Analysis of Color Image Enhancement Techniques for Remote Sensing Images

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Abstract— This paper gets quiche and effective filtering methods or ways to reinforce image from remote sensing satellite P6 Liss IV remote sensing data as a Near-Infrared band. There are four filtering methods used to enhance the image depending on local background filters and common background filters such as median filter, wiener filter, dual filter and home Gaussian filter and selected salt and pepper sound and Gaussian sound applied filter. Selected images are screened for each filter and are based on the PSNR metric performance value and the advanced filtering process identified in these filters. Finally, the Gaussian homomorphic filtering process is ready for the development of the Liss IV image that is heard far away from the Near-Infrared band. Image enhancement process prepares for future work such as editing and image segmentation.

Keywords — Filtering Techniques, selection data , input data , Gaussian noise, peak signal to noise ratio, conclusion

I. INTRODUCTION

The remote sensitivity is that acquisition of data about an object or object without contact with the thing and thus like site view. Remote sensing is a mathematical tool or process that uses sensors to measure the amount of electromagnetic radiation emanating from an object or space remotely and extracting sensitive data using mathematical-based algorithms for scientific work. Remote hearing scenes are based on digital imagery. That the remote hearing scene is not a picture is a local distribution of visual aids. Earth information is hidden within digital access and can vary in different types of sensors of satellites. This type of images used for unique purposes and sound are an unusable part of the image. The sound reaches from pictures for many reasons. The gausses sound is a part of totally any signal. For example, the typical white sound on a not strong television channel is best imitated as Gaussian.

Enhancement techniques can be used to process an image so that the end result is more relevant than the first image of a particular program. . Image clarity is easily affected by the lighting, weather, or equipment used to take the photo. These conditions lead to loss of information.

II . LITURETURE REVIEW

Processing has become a common way of making images easily recognizable to the human eye. There are available different ways to delete clashing noise together gray scale and color photos. But very few has been done to remove different noise from color photos. The many filters got, mostly are limited to gray only photos. Filtering techniques for gray scales pictures can be increased to the color photos by attaching them to many color segments uniquely but this is also obvious that they may partially obscure image knows. Current systems adding the conservative smoothing, the filters of linear, without online filters such as median filter and the indirect filter, flexible filter, wave support filter and many. The image filter technique can be classified as linear and non-linear filters .The direct filter can be usable to remove certain a part of noise. IN these some filters, such central or Gaussian filters, are perfect for this type of goal. For example, Averaging filter used to remove grain noise in the photos.

III. FEASIBILITY STUDY

The image enhancement is the one of the main areas of researching in the usable of digitized photography. The main goal of image enhancement is to processing the photos so conclusion is better consistent as the main picture of a single program. The many photos sass satellite imaging, medical imaging, aerial pictures and the images are very sensible for the sound for to various cautions as lighting, weather or equipment using to take pictures. It is urgent to do more contrast and remove sounds to increase photo quality using

pictures parameters. The image enhancement techniques vary from one area to second depended on its goal.
Gaussian sound, salt and Pepper sound and Speckle sound affected for mostly of the photos that are showed. This paper tells about the pros and cons of various image enhancement techniques and the metrics using to plural parameters .and early tells which strategies are best suited to the real-time picture.

IV. Data Selection

The choice of data or satellite data is very important in the remote hearing field. This program contains various types of spectral and adjustment groups. First, which includes the features that we need to remove from the visual aids. In this paper, we have used Less IV data to extract the feature and this data such as Linear Imaging and Self Scanning Sensor from P6 Conclusion of Indian Remote Sensing. LISS IV Bands (Fig. 1a) Green band with a spectral resolution of 0.52–0.59, m, the picture that are showed Red band with spectral resolutions the value is 0.62 to 0.68μm and the other picture Next to Infrared band together spectral resolution and the value is 0.76 to 0.86μm and photo scale
1 : 50 000 approximately 5.8m local solution with digital number.

