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Enhancing the resolution of satellite image by denoising,deblurring and contrast setting

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Abstract: The subject of obtain high-resolution images from low-resolution images is one of the most important application in digital image processing in recent years, attracting much research .In this work, an effective method for image contrast enhancement is presented with a mapping function, which is a mixture of global and local transformation functions that improve both the brightness and fine details of the input image The global transformation function preserves the overall image brightness and contrast stretching. Whereas, the local transformation function uses to Preserve the edges and fine details of the satellite images. In this paper, resolution algorithm and contrast setting is used to enhance the resolution of satellite images objects in a space. The algorithm proposed in this paper is an automatic algorithm to pre-process such bad focused or corrupted satellite images. It reduces the effect of blur and You can use this document as both an instruction set and and noise and composed of several successive independent processing steps which suppress noise, enhance contrast, preserves the edge and increase the resolution of the image .

Keywords: resolution; denoising; deblurring; constrast setting

I. INTRODUCTION

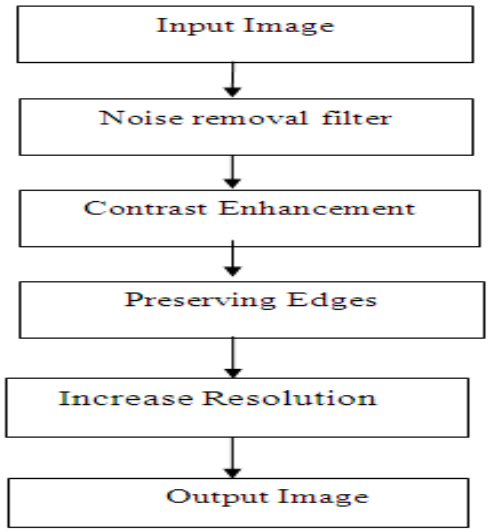
Lots of satellite images affected by the shadow of the clouds in the sky, the shadows caused by these clouds represent areas with low illumination conditions that are harder to detect but have the potential for enhancement. Cloud-related shadow removal is normally handled by first detecting the cloud and shadow areas. Then, image intensities in the shadow regions are adjusted to enhance the image quality. Different methodologies are developed and implemented for shadow detection that utilizes geometric constraints in addition to the image spectral characteristics [1] [2].

Some of these methods identifies and removes the image illumination variations using surface reflectance and variations constraints [3] [4]. Such methods were implemented mostly on high spatial resolution imagery and suffer costly computational overhead in addition to shadow edge processing problems. In satellite images, all open space area have the same characteristics will fail to extract total open space area. In addition, the light and weather conditions have big impact over images. Therefore, it is impossible to predict what and where objects are, and how they look like in a raster image. All these uncertainties and complexities make the extraction very difficult. Due to its importance, much effort has been devoted to this problem [5, 6]. Similarly, there are numerous factors that can distort the edges, including but not limited to blocking objects such as trees and shadows, surrounding objects in similar colors such as roof tops. As a matter of fact, the result of edge detection is as complicated as the image itself. Edges of open space area are either missing or broken and straight edges correspond to buildings, Therefore, edge-based extraction schemes is always needed to increase the visual appearance of such images.

One of the most important quality factors in images comes from its resolution. Interpolation in image processing is a well-known method to increase the resolution of a digital image. Interpolation has been widely used in many image-processing applications such as facial reconstruction [7], multiple-description coding [8], and resolution enhancement [9],[10]. Popular class of methods solves the problem of resolution enhancement in the spatial domain.

So, in this paper we are proposing a fully automated technique that can improve the clarity of satellite images by reducing the effect of noise, blur then preserving the edge component and finally increasing contrast and resolution of the image and produces a good quality of output image.

II. METHODLOGY



A. Input image:

Here input image is a bad focused or noise effected satellite image. The quality of satellite images degraded by lots of factor like heat of sun light, noise presence in environment, rotation of satellite camera and shape of earth.

B. Noise removal:

We can use linear filtering to remove certain types of noise. Certain filters, such as averaging or Gaussian filters, are appropriate for this purpose. For example, an averaging filter is useful for removing grain noise from a photograph. Because each pixel gets set to the average of the pixels in its neighborhood, local variations caused by grain are reduced.

Here, we are using median filter. Median filtering is similar to using an averaging filter, in that each output pixel is set to an average of the pixel values in the neighborhood of the corresponding input pixel. However, with median filtering, the value of an output pixel is determined by the median of the neighborhood pixels, rather than the mean.

