Development of ROI Video Coding for low Bit rate Transmission of Ultra sound videos

[1]Kalpana Bansod, [2]Pranjali Dahikar, [3]Nilesh Bodane

[1]PG Student, [2]Assitant Professor, [3]Assitant Professor
Department of Electronics and Communication engineering
Vidarbha institute of technology Nagpur, Maharastra ,India

***Abstract*: Image compression based on ROI has been one of the hot topics of interest in image processing. There is not a single widely accepted method for detecting the ROI automatically form an image .common image compression standards are usually based on frequency transform such as Discreate Cosine Transform or wavelet. Saliency detection is a category of computer vision algorithum that aims to filter out the most salient object in a given image. Existing saliency detection method can generally be categorised as bottom-up method and top-down method, and the prevent deep neural network has begun to show its application in saliency detection in recent years. In this paper we present a region of interest based ultrasound videos compression study which shows that significant reduction of the required for transmission, bit rate can be achieved without altering the design of existing video codes.**

Introduction

Image compression is the huge problem in medical system. Compression is the one of the technique. For most medical images or videos, the diagnostically significant information is localized over relatively small regions of interest. In practice, the compression of medical images or videos must be reliable because a minor loss may result in a serious consequence. Due to clinical need lossless compression medical image is often a sensible choice .basically image compression is classified in two categories namely lossy and lossless method.

Video Compression

To achieve efficiency and to meet bandwidth and delay constraints as well, raw video must be compressed before transmission. In other words video compression is done at sender's side in a scalable manner using a predefined standardized coding/decoding system. Then at the client side the encoded video layers would be decoded and played in a proper way. In this survey we only consider MPEG standards. MPEG stands for the Moving Picture Experts Group. MPEG is an ISO/IEC working group, established in 1988 to develop standards for digital audio and video formats. There are five MPEG standards being used or in development. Each compression standard was designed with a specific application and bit rate in mind, although MPEG compression scales well with increased bit rates. They include: MPEG-1, MPEG-2, MPEG-4.

Saliency Detection

The method of saliency detection are broadly categorized into two major group, namely the bottom-up method and the top-down method.

Bottom-up Method

It largely designed for non task specific saliency detection, in low-level features are mainly involve as fundamental for the detections. These features are usually data driven and hand crafted.at this time, usually only the most basic features in conventional image processing, such as pixel colour value, histogram, frequency spectrum, etc. are exploited in the method.

Top-Down method

These method break down the saliency detection task into more fundamental components, and task specific high level features are frequently involve as prior knowledge. Supervised learning approaches are commonly used in detecting image saliency.

Enhancement technique

Image enhancement is the popular and the most widely known technique of image processing. Many image like medical image, satellite image suffer from noise and poor constrast. Image enhancement algorithum over a wide variety of approaches for modifying image to achive visually acceptable image. Enhancement technique improve the quality of the image view, blurring, noise and increasing contrast and improve the border and sharpness of the image. The enhancement method can broadly be divided in to following two categories.

1) Spatial Domain
2) Frequency Domain

Spatial domain and frequency domain include technique like point processing, image smoothening, edge detection and image sharpening. The technique used in this paper are spatial domain which deal with the image pixel and enhance the contrast and the compressed medical image are image are well enhanced by image adjustment. The technique used in paper is Adaptive Histogram Equalization (AHE).

