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TECHNOLOGY****IMPLEMENTATION OF IMAGE RESOLUTION ENHANCEMENT****J. Ravi * , K. Venkat Rao, N. Kishore Chandra Dev**

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ABSTRACT

This paper represents an approach to implement image resolution enhancement i.e. Stationary wavelet decomposition and Discrete Wavelet Decomposition. An image resolution enhancement technique based on interpolation of the high frequency subband images obtained by input image and the Discrete Wavelet Transform. These two type of wavelet transforms are used in several type of applications in image processing.

KEYWORDS: Stationary Wavelet Transform, Discrete Wavelet Transform**I. INTRODUCTION**

Interpolation is One of the commonly used techniques for image resolution enhancement. These Interpolation technique is used to increase the resolution of the image by selecting pixel[1] from surrounding one. For any one imaging application, Image Interpolation[3] in complex wavelet transform is produces better results [3]-[4]. Image resolution enhancement is the process of manipulating an image so that resultant image is good quality image. Image enhancement can be done in various fields. Linear Interpolation[3] includes neighbour, bilinear, bicubic Interpolation [5]. But Images obtained by these linear Interpolation technique produces blurring, blocking . to avoid these drawbacks non linear Interpolation[3] algorithms are used for resolution. There are three interpolation[3] techniques, those are interpolation, bilinear interpolation, and bicubic interpolation. In image processing Discrete wavelet transform (DWT) [8] is used as one of the recent wavelet transforms. Discrete wavelet Transform decomposes an image into different subband images, namely low-low (LL), low-high (LH), high-low (HL), and high-high (HH). Stationary wavelet transform (SWT) [10] is another type of wavelet transform used in image processing[8].

Interpolation:

There are three interpolation techniques, namely interpolation, bilinear interpolation, and bicubic interpolation. These techniques are used to increase the image resolution[4] by selecting pixel from surrounding ones. Among all these techniques to improve the brightness of the image by comparing their pixel characteristics[6]. A difference image can be obtained by subtracting lower subbands[9]. In atmospheric nature[7] various interpolation techniques are used. The main aim of the interpolation is , it is the process of obtaining unknown data values by using known data values. The problem of interpolation[9] is , it gives the non-given point in some space when some colour points surrounding that one. Bilinear interpolation is one of the resampling technique in image processing. Bilinear filtering is also known as Bilinear interpolation. These Bilinear filtering is used to produce the realistic images. Once in any situation Bilinear filtering or Bilinear interpolation is used so that to calculate and assign intensity values to the pixels[1]. One of the cubic interpolation is Bicubic interpolation for interpolating data points on a two dimensional grid. These bicubic interpolation is used to accomplish the splines, polynomials, and Cubic algorithms[6]. Figure 1 represents Super resolution algorithm. In these one an image resolution[4] enhancement technique which generates sharper higher resolution[4] image. Fig. 2 shows that super resolved image of (a) Baboon, (b)Barbara, and (c)Lena's picture using proposed technique are much better than the low resolution image in super resolved image by using the interpolation, and WZP. Table 1 indicates that the proposed technique over performs the conventional and state of art image resolution enhancement techniques. Fig 1 shows each wavelet

transform[7] divided into four number of wavelet coefficients[7]. Each coefficient have special characteristic comparing to remaining ones. Every wavelet[2] coefficient is interpolated with a factor 2. Comparing all these coefficients with one to another after completing the filtering operation the least wavelet[7] coefficient LL is removed because of it's low resolution[9]. After filtering operation all are fused and finally reconstruct the original image by applying Inverse Discrete Wavelet Transform[7].

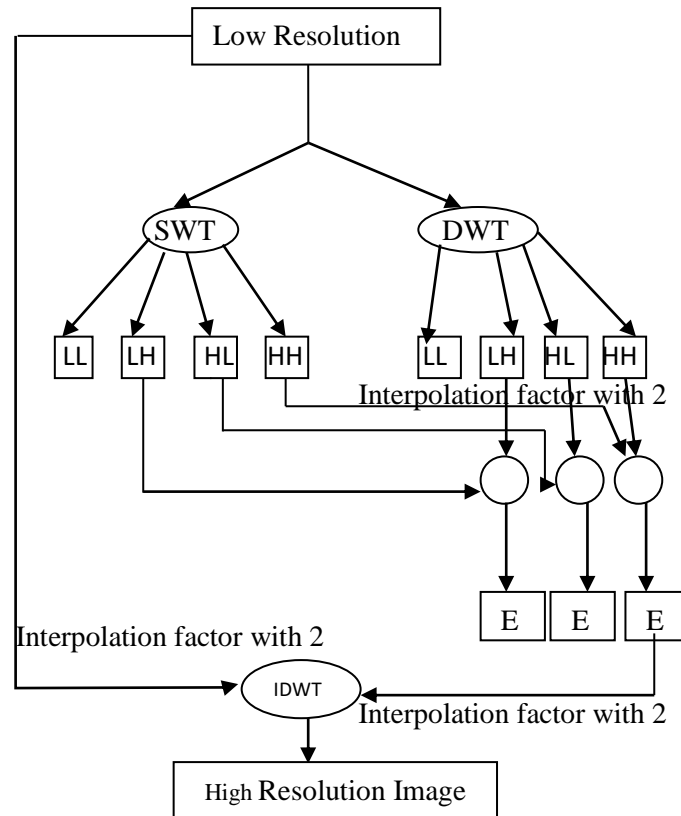


Figure 1 represents Super resolution algorithm. In these one an image resolution enhancement technique which generates sharper higher resolution image.