Input Data

The LISS-IV camera could be a multi-spectral high-resolution camera with a spatial resolution of 5.8m at nadir. This camera operated in two modes: Mono and Multi-spectral mode. Within the multispectral mode, the data collected in three spectral bands namely, **0.52 to 0.59 μm (Green (Band 2)) 0.62 to 0.68 μm (Red (Band 3)) 0.76 to 0.86 μm (NIR (Band 4))**
In the multispectral mode, the LISS-IV sensor provides information similar to pre-selected 4096 contiguous pixels, corresponding to 23.5 Km swath.

Color composite RGB Band(Combined bands of Green, Red, and Infra-Red)

This RGB image is a very big size. So It will take processing time. Therefore we have to crop some parts of the image from the original image. These parts of these images will be applied for image enhancement.

VI. Color Conversion

Most remote sensing systems create a system of numbers that represent the location in the globally earth surface. Total arranging thins in it is called as a picture or a any scene, together every living thing math's are called pixels (pictorial objects) as structure of water, swamp, forest area and many ways. The value of every pixel shows the value measurement that are measured as the intensity of light in this above brought the wave length. So this can be shows a very good high quality product for example environmental condition or chlorophyll concentration or almost anything. Other programs that work as well brought the classification of reflected radiation that are used so every pixel will include the number that is a complex number.
Similar sizes with good pixels and a system with many channels may require megabytes of storage per unit. In addition, a satellite can collect 50 of these frames in
one pass so that the data sets are too large. There are many types of established colors useful of computer graphics that is coordinately, but most common are that which are followed as Gray Scale model, RGB (Red Green Blue) model, and the other HIS (Hue, Saturation, Intensity) and finally Black-Black) model, To Remote Sensing Technology which is used in digital picture processing by presented a deeply discussion.

VII. The RGB and L -Color Transformation

A combination of red, green and blue light forms white. As a result of reducing the weight of the computer The specified data available in the RGB color model is converted for a gray scale type of image. The width of the gray scale type of image which is extracted from black to white numbers which can be executed by the equation.
Where X is the image

The RGB exactly is a color space based on CRT (or similar) shows applications, that are displayed so this was prepared to tell a color as a total combination of three rays that have colors such as red, green, and blue.

VIII. The Segmentation using FCM algorithm

The Satellite picture categorization is one of the very necessary issue in all issues in the picture processing process. Contains to create a symbolic representation of images which separates the image into non-continuous regions as if each region is the same and the combination of the two adjacent locations is the same so this is usable for the process of sorting in any order the

favorites across or manipulates the scene or image. The various categorization algorithms which are very used that can be got. Ago the sixties the time, many algorithms have been occurred endlessly but the depending on applications that are contains. Many remote application and the application problems or issues need to be solved category to identify objects or to find various image parameters and turn it into circuits, corresponding to a single or particularly condition, such as like top, color, and many others ., SMV08: HOR03 thesis are the conditions and labeling total one pixel- pixels with current label shares many visual features and are still visible you have not yet grown up in the field of satellite image processing. The main reason for this is huge the difference is the quality of picture during capturing or we can say clicking picture and this increases in the size picture and problems in understanding or reading the satellite imagery with a variety of applications or software . The all number of showing patterns in the picture is mostly increased way or increased method. So these things have growled the usability's of computers to helping , processing and the analyzing data or information. The working of separating satellite imagery or separately satellite imagery that is being taken to be challenging because the photos contains many regions with the help of the text or text background and often undergoing light changes or true ground structures. All of these forces create an urgent need for a faster satellite image processing system as well a separate image model that requires minimal involvement from the user. Existing solutions for the separation of satellite images face three major challenges. The reduction of representation in the provision of large images, reduction of section accuracy due to image quality obtained and segmentation speed does not meet modern standards

This improved image looks for GIS usage and remote hearing usage for to consider divorce strategies. Processing makes the input work images that enhance image quality and algorithm for integrating FCM file enlargement image quality by process of separation. Includes color change, power adjustment, method and parameter selection, edge or boundary enhancement and demising performance [HOR03]. Apart from this, boundary enhancement, pixel adjustment and noise removal had a major impact on the divided results. ERDAS imaging classification process includes several steps. Installing image modification in a feature area depends on two-step integration methods.

- The main step involves converting the input image to L = RGB value attributes using a sophisticated method of combining c.
- The second step involves adjusting the image to replace the selected ones fuzzy c-means meeting method.