Adaptive Histogram Equalization (AHE)

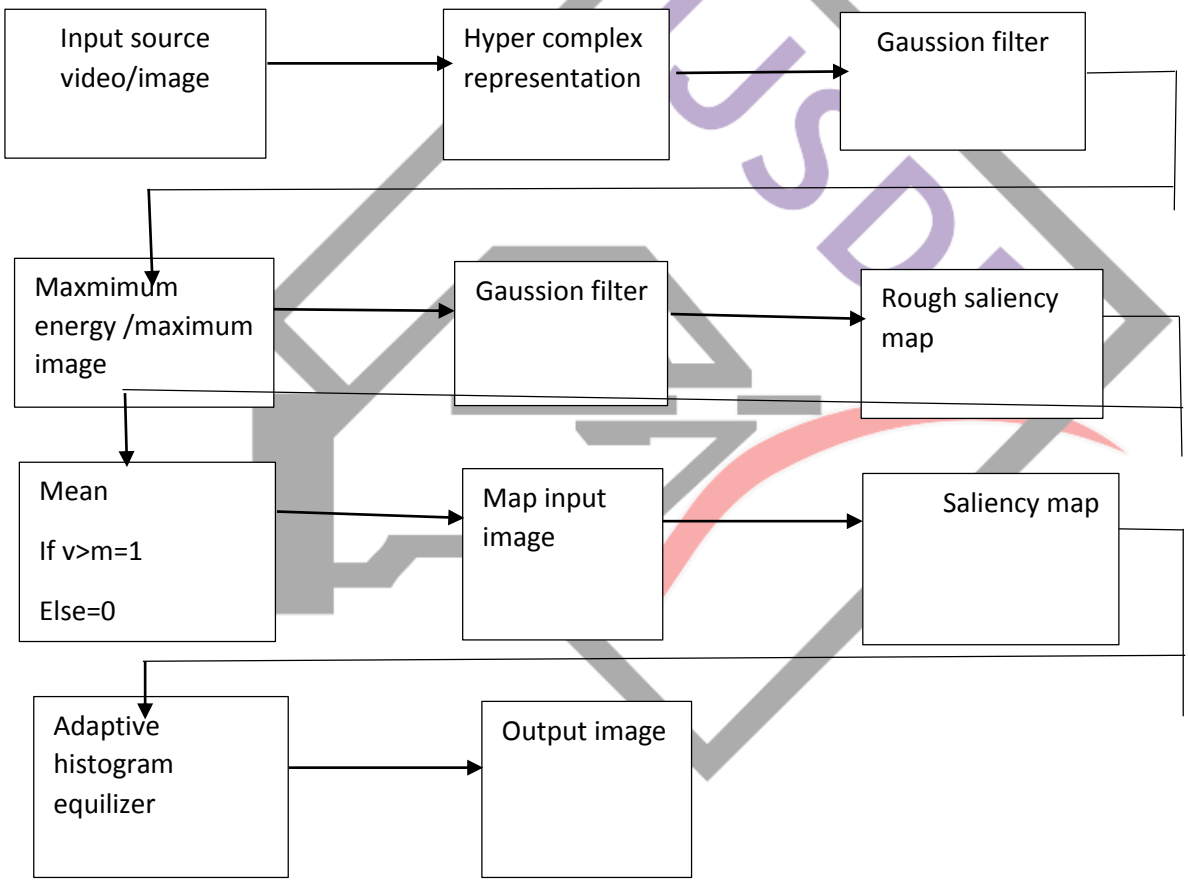
This method used for contrast enhancement of image. the compressed medical image are enhanced again by using this contrast enhancement method as it is simple and effective. By using the MATLAB commands and function the image is enhanced using AHE.thus the AHE enhanced output image is obtained for all the lossy and lossless compression technique. The performance metrics are measured, tabulated for a clear understanding of the compression mode.

