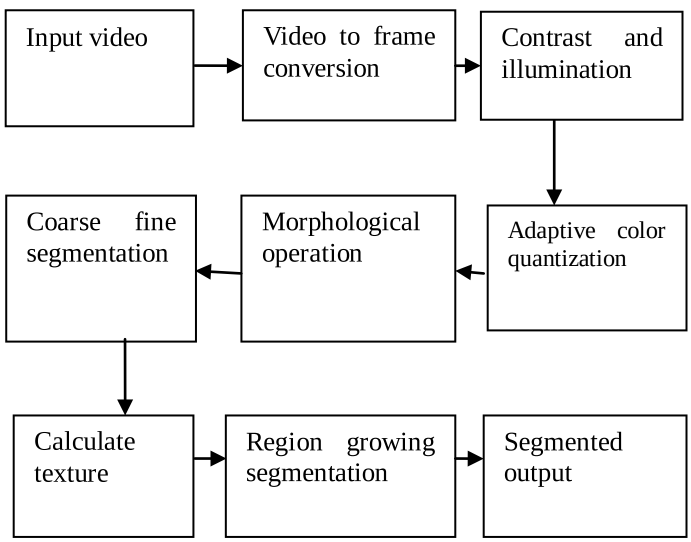

Fig.1 Proposed Block Diagram

(A)IMAGE GRADIENT AND IMAGE MAGNITUDE

For any edge detector, there is a trade–off between noise reduction and edge localization. The decrement is typically achieved at the expense of good localization and vice versa. The Sobel edge detector can be shown to provide the best possible compromise between these two conflicting requirements. The mask we want to use for edge detection should have certain desirable characteristics called Sobel's criteria [12] .The magnitude and orientation of the gradient can be also computed from the formulas

$$Magnitude(x, y) = |g| = \sqrt{g_x^2 + g_y^2}\ .$$

(B) *THRESHOLDING*

The typical procedure used to reduce the number of false edge fragments in the non-maximal suppressed gradient magnitude is to apply a threshold to suppressed image. All values below the threshold are changed to zero [12].We has noted already the problems associates with applying a single, fixed threshold to gradient maxima. Selecting a low threshold ensures that we capture the weak yet meaningful edges in the image. Also high a threshold, on the other hand, will guide to excessive fragmentation of the chains of pixels that represent significant contours in the image. Hysteresis thresholding offers a determination to these problems It uses two thresholds T_{low} and T_{high} , with T_{high} =2 T_{low} .T_{high} is use to mark the best edge pixel candidates.

(C) SOBEL EDGE DETECTOR

- Plain the input image with a Gaussian filters.
- Count the gradient magnitude and orientation using smoothed image and calculating finite –difference approximations for the partial derivatives [12].
- Apply non - maxima suppression to the gradient magnitude image.
- Use the double thresholding algorithm to discover and link edges.

The effect of the Sobel operator is determined by three parameters - the width of the Gaussian kernel used in the smoothing phase, the upper and lower thresholds used by the tracker. Plentiful the width of the Gaussian kernel [8] reduces the detector's sensitivity to clutter, at the expense of losing some details in the image. The localization survives in the detected edges also increases slightly as the Gaussian width is increased. Usually, the sublime tracking threshold can be set quite high and the lower threshold quite low for good results. Setting the lower threshold also high will cause noisy edges to break up. Setting the upper threshold [9] too low increases the number of spurious and undesirable edge fragments appearing in the output.

3 IMPLEMENTATION

(A) SUMMARY OF THE PROPOSED SYSTEM

Steps that are involved in the proposed system is as follows:

1) Read input video
2) To improve the quality of the video.
3) Image enhancement is to improve the visual appearance of the image.
4) Contrast and illumination is improved when principle component analysis technique is applied
5) Implementing K means clustering for grouping the pixels
6) After clustering process the image becomes gray to convert it into color image color quantization technique is used.
7) Morphological operation is used to extract the multiple scales and few scales.
8) Gradient images are created from original image
9) Sobel filter is used to find the high frequency components in Images
10) Spatial to frequency conversion is done based on dual tree complex wavelet transform technique to compute the magnitude
11) Extracting the texture feature for regions
12) Calculating similarity pixels for regions
13) Highlight salient object regions and suppress the background regions
14) Salient object regions are segmented by using Region GrowingAlgorithm

