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IMAGE RESOLUTION ENHANCEMENT BY USING SWT AND DWT

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Abstract - We employed the Interpolation technique with the Stationary Wavelet Transform (SWT) and Discrete Wavelet Transform (DWT) to improve image resolution.

We get three frequency sub-bands by applying DWT to the input image, and we also get three frequency subbands by applying SWT to the input image.

By applying the Interpolation technique and adding SWT and DWT, we were able to achieve the same input size. As a result, we now have three separate frequency sub-bands.

Then we had to apply the Inverse Discrete Wavelet Transform to the sub-bands to get the improved image.

***Key Words*:** image processing, resolution software, matching.

1. INTRODUCTION

Image enhancement is a technique for improving image quality. The major goal of the modification was to improve the image's interpretability by increasing the pixel count. Interpolation of high-frequency sub-band pictures generated by discrete wavelet transform of the input image [4] is used as an image resolution approach. The basic goal of enhancement is to improve the image's features to improve the quality of the image. Improve the quality We can improve the image quality by employing SWT and DWT, as well as the interpolation technique. We use image enhancement to improve images. To improve image quality, the pixel values must be increased. We will start with image improvement. In this case, the image plays a significant influence. We can't recognize anything without photographs in our lives. Image enhancement is a technique for improving image quality. The primary goal of the upgrade is to improve the interpretability of our environment. Images are objects that can hold a variety of concepts, colors, details, and event information. Even though the image isn't perfect, it does have a flaw that not everyone can overcome. It's obvious We can't tell what the picture's objective is because there's less detail, less brightness, and noise in it. As a result, image. The image is a highly important object in the sphere of geography, industry, medical, and as a result, development is required, especially at this time. The amusement Digital image processing is a field that is frequently employed in large-scale investigations. Image captured on a computer processing has many algorithms and methods for the process. Implementation of the algorithm can be done on the input image to be processed further. With this digital image processing, an image with bad information would be great if used in digital image enhancement. To use the image enhancement, we must understand what is contained in the image of the problem in terms of what underlies us to use the image repair method, whether from detail, color, lighting, and others. Because in image enhancement, not all methods will produce a good image after being processed. Sometimes we initially want to improve the image but instead aggravate the image. Images are being used in many fields one of the major issues of the image is their quality. DWT of a signal to obtain four sub-bands is calculated by using a series of high and low pass filters (HPF and LPF).[5]

2. LITERATURE SURVEY

Poor lighting conditions or imaging devices with a limited dynamic range might result in low-contrast photographs. The methods proposed are as follows:

For the dark and bright inputs, a fuzzy rule-based technique is used, followed by the use of sigmoid functions. Splitting color images into RGB planes and applying membership functions to each plane is the method utilized for enhancement. To distinguish between underexposed and overexposed parts of a picture, an objective function termed exposure is defined. The picture is the spatial domain and the frequency domain are the two domains. Only if these satellite photos are

used effectively can they be used effectively. The photographs captured are of great quality, with high-resolution pixels, and are free of extrinsic variables such as noise, capturing device defaults, and discreteness. Radiation sources, for example. The number of pixels in a digital image rises as a result of interpolation, and its applications, such as image editing, benefit. Facial reconstruction, resolution enhancement, and multiple description coding Interpolation has been used to improve several approaches. As a result, the application of infrared technology is becoming more and more common as a result of the integration of infrared technology and imaging technology. A great deal. However, due to the limitations of infrared detector performance, the infrared image has low spatial resolution and poor visual quality. The effect however isn't evident in low contrast and detailing as a result, infrared picture contrast and detail enhancement have attracted a lot of attention. The X-ray image Since its inception, it has been widely employed in biomedical and medical disciplines. X-ray pictures have now become an integral part of the process. in terms of medical diagnosis A medical X-ray image provides a lot of information, but the details are fuzzy and the contrast is poor, so it's difficult to see what's going on.

Detrimental consequences on a doctor's decision. As a result, enhancing image contrast and sharpness while reducing sounds are important. The most important aspect of this type of image enhancement detrimental consequences on a doctor's decision, as a result, enhancing image contrast and sharpness while reducing sounds are important.

3. METHODOLOGY

We use SWT and DWT interpolation as an image resolution enhancement technique. First, we must take a high-resolution input image and down sample it using DWT. At the same time, we must apply SWT to the same input image, and it will be down sampled in three different frequency sub-bands, while SWT will give the same frequency sub-bands. Finally, we must apply the interpolation technique, which is nothing more than the addition of the outputs of SWT and DWT.

4. BLOCK DIAGRAM OF PROPOSED METHOD

To overcome the issue of low-quality of images we have to use the above technique to enhance the quality of images.

Block diagram of the proposed technique.