VI) Enhancement Techniques

- Median Filtering Technique
- Weiner Technique
- Bilateral Technique
- Gaussian Homomorphic Technique
- Contrast Adjustment
- Intensity Correction
- Noise Removal

A) Median Filter

A median filter in image application is often desirable to create some form of reduction of noise in a digital picture. The median filter is a non-digital digital process or we can say it not online or online and helps to remove audio from a digital image .Medium filter is to use image input by inserting and re-inserting individual inputs into neighboring inputs. A pattern of neighboring pixels like a matrix is called a window, which slides in through the whole image (arce, 2005; arias-Castro no Donohue, 2009). The median filter is such a non-linear function used to process digital image reduction to reduce the noise of salt and pepper. The Median filter is called a non-line digital filtering process and is used to remove the salt and pepper noise. It is often used to process image because it keeps the edges under certain conditions while removing sound. In the middle filter, the neighboring pixels are calculated in terms of intensity (light) and the center value becomes the new center pixel value. the central filters do not provide for the reduction of variability in every step. It does not push boundaries but is possible with standard smooth filters. Since the contents of the space filters are less sensitive to what is said in bold numbers, those calculates values are totally removed or deleted and the media is very strong such as this does changes by bright values or numbers. So value of output pixel is one of the neighboring values, new absurd values are not built nearby edges.

The central filters smooth the images and can keep the action in check. It can slide a few pixels whose value varies greatly around it without affecting other pixels. The central filter forms a matrix of two sizes. All effect pixels contain the average value in the tethering pixels which exists around the correspond value of pixel in input image . The middle flite which exits among two is more better at the keeping sharp edges than the another filter says The central filter alone enters when sound produces highly external pixel values, for example when it is

corrupted by the noise of salt and pepper . The effect of the image filter in the middle filter is shown in Figure

B) Weiner Filter

The most important procedure for removing blurry from photos due to direct movement or offline optics filter Wiener. From a signal processing perspective, blurring due to direct movement in an image is the result of a negative sample. Each pixel in digital image display definitely will shows the intensity of an point standing in front of the camera which you have. Infect, if shutter speed is slow or less and the camera is moving not standing , a taken pixel will be an amalgam of power in the camera from the starting poles on the motion of the camera.

The wiener filter is that a filter used to produce the desired or horizontal orientation of the desired process over time corresponding to the process of visual acuity, taking into account the static image combined with the sound and additional sound . Contrast filtering is a method of restoring deconvolution, in which a well-known low earth filter blurts the image; it is possible to retrieve the image with the opposite filter or by standard filtering. however, reverse filtering is much sensitive to add the other noise. The filter is right according to the MSE mean square error. And reduces or do less square error which refers all things in the filter process as opposed to a very good sound smoothing. Input image filtering uses wiener-wise pixel filtering, using matrix size neighbors to measure the mean image of the area and standard deviation. The default matrix size is three times. what is thought to be an additional sound with the power of the white Gausses sound. Wiener filter requires more time to count and then direct filter (Thomas and manuhiri, 1998). This filter works best when the sound is an additional power boost on a regular basis. Call it the sound of Gaussian. This wiener filter measures the definition of location and variation around each pixel.

C) Bilateral Filter

The two-dimensional filtering process smoothens the image while keeping the edges, with an irregular arrangement of the nearest image value. This method is informative, local and simple. However, the gray scale image is used only for two filters. A two-state filter can force the subconscious metric, and maintain the edges in a human

The dual filter is an indirect filter, which saves the edge, and the image volume reduction. It replaces the intensity of each pixel with an approximate value of the intensity values from adjacent pixels. This weight can be based on the distribution of Gaussian. In extreme cases, metals depend not only on the Euclidean range of pixels, but also on radiometric differences (e.g., distance differences, such as color intensity, depth distance, etc.). This keeps the edges sharp.