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IV.EXPERIMENTALRESULTS

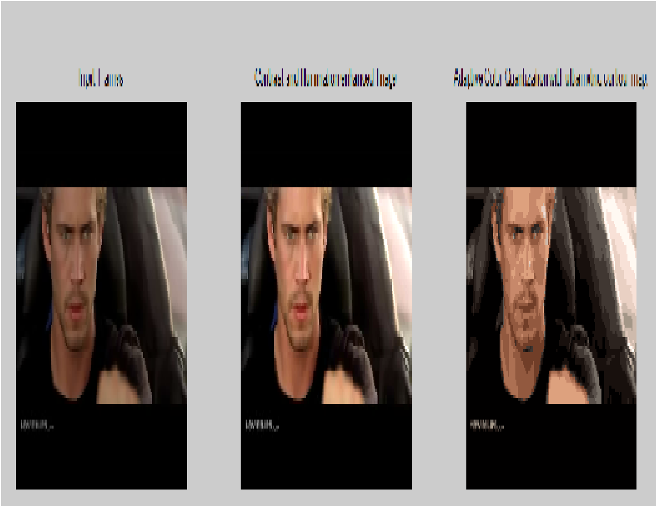
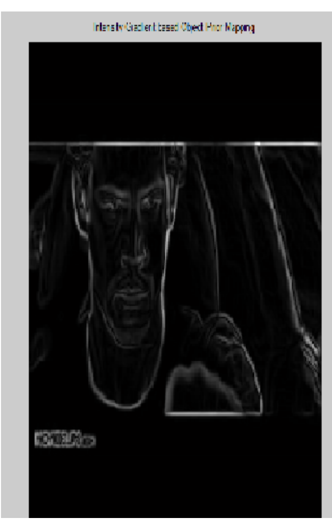


Figure (2) input frames, contrast and illumination enhanced image, adaptive color quantization image

Figure (2) shows the Input frames can be obtained from video and converted into image. This is implemented in mat lab. The total input video has 31seconds finally we get 770 frames but we take 5 input frames to be processed. The input image resolution contains 320×240 pixels. Contrast can be simply explained as difference between maximum and minimum pixel intensity in an image. Figure image enhancement uses principal component analysis technique for contrast and illumination improvement. Principle component analysis is a multivariate statistical technique.Adaptive Color Quantization is an algorithm .It is based on Perceptive information carried by images. Common colour resolution for high quality image is 256 levels for each Red, green, blue channels 256^3=16777216 color we can display 256 distinct colors at a time .sample original image for color statistics select color map based on those statistics .Map the colors to their representative color map next redraw the image quantized pixels.



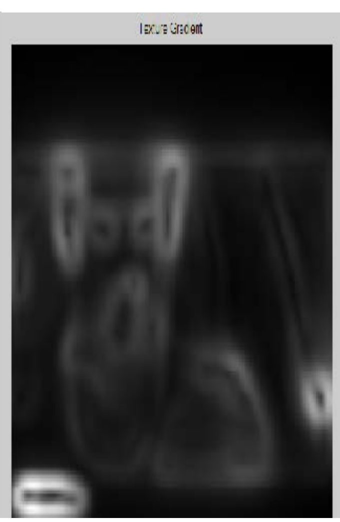


Figure (3) intensity gradient Figure (4) Texture gradients

Figure (3) Apply Morphological operation is used to separate the foreground and background pixels. Gradient is the directional change in intensity of color.Gradient images are created from the original image using Sobel filter.sobel filter is very similar to prewitt filter .It is also a derivate and is used for point detection. It also calculates edges in both horizontal and vertical direction.Spatial to frequency conversion is done based on dual tree wavelet transform technique to compute the magnitude. In spatial domain we deal with images as it is. The value of the pixels of the image deviates with respect to scene. Sharpening is opposite to blurring.In blurring reduce the edge content and in sharpening , increase the edge content.so inorder to increase the edge content in an image find the edges first.edge can be find by using any operator after finding edges are calculated by difference between corresponding pixel intensities of an image. Figure (4) Apply coarse fine segmentation of image is used to calculate the texture of image using texture features. Median filter is used to reducing impulse noise when converting spatial to frequency domain.By using dual tree complex wavelet transform to separate real part,imaginary part and also calculate the magnitude. Extracting texture features from regions. Calculate the similarity pixels of the region. Using post processing filter noise can be removed. Interpolation means upsampling it is used to when segmenting the region the pixels are not missed.