1. Original image

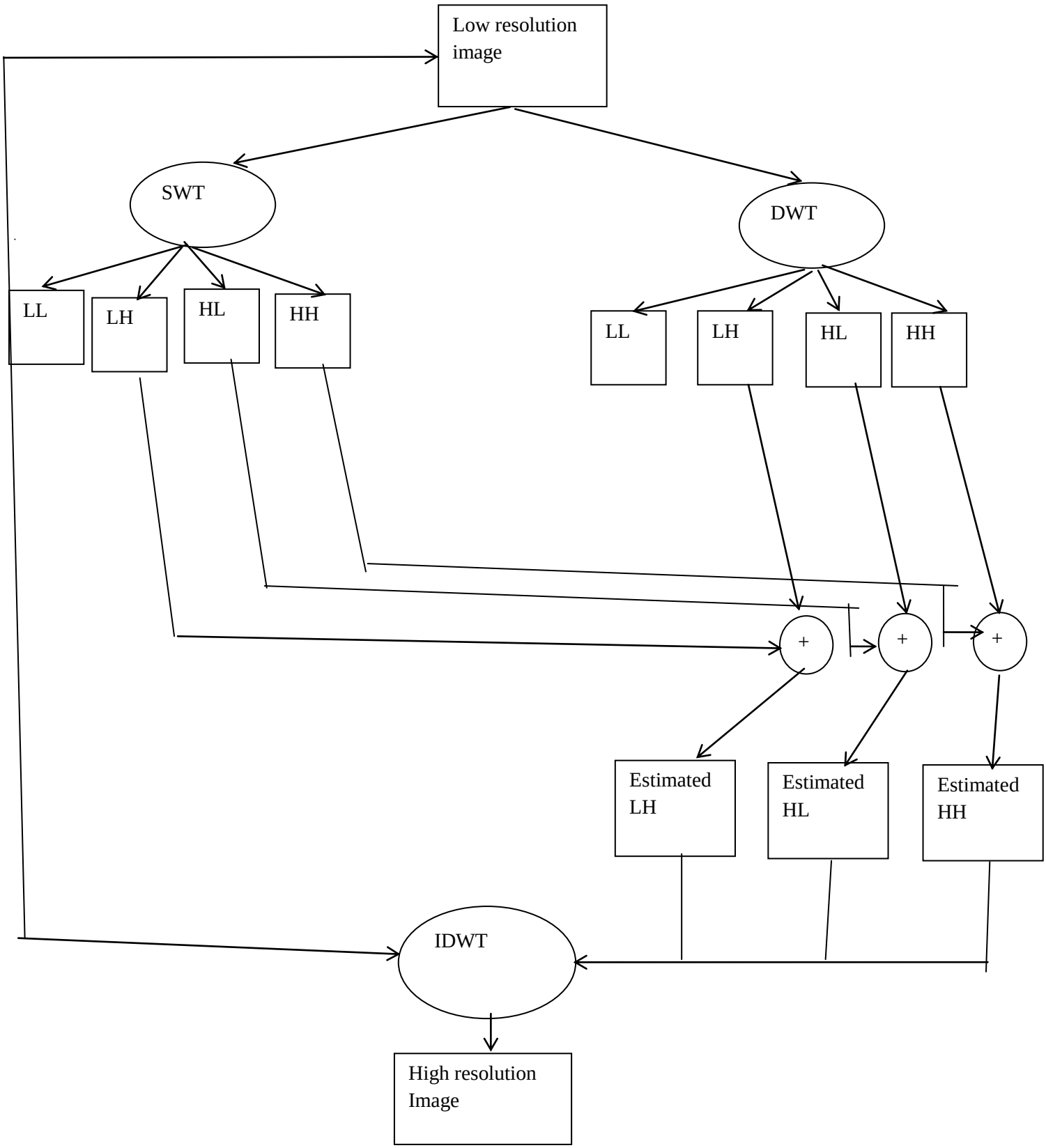
2. Discrete Wavelet Transform (DWT)

3. Stationary Wavelet Transform (SWT)

4. Interpolation technique

5. Inverse Discrete Wavelet Transform (IDWT)

6. High resolution image


Low resolution image
SWT
DWT
LL
LH
HL
HH
LL
LH
HL
HH
+
+
+
Estimated LH
Estimated HL
Estimated HH
IDWT
High resolution Image

5. ALGORITHM

a. Input a low-resolution image.

b. Apply DWT and SWT on the input image.

c. Apply bicubic interpolation with a factor of 2 to high-frequency sub-bands.

d. Add interpolated high-frequency sub-bands of DWT and SWT technique to get the estimated sub-bands.

e. Apply IDWT to the interpolated sub-bands to get the high resolution.

RESULT

For testing, we've taken the two standard photos (Lena, baboon). We started with a 512*512 image, then down-sampled it to 128*128 and ended up with a low-resolution image. Then, using SWT and DWT, we must increase the resolution to 512*512 using the interpolation approach. The PSNR ratio of the input image must be calculated.

PSNR=10log10[255^2/MSE]
The image's PSNR values were increased from 128*128 to 512*512.

6. CONCLUSION

The enhanced image is obtained by doing image resolution improvement utilizing the interpolation approach by SWT and DWT. It improves the image quality and improves visual quality. The image of Lena and the baboon has different values, as shown in the above result.

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