ISSN 2349-0292
Impact Factor 3.802

GLOBAL JOURNAL OF ADVANCED ENGINEERING TECHNOLOGIES AND SCIENCES

RESTORATION OF DEGRADED IMAGES USING HYBRID DENOISED MODEL WITH FUSION AND ENHANCEMENT

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DOI: 10.5281/zenodo.3357868

ABSTRACT

Image reclamation is a craftsmanship to improve the idea of Image by means of assessing the proportion of commotions and obscure occupied with the Image. Despite the vital research drove on this subject, the improvement of capable denoising procedures is up 'til now a persuading test. The huge inadequacy is that while redesign, the splendor of the Image self-destructs in an impressive sum. The Image fusions techniques perform well spatially however more often than not present otherworldly bending. Which implies that the variety of tint when the combination procedure has showed up? There is shading contortion when the combination is showed up in the shading Images. There are human portrayal and target appraisal criteria related issues when the combination of two Images occurred. The Hue, Saturation and the Intensity of the shading Images affected because of combination. Image denoising is an essential of Image handling as the Images contain solidly masterminded music and edge discontinuities. Improvement is done by Spatial separating method known as Histogram Equalization. We have done correlation with our proposed strategy in which we mixture the Wiener Filter with Bayes shrink Wavelet thresholding procedure for Denoising and upgrading the Images as to save brilliance more, brings about better representation. Results are evaluated by parameters, for example, PSNR, CoC and Elapsed Time which shows our half and half system has best results from various procedures that are, for example, Median Filter, wiener Filter, Wavelet thresholding, Bayes shrink Method and so forth.

Keywords: Median Filter, Bayes Shrink, Histogram Equalization, edge discontinuities.

INTRODUCTION

Image denoising is a fundamental process in image processing, pattern recognition, and computer vision fields. The main goal of image denoising is to enhance or restore a noisy image and help the other system (or human) to understand it better. Image denoising is used to remove the noise while retaining as much as possible the important signal features. The purpose of image denoising is to estimate the original image form the noisy data. Image denoising is still remains the challenge for researchers because noise removal introduces artifacts and causes blurring of the images.

Image restoration is an important issue in high level image processing which deals with recovering of an original and sharp image using a degradation and restoration model. During image acquisition process degradation occurs. Image restoration is used to estimate the original image from the degraded data. An image is often corrupted by noise during its acquisition and transmission.With the passage of time, image gets degraded due to different atmospheric and environmental conditions, so it is required to restore the original image using different image processing algorithms. In Medical images, noise particles are a particularly delicate and very difficult task. A tradeoff between noise reduction and the preservation of actual image features (without noise) has to be made in a way that enhances the diagnostically relevant image content.Image denoising is used to remove the additive Gaussian noise while retaining important maximum possible image features. The problem is to recover the original signal from the noisy data. We want the recovered signal to be as close as possible to the original signal, retaining most of its important properties (e.g. smoothness). Recently, nonlinear methods, especially those based on wavelets have become increasingly popular.

LITERATURE SURVEY

G.Amar Tej (2015), pre-preparing methods enlist filtration and determination improvement to evacuate noise and have great determination is the fundamental quality parameters in restorative images. In order to save the edges and contour data of the medical images, an enhanced image system and the productive denoising is required. Here, focus on the filtering method such as Average, median, wiener and wavelet denoising for images

with interpolation based DSWT strategy for resolution enhancement is figured out on the base of some execution parameters, for example, PSNR which gives proficient denoising and resolution improvement for picture pre-handling. **Pravin R. Dabhi at el.(2015),** creator chipped away at satellite images which has the same number of utilizations, for example, in meteorology, oceanography, angling, horticulture, biodiversity preservation, ranger service, scene, topography, cartography, provincial arranging, instruction, knowledge and fighting. Images can be in noticeable hues and in other spectra. There are likewise rise maps, typically made by radar images. Low determination is the real disadvantage in these sorts of images. The determination of satellite images differs relying upon the instrument utilized and the elevation of the satellite's circle. Observing in mind the last part of a goal to abuse the data, as also to investigate the image the determination of the image must be improved. Different image handling procedures exist for resolution enhancement. In this, a correlation of two principle wavelet procedures i.e. DWT and SWT are examined in light of the image quality measurements and another image quality improvement system had been worked in view of wavelet fusion calculation. The calculation after effects of the image improvement and image quality measurements of the proposed method is contrasted and existing systems. It is demonstrated that the proposed procedure have higher resolution enhancement ability than existing methods. **Biswa Ranjan Mohapatra (2014),** author here, depicts about the survey of various Image reconstruction as to enhance using systems utilization for noise and blured images. Be that as it may, fundamentally Image reconstruction is done generally utilizing wiener filters, Blind De-convolution Richardson – Lucy calculation, Pseudo and Inverse backwards filter.