II. RESULTS AND DISCUSSION

TABLE 1

Techniques	PSNR(dB)		
	Baboon	Barbara	Lean
Bilinear Method	28.33	29.15	30.15
Bicubic Method	29.89	30.78	31.85
WZP Method	35.86	36.81	37.40
Proposed Method	36.90	37.80	38.85

Table 1 indicates that the proposed technique over performs the conventional and state of art image resolution enhancement techniques. By comparing all above four techniques the proposed technique gives better results comparing to remaining ones.

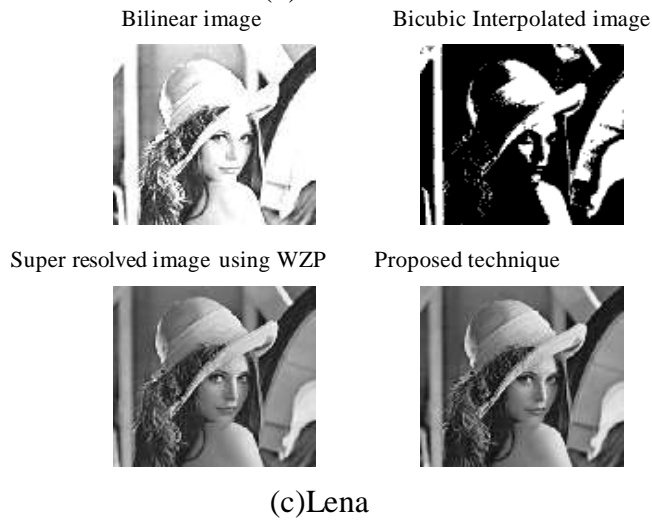
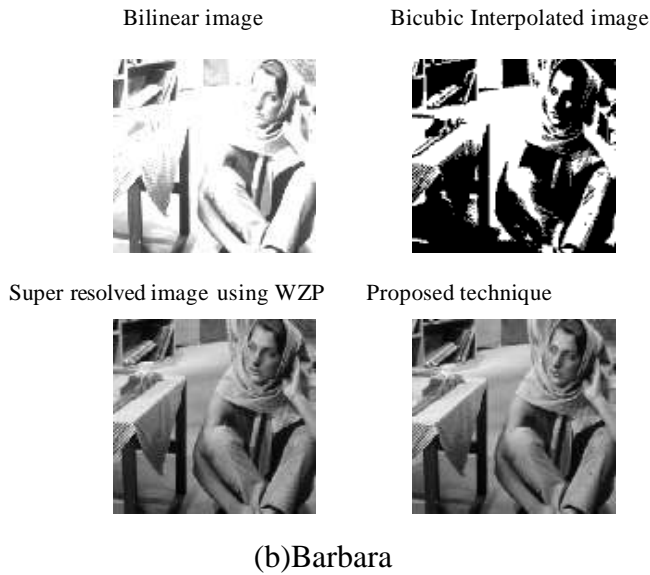
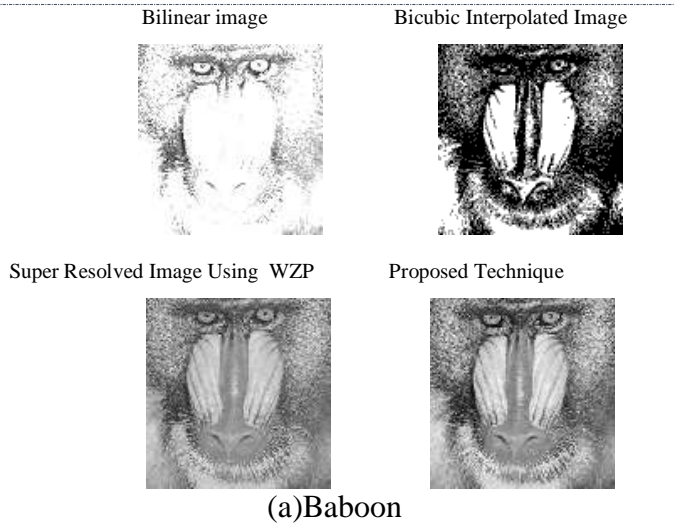


Fig. 2 (a) Baboon, (b) Barbara, (c) Lena



III. CONCLUSION

Discrete and stationary wavelet decomposition technique based on Interpolation of high frequency subbands images resulting from Discrete Wavelet Transform. The proposed technique uses DWT to decompose a low resolution image into different subbands. Then the three high frequency subband images have been interpolated using bicubic interpolation. By using Stationary wavelet Transform, High frequency components of images are enhanced.

IV. FUTURE SCOPE

From Original low resolution image, A difference image can be obtained by subtracting Interpolated LL subband. This can be helpful for preservation of edges. From above changes, we can expect to get more accurate results.

V. REFERENCES

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