Performance Metrics

The performance metrics that are considered for measuring the compression and enhancement techniques of image are as follows

1) Peak Single to Noise Ratio (PSNR)
2) Mean Square Error (MSE)
3) Structural Similarity Index Modulation (SSIM)

Block diagram Development of ROI VIDEO CODING FOR LOW BIT RATE TRANSMISSION OF ULTRASOUND VIDEOS

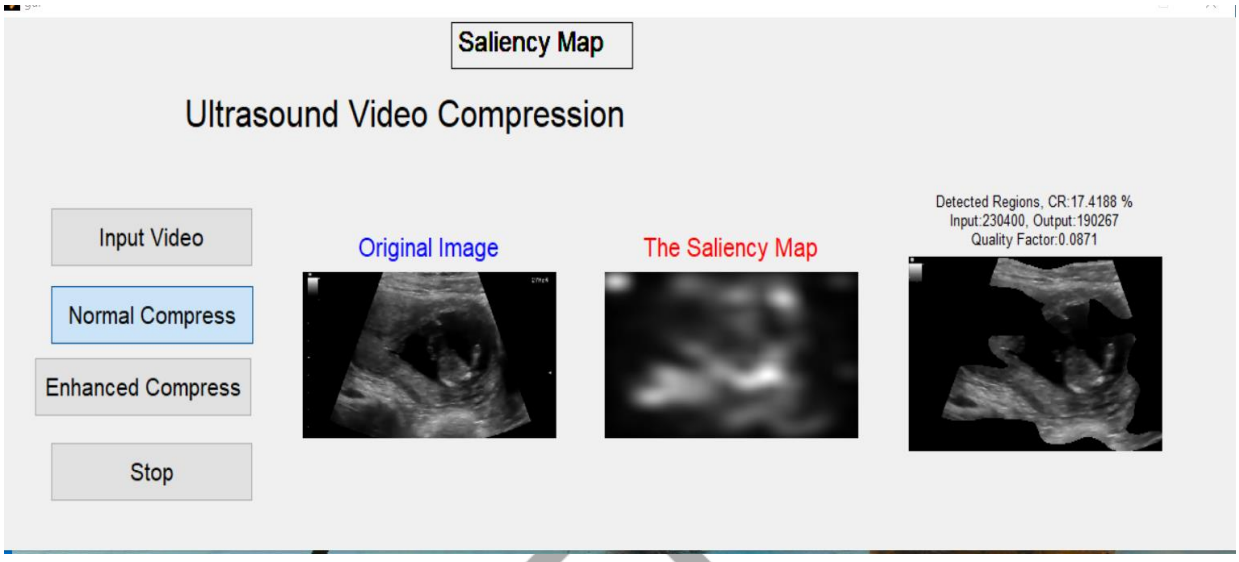


Dia. block diagram of image or video transmission over saliency map

Result

To analyze the results three images or videos are selected and then the specific outputs of the respective image are displayed here as results of both compression and enhancement techniques are as.

