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IMAGE ENHANCEMENT FOR SATELLITE IMAGE

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ABSTRACT

In this work, proposing an image resolution enhancement technique which generates sharper high resolution image. The proposed technique uses DWT to decompose a low resolution image into different sub bands. Then the three high frequency sub band images have been interpolated using bicubic interpolation. The high frequency sub bands obtained by SWT of the input image are being incremented into the interpolated high frequency sub bands in order to correct the estimated coefficients. In parallel, the input image is also interpolated separately Discrete wavelet transform (DWT) is one of the recent wavelet transforms used in image processing. DWT decomposes an image into different sub band images, namely low-low (LL), low high (LH), high-low (HL), and high-high (HH). Another recent wavelet transform which has been used in several image processing applications is stationary wavelet transform (SWT). In short, SWT is similar to DWT but it does not use down-sampling, hence the sub bands will have the same size as the input image.

KEYWORDS: DWT, IDWT, Interpolation, SWT .

INTRODUCTION

Image resolution can be measured in various ways. Basically, resolution quantifies how close lines can be to each other and still be visibly resolved. Resolution units can be tied to physical sizes (e.g. lines per mm, lines per inch), to the overall size of a picture (lines per picture height, also known simply as lines, TV lines, or TVL), or to angular subtenant. Line pairs are often used instead of lines; a line pair comprises a dark line and an adjacent light line. A line is either a dark line or a light line. Resolution is the capability of sensor to observe or measure the smallest object clearly with distinct boundaries. There is difference between resolution and pixel. Pixel is actually a unit of digital image. Resolution depends upon the size of pixel. Smaller the size of pixel, higher will be the resolution and more clearly will the object in image. Image having smaller pixel size occupy more size on disk. Over the past several years, the wavelet transform has gained widespread acceptance in signal processing in general and in image compression research in particular. In applications such as still image compression, discrete wavelets transform (DWT) based schemes have outperformed other coding schemes like the ones based on DCT. Since there is no need to divide the input image into non-overlapping 2-D blocks and its basis functions have variable length, wavelet-coding schemes at higher compression ratios avoid blocking artifacts. Because of their inherent Multi-resolution nature, wavelet-coding schemes are especially suitable for applications where scalability and tolerable degradation are important.A DWT is a wavelet transform for which the wavelets are discretely sampled. The DWT of a signal is calculated by passing it through a series of low and high pass filters to obtain four sub bands.