The bilateral filter is defined as[1]

$$I^{\text{filtered}}(x) = \frac{1}{W_p} \sum_{x_i \in \Omega} I(x_i) f_r(\|I(x_i) - I(x)\|) g_s(\|x_i - x\|),$$

and normalization term, WP is defined as

$$W_p = \sum_{x_i \in \Omega} f_r(\|I(x_i) - I(x)\|) g_s(\|x_i - x\|)$$

The filter saves image capabilities and, I a filter image, is the first input image to be filtered, x is the current pixel links to be filtered, el x-centered window, fro is the kernel range for smoothness of power This function can be Gaussian work, gas is kernel of the placement of the difference in links. Both could be the work of Gaussian. PW is given using local proximity and density difference. Think of a pixel found in (i, j) that needs to be made to be illustrated using neighboring pixels found in (k, l), a given pixel weight (k, l) to make a pixel iPhone

$$w(i,j,k,l) = \exp\left(-\frac{(i-k)^2 + (j-l)^2}{2\sigma_d^2} - \frac{\|I(i,j) - I(k,l)\|^2}{2\sigma_r^2}\right),$$

Where a_d and o_r are smoothing parameters and I (i, j) and (k, l) are the intensity of pixels (i, j) and (k, l) respectively. Then calculate the weights and normalize them I

$$I_D(i,j) = \frac{\sum_{k,l} I(k,l) w(i,j,k,l)}{\sum_{k,l} w(i,j,k,l)},$$

Where ID is by pixel strength (i, j). As a parameter, the increasers raises the two-state filter closer to the Gaussian agreement very closely because the Gaussian distance grows and shifts, which means it becomes more and more constant during the tightening of the image. In increasing the featured area parameter, freely rated features are relaxed in (Thomas and Mantachie, 1998).

D) Gaussian homomorphic filter

Homomorphic filtering is one way to improve an image based on a common background. This is a common way of doing image processing and signed processing, which involves offline mapping in various domains where sequential filtering techniques are used, followed by mapping of the original domain. Homomorphic filter simultaneously filters image brightness and enhances contrast. Here a homomorphic filter is used to remove Gaussian noise.

Homomorphic filters are sometimes used to enhance the image. Sometimes it adjusts the brightness in the image and magnifies the contrast. Homomorphic filtering technique is usable for to remove or deletion repetitive or continuous noise. The light and lighting are excesses, but their areas close to a common domain can be found. As light and light meet frequently, parts are added for using an algorithm of size of image , so that the duplicate parts of the picture does sorted sequentially or in any order in range of frequency. Variations lighting could be discussion of as repeating or continuous sound, and that can be reduced by using the filtering in the log domain that is high domain. For growing brightness of the picture, the better frequency components or parts that increase and the lower frequency components or parts decrease, As much frequency components or parts are supposed to shows more visibility in the scene or image (amount of light reflected in object in the scene or image), and lower frequency components or less frequency parts are supposed to shows more light in the scene or image. It is very high filters are used to compress less waves and amplify high waves, in the domain that is a log-intension domain.

E) Contrast Adjustment

The algorithm that is CLAHE algorithm is a main type of histogram equalization. The flexible histogram that is easy to adjustment balance increases the difference between the picture and differently enhances or adjusts the brightness of every pixel likely to a local area. This is the process gets improved brightness or good brightness at every levels of comparison or for difference (small and large) in first picture. Histogram gets the same or equal to improve local variability, histograms finds number of small regional pixels, which gets local histograms. Histograms are measured or reclassified in the most common range of diminished values which shows the center pixel and its closest neighbors in the full range of strength values available at the exhibition. In addition, to enhance the edges, a sigmoid function is used.

$$I(X) = \frac{N}{1 + e^{-\left(\frac{X - N - \Delta X}{a}\right)}} + \Delta X$$

M is 255, and m = 128 that is 8 bit image
x is range between pixels or range pixels The range is
, -127Δ < x <+128

Parameter 'a' refers to the speed of changing between around the center of it . A process is repeated or comes same many times 96 to detailed coefficients. The inverse wavelet transformation performed or executes to get an edge enhanced picture.