Output for normal compress video



Output for enhanced compress video

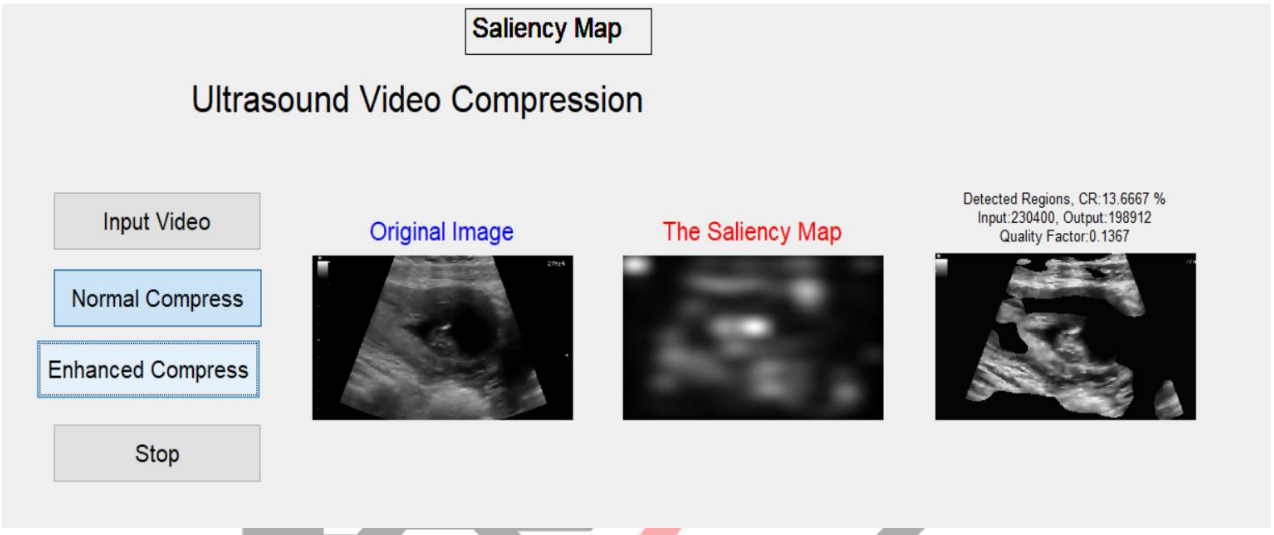


Table for output videos

Input video	Normal compress		Enhance compress	
	CR	Q	CR	Q
1	31	0.15	37	0.37
2	24	0.12	24	0.24
3	20	0.10	23	0.21

Table no.1

Conclusion and Future work

Different methods of image compression with different compression parameters were implemented and tested. The proposed method performs well for medical images such as MRI scans, IR images from battle field or surveillance cameras. Since the details in the Regions of interest are preserved completely, the most important data is not damaged due to the compression process. In this thesis a saliency-based visual attention model was applied to identify regions of interest for ROI-based video coding. The proposed model processes two separate information channels; a high-level one which models conscious search for diagnostic rich image/frame regions and a lowlevel one which models sub-conscious attention attraction. ROI based encoding is then applied by smoothing the nonROI areas with a gaussion filter. Coding efficiency was examined based on both visual trial tests and encoding gain. The results presented indicate that: (a) improvr the quality factor and comman ratio.(b) comrair between normal compress and enhance compress.

Further work includes conducting experiments in an increased set of carotid ultrasound videos as well application of the proposed model to other types of medical videos and images.

References

[1] S. Yuan; X. Xie, Q. Guo and R. Zhu, "Research on infrared image compression based on region of interest automatic detected," Proc. of the International Conference on Audio, Language and Image Processing (ICALIP), pp. 883-888, 2008.

[2] T. Pun "A new method for grey-level picture thresholding using the entropy of the histogram". Signal Processing, pp. 223-237, 1980.

[3] S. Kumar, M. Pant, and A.K. Ray, "2D Maximum Entropy Method for Image Thresholding Converge with Differential Evolution", Advances in Mechanical Engineering and its Applications, vol. 2, no. 3, pp. 189-192, 2012.

[4] M. A. El-sayed , S. Abdel-khalek and E. Abdel-aziz, "Study of Efficient Technique Based On 2D Tsallis Entropy For Image Thresholding", International Journal on Computer Science and Engineering (IJCSE) , vol. 3, no. 9, 2011.

[4] J.N. Kapur, P.K. Sahoo and A. Wong: "A new method for gray-level picture thresholding using the entropy of the histogram. Computer Vision", Graphics and Image Processing, pp. 273-285, 1985.

[5] A. Khademi and S. Krishnan, "Comparison of JPEG 2000 and Other Lossless Compression Schemes for Digital Mammograms", Proc. of the 27th Annual International Conference of the Engineering in Medicine and Biology Society (EMBS), pp. 3771-3774, 2006

[6] R. Shah, P. Sharma and R. Shah, "Performance Analysis of Region of Interest Based Compression Method for Medical Images" Proc. of the Fourth International Conference on Advanced Computing & Communication Technologies (ACCT), pp. 53-58, 2014.

[7] C. Doukas and I. Maglogiannis, "Region of Interest Coding Techniques for Medical Image Compression" , IEEE Engineering in Medicine and Biology Magazine , vol. 26, no. 5, pp. 29-35, 2007.