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PROPOSED SCHEME

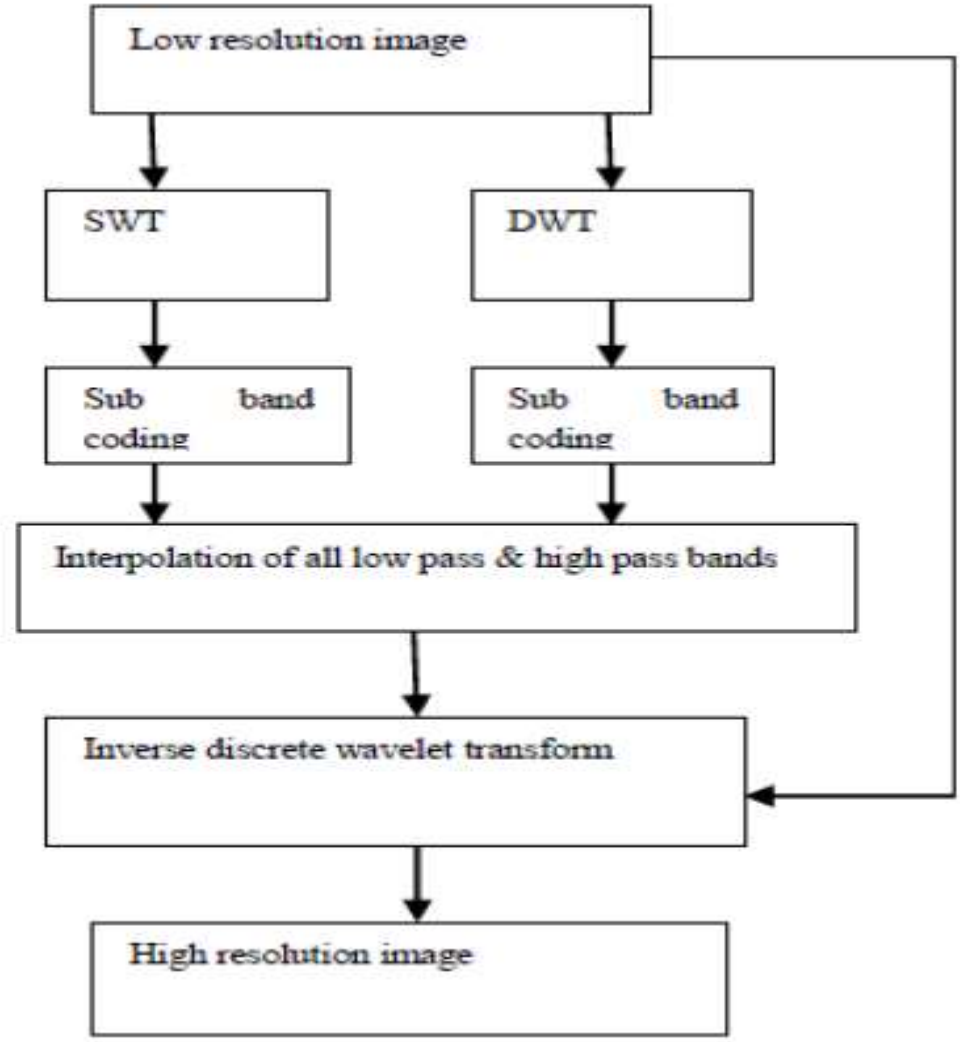

Fig.1: Block diagram of proposed system

Fig. 1 shows block diagram of the proposed system. Low resolution image obtained is passed for wavelet transform like discrete wavelet transform and stationary wavelet transform which will give sub band coding.diffrent bands like LL, LH, HL, HH all bands are interpolated with bicubic and linear interpolation technique to increase resolution with pixel based improvement then estimated bands are passed to inverse discreet wavelet transform for reconstruction of high resolution of image. Discrete wavelet transform gives multi resolution analysis.

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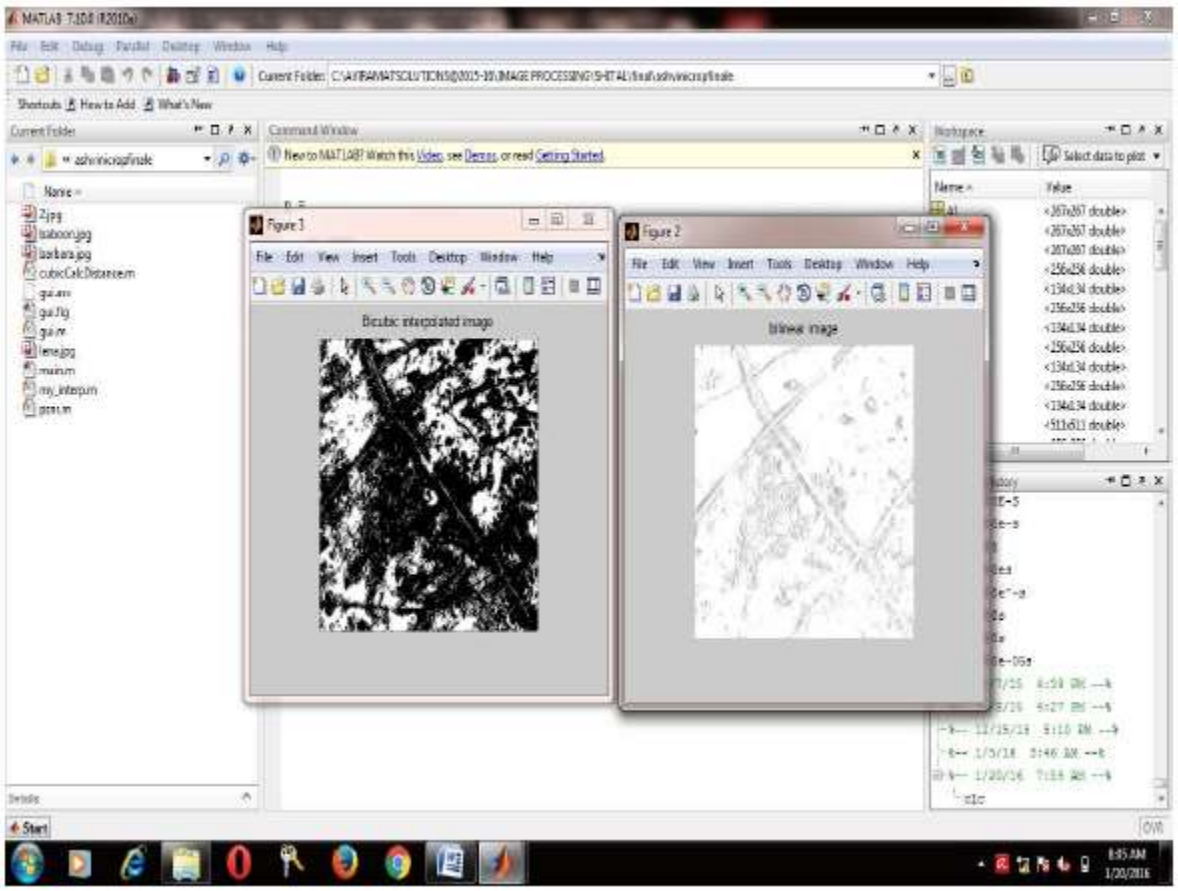

Fig 2.1.Result of bilinear and bicubic interpolation.