F) Intensity Correction

The intensity of the contrast under the satellite imagery is cause to a number of factors processing the image data acquisition. So, they are cause to get the differences in the adoption devices or gadgets and likely artifacts caused by a less or slow, non-anatomic different variety. In this paper, the Expectation-Maximization (EM) algorithm is used adjust the local variability of the stiffness. Ways to Raise Expectations do not make any sense of sequence type or texture size so it done by all categories of picture sequences or arrangements. Basically EM algorithm has contains two steps:
(i) The E-Step (or) Expectation Step and
(ii) the M-Step or Increase Step, means growing step
The algorithm is same to the K-means process in the sense that can senses something that a the combinations of parameters is recalculated until the desired combination is obtained.
These the two steps are repeated alternately in the form of repetition until the reunion is reached

G) Noise Removal

After fixing the stiffness, an improved version of the anisotropic dispersion that dispersion which fix is downloaded to remove or delete dotted sound means not everywhere in a much fast and a suitable way. Personal Malik

scattering, a process that aims to reduce the sound of an image without significant output parts of the image content, the edges itself, the lines or other details that are important to 97 image translation [SAP01]. Anisotropic diffusion filter is often used the process of filtering or enhancing in online pictures. Basically its popularity, or famousness anisotropic has been taken a diffusion algorithm which basically to diffuse and it takes blocking effects and destroys or permanently delete structural based on structure and environmental location details. They are less or slow for reaching the meeting stage. To solve these problems, the algorithm was integrated with the sensitive part of the edge the difference between the scale during the new hybrid noise removal method. The anisotropic filtering in hybrid sound removal makes it easier for image features to enhance the image split by hanging the image in the corresponding position while retaining develops edges. It reduces the blocking of the art by removing the small edges enlarged by
homomorphic filtering.

Gaussian Noise

Gaussian sound is a calculation sound that has a function or method of equal chance of normal distribution one by one distribution , also known as Gaussian distribution . The main sources of Gausia audio in digital images appear at the time of acquisition. For example, these sensory sounds are caused by poor lighting. In the online picture processing system that is digital , Gaussian noise can be reduced becomes less using local filter and a frequency filter. The studio does take over the values or numbers distributed in Gaussian noise .

probability density function name p of Gaussian random or choosing anyone variable z is by

$$p_G(z) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(z-\mu)^2}{2\sigma^2}}$$

Here z is gray, μ mean value and s is a normal deviation. This Gaussian sound has been used in a homomorphic filtering process. In the light of homomorphic lighting and reflectance is made an addition by taking algorithm of size of picture. Here the parts or components of the picture can be classified sequentially arranging in the other frequency setting. More frequency components or parts are irrelevant and low frequency components or parts are considered to be more representative of the image, low frequency components are supposed to represent greater light in the picture.

Last step is for usable for the specification or find uniquely function to changing the log conversion and in last find the homomorphic Gaussian filtered picture with the effect of improvement .

Peak signal to noise ratio

PSNR block gets the peak signal-to-noise ratio(PSNR), with some sound, among atleast two pictures the real image and the enhanced image (Kaur & Singh, 2014). The higher PSNR provides better image quality. Mean Square (PSNR) and Peak Signal to Noise Ratio (PSNR) error or issue are two error metrics used to find the difference picture enhancement quality or adjusts quality. PSNR gets the added two errors or combined square error between the enhanced image (I2) and the first image (I1), while the PSNR represents the highest error rate. To perform PSNR, the block first calculates the square-meter error using the following equation:

$$MSE = \frac{\sum_{M,N} \left[I_1(m,n) - I_2(m,n) \right]^2}{MN}$$

M , N are number of rows and columns in the input pictures or selecting picture This block finds PSNR using equation::

$$PSNR = 10 \log_{10} \left(\frac{R^2}{MSE} \right)$$

In the above equation, R that is highest flexibility or largest flexibility in the category of input picture data. Such as if input image or select picture includes a double-point that is data point, then R means 1. If its value is 8-bit unwritten data type, value of R is 255. That means the gray levels are too high for the image.

Conclusion

In this paper, The result of the proposed pre-algorithm was compared to the standard one method and it was found that the promoted method or required way is an improved method. So the conclusion after working or processing using the proposed development method applied in time separation. Three algorithms were used during the split. They were common Enhanced Fuzzy C-based integration Means algorithms. Various tests have proved that modified and produced better segmentation results compared to existing ones high efficiency. The progression of the Fuzzy C-means algorithm totally depends on the accuracy first parameters assumptions.

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