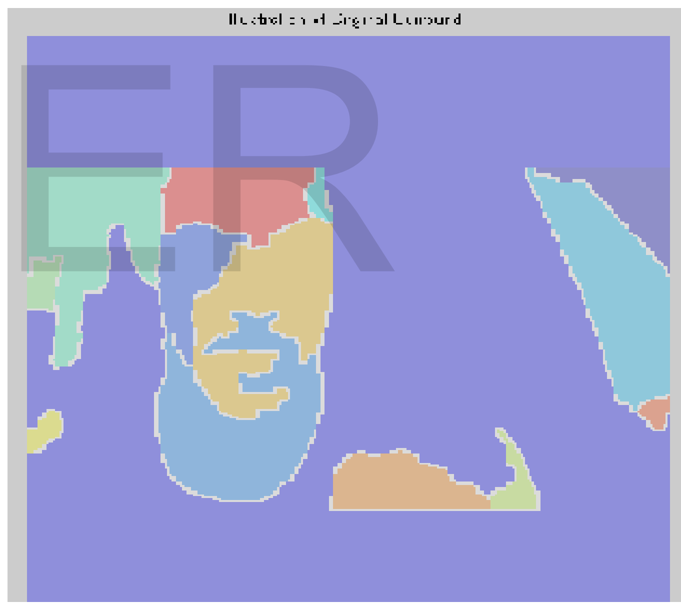


Figure (5) illustration of original surround

Figure (5) shows the apply total gradient input to this image. Salient object regions as well as other meaningful background regions, which are generated in the saliency tree, can be more completely preserved in such a partition. Therefore we exploit the object prior evaluated on the basis of regions to adjust the initial regional saliency measures in order to highlight salient object regions and suppress background regions more effectively. Spatial domain and frequency domain can be established by convolution theorem.Give hold on function to the image surround can be mapped.

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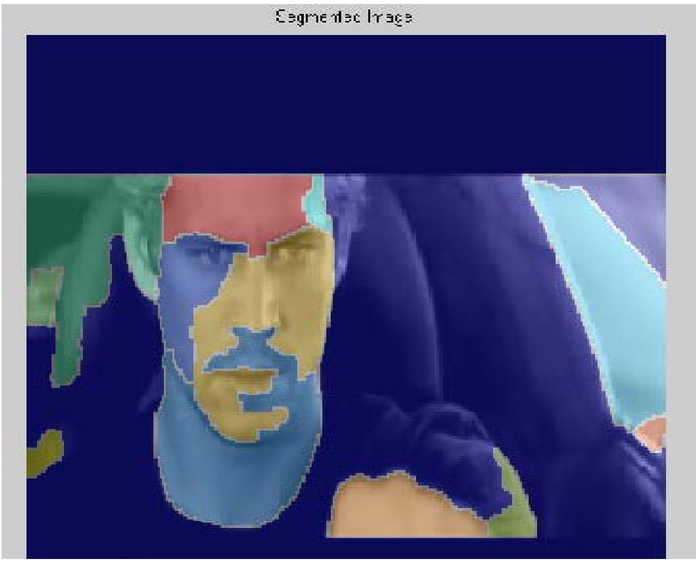

Figure (6) segmented image

Figure (6) shows the Region growing is a procedure that groups pixels or sub regions into larger regions based on growth. The basic approach is to start with a set of seed points and from these grow regions by appending to each seed those neighboring pixels that have predefined properties similar to the seed such as

Specific ranges of intensity or color. Salient object regions are segmented by Region Growing algorithm. Grouping the saliency object based on illumination. By applying Region Growing Technique illuminations are calculated. Grouping higher and lower pixels by thresholding technique.