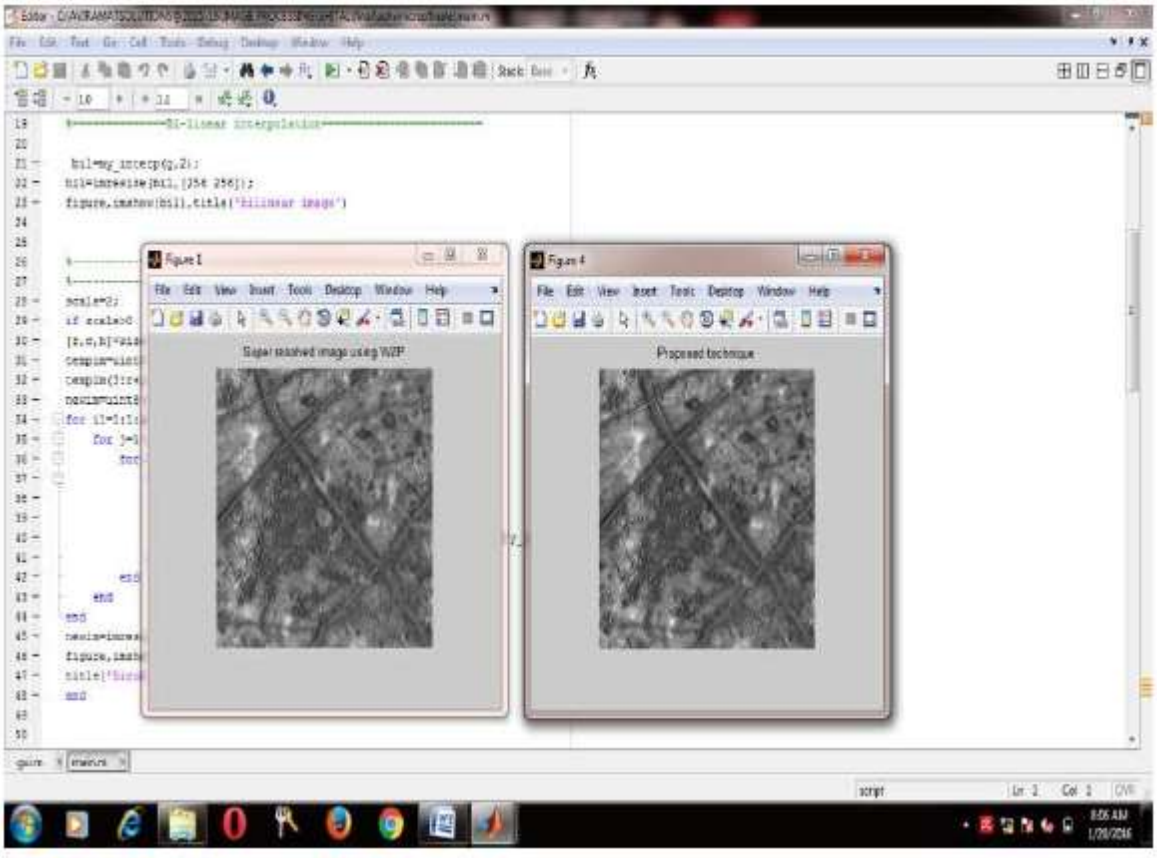

Fig 3.2. Result of super resolved and proposed techniques.

CONCLUSION

The interpolated frequency sub bands and the SWT frequency sub bands have the same size which means they can be added with each other. The new corrected frequency sub bands can be interpolated further for higher enlargement. Also it is known that in the wavelet domain, the low resolution image is obtained by low pass filtering of the high resolution image. In other words, low frequency sub band is the low resolution of the original image. But still we are interpolating it to achieve high resolution using directional information features of low low band. We are using the input image for the interpolation of low frequency sub band image. Using input image instead of low frequency sub band increases the quality of the super resolved image.DWT gives better performance compared to discrete cosine transform.

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