C. Contrast setting:

The contrast stretching algorithm is used to enhance the contrast of the image. This is carried out by stretching the range of the color values to make use of all possible values. When the contrast stretching algorithm is applied to color images, each channel is stretched using the same scaling to maintain the correct color ratio. The first step is to balance the red and green channel to be slightly the same to the blue channel. This is done by stretching the histogram into both sides to get well-spread histogram.

D. Preserving edge component:

Edge-preserving smoothing is an image processing technique that smooths away textures whilst retaining sharp edges. When we need to preserve edge information and at the same time preserve the edges. Even when uniform smoothing does not remove the boundaries, it does distort them. This is not acceptable in the context of, for example,medical imaging. An alternative to linear filtering, calledanisotropic diffusion

We use the bilateral filter to contain the true color and brightness of satellite images and preserve edge components. And then applying adaptive edge enhancement method to highlight the edge component clearly.

E. Increase resolution:

Using the transform function we have been able to stretch the saturation and intensity values of RGB color model. Using the saturation parameters we can get the true values the resolution and visual appearance of image is increased.

F. Output image:

The resulting image is better than the original image. And the output image will be improving the image contrast and visual appearance of image will be clear.

III. RESULT ANAYSIS

Figure 1 shows the stepwise output after applying the proposed method on an image taken from satellite in day time, in such images a good amount of noise and blur present due to effect of sun light, its quality is analyze after each step in table I and table II and then finally the proposed algorithm is applied on night time satellite images where less blur and noise occurs but visual appearance of image is very badly affected due to darkness of the night. The figure 2shows the stepwise output after applying each algorithm

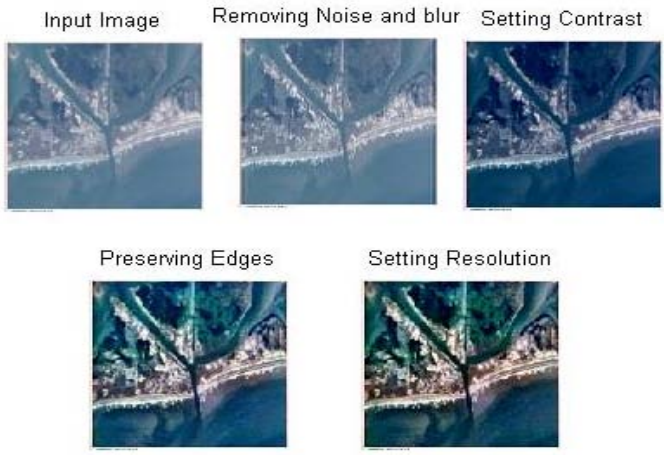


Figure 1.result of proposed algorithm

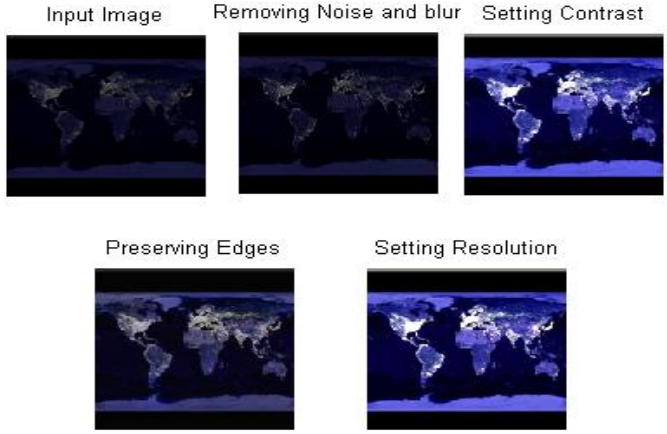


Figure 2.result of proposed algorithm

Table: 1 Analysis the quality of image after each step

Sr. No.	*Stage*	*Image1*	*Image2*	*MSE*	*PSNR*	*Visual appearance*
1	1	Input image	After denoising	86.17	28.390	Good
2	2	denoising	After contrast set	4300	12.21	Very good
3	3	Contrast setting	Edge preserve	814.12	19.2	Very good
4	4	Edge preserve	Resolution setting	337	28.21	Excellent

Table: 2 Analysis the quality of image after each step

Sr. No.	***Stage***	***Image1***	***Image2***	***MSE***	***PSNR***	***Visual appearance***
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IV. CONCLUSION

From figure 1 and table I and firgue 2 and table IIit can be concluded that, after applying four successive steps the final output increases the visual appearance to excellent level and also saves the quality of image by increasing the peak signal to noise ratio and decreasing the mean square error.

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