V.CONCLUSION

Thus concluded that the work here is done in the video segmentation and the concept in this paper is to improve the contrast, illumination and also calculate the gradient it is supported by MATLAB tool. . Instead we propose a simple algorithm that uses a video with segmented salient objects to learn to detect saliency using region growing segmentation technique. Building on the recent success of segmentation-based approaches to object detection, our saliency detection is based on image super pixels, as opposed to individual image pixels. Our features are the principle ones often used in vision, i.e. they are based on color, texture, gradient etc. These common features, properly normalized, surprisingly have a performance superior to the methods with features specifically designed for saliency detection.

REFERENCES

1. Alexe.B, T. Deselaers, and V. Ferrari,(Sep. 2010) "What is an object," in Proc.IEEE CVPR,, pp. 73–80.
2. Borji.A, D. N. Sihite, and L. Itti,(Oct. 2012) "Salient object detection: A benchmark, "in Proc. ECCV, pp. 414–429.
3. Fu.H, Z. Chi, and D. Feng, (Jan. 2011) "Attention-driven image interpretation with application to image retrieval," Pattern Recognit., vol.9, no. 9, pp. 1604–1621.
4. Guo.C, and L. Zhang, (Jan. 2010) "A novel multi resolution spatio-temporal saliency detection model and its applications in image and video compression,"IEEE Trans. Image Process., vol. 19, no. 1, pp. 185–198.
5. Han.J, K. N. Ngan, M. Li, and H. Zhang, , (Jan. 2006) "Unsupervised extraction of visual attention objects in color images," IEEE Trans. Circuits Syst.Video Technol., vol. 16, no. 1, pp. 141–145.
6. Itti.L, C. Koch, and E. Niebur, (Nov. 1998) "A model of saliency-based visual attention for rapid scene analysis," IEEE Trans. Pattern Anal. Mach.Intell. vol. 20, no. 11, pp. 1254–1259.
7. Jung.C, and C. Kim, (Mar. 2012) "A unified spectral-domain approach for saliencydetection and its application to automatic object segmentation," IEEETrans. Image Process., vol. 21, no. 3, pp. 1272–1283.
8. Jiang.H, J. Wang, Z. Yuan, Y. Wu, N. Zheng, and S. Li, (Jun 2013)"Salient object detection: A discriminative regional feature integration approach," inProc. IEEE CVPR, pp. 2083–2090.
9. Koch .Cand S. Ullman, (1985) "Shifts in selective visual attention: Towards the underlying neural circuitry," Human Neurobiol., vol. 4, no. 4,pp. 219–227.
10. Li.Z, S. Qin, and L. Itti, (Jan. 2011) "Visual attention guided bit allocation in video compression," Image Vis. Comput., vol. 29, no. 1, pp. 1–14.
11. Luo.Y, J. Yuan, P. Xue, and Q. Tian, (Dec. 2011) "Saliency density maximization for efficient visual objects discovery," IEEE Trans. Circuits Syst. VideoTechnol., vol. 21, no. 12, pp. 1822–1834.
12. Rafael C.Gonzalez,Richard E.Woods,(2009)"Digital Image Processing",Third edition,India
13. Rahtu.E, J. Kannala, M. Salo, and J. Heikkila, , (Jan. 2006) "Segmenting salient objects from images and videos," in Proc. ECCV, pp. 366–379.
14. Setlur.V, T. Lechner, M. Nienhaus, and B. Gooch, (Sep. 2007) "Retargeting images and video for preserving information saliency," IEEE Comput. Graph.Appl., vol. 27, no. 5, pp. 80–88.
15. Shamir.A, and S. Avidan, (Jan. *2009)* "Seam carving for media retargeting,"Commun. ACM, vol. 52, no. 1, pp. 77–85.
16. Shi.R, Z. Liu, H. Du, X. Zhang, and L. Shen, (Apr. 2012) "Region diversity maximization for salient object detection," IEEE Signal Process. Lett. vol. 19, no. 4, pp. 215–218.
17. Treisman. A.M and G. Gelade, (Jan. 1980) "A feature-integration theory of attention,"Cognit. Psychol., vol. 12, no. 1, pp. 97–136.
18. Zhi liu,(May 2014)"saliency tree a novel saliency detection framework "IEEE Trans.Image processing,vol.23,no.23.
19. Zou.W, K. Kpalma, Z. Liu, J.Ronsin, (Sep. 2013) "Segmentation driven low rank matrix recovery for saliency detection," in Proc. BMVC, Sep. 2013,pp. 1–13.