Jigar R. Patel and Jwolin M. Patel (2014), has displayed that in the field of pharmaceutical to evaluate or to take a gander at the internal body parts unmistakable radiometric inspecting methodologies can be used. Some most by and large used sifting techniques join the motorized tomography check (CT look at) and appealing resonation imaging check (MRI check). X-ray breadths can exhibit the photos of fragile tissues doubtlessly yet it can't show the pictures of bones and hard tissues undeniably. Picture combination incorporates mixing no less than two pictures to hold the most appealing characteristics of info picture in resultant yield Image. By viewing therapeutic combination picture, authority could without quite a bit of a stretch oblige the circumstance of infection. **Norbert Remenyi, Orietta Nicolis et al. (2014),** inconsequential (unitary) and dull (most extraordinary cover) interpretations of the transform are used. The covariance structure of background(white) commotion wavelet space is set up. Estimation is performed by methods for correct Bayesian systems, shrinkage procedures, cSM-EB and cMOSM-EB, rely upon observational Bayes and utilize non-zero covariances among genuine and nonexistent parts of the wavelet coefficients. Another theory is go past Gaussianity and examine assorted inadequate models and priors, and to overview comparable execution and compressibility of various multi scale change including genuine and complex wavelets.

METHODOLOGY

In this, we discuss some efficient approaches for image denoising using wavelet transforms and filtering with HE enhancement techniques and best result out of Fusion method (DSWT with PCA) for good quality result. In brief, all these algorithms first perform the fusion by DSWT and PCA, secondly, HE enhancement is done and at last step with hybrid filtering and Bayes wavelet transforms thresholding is performed on the image to denoise, and finally take the inverse of transform using Bayes based wavelet thresholding to restore the denoised image.

Algorithm of our working model

Step 1: Read the input image first.

Step 2: Next, Read the input image second.

Step 3: Select the hybrid Fusion technique of 2-DSWT with PCA.

Step 4: Decompose first image by DWT and second image by SWT fusion technique.

Step 5: Applied the image fusion PCA technique again on both the images after applying step4.

Step 6: Image is reconstructed to generate the fused image and saved as in a database. After applying inverse of the 2 level decomposition of DSWT and PCA fusion technique.

Step 7: Now, again read the fused image to enhance more as to preserve brightness by using HE technique.

ISSN 2349-0292
Impact Factor 3.802

Step 8: Again, Select the Enhanced fused image which is saved in step 7 as for applying Denoising techniques.
Step 9: Firstly select the noisy image with some noise level as 0.04 and Speckle noise type for removing noise as it degrades the quality of image.

Step 10: Select various techniques for denoising such as Median Filter, Wiener Filter, Wavelet technique, and Bayes Shrink Thresholding technique, proposed technique (hybridization of Wiener, Wavelet and Bayes Shrink Thresholding techniques).

Step 11: Result is calculated on the base of different parameters like PSNR, CoC and Elapsed Time.

Step 12: Repeat, step 1 to step 11 again on the different image as to find the best technique for producing quality image.

Step 13: Stop.

TESTING & RESULTS

Below figure 1.1 shows the GUI part in which all details is displayed in one window on which many buttons with name are mentioned, some axis are used for images to be selected by clicking on their buttons to perform their functions. There are inputs performed by selecting buttons but output is placed on axis as in the form of images. This is how image restoration using denoising is been done using GUI.

Figure 1.1: Browsing Interface

Figure 1.2 is a browsing window which shows some images in .jpg format from these images we have to select one image of same type on which fusion is to be performed by using DSWT with PCA technique. Image is selected by clicking on button named as select 1st image.

Figure 1.2: Browsing 1st image for fusing

ISSN 2349-0292
Impact Factor 3.802

Figure below 1.3 is a browsing window which again asks for selecting second image of same type on which fusion is to be performed by using DSWT with PCA technique. Image is selected by clicking on button named as select 2nd image.

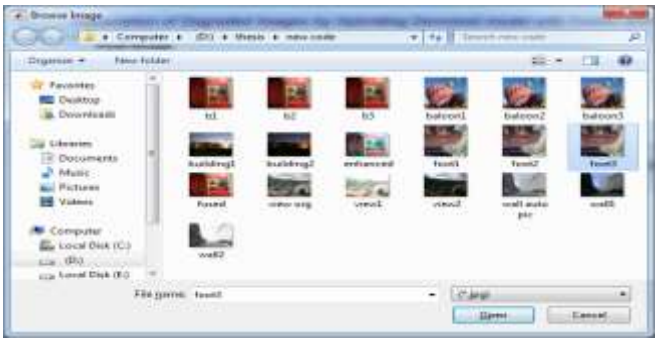

Figure 1.3: Browsing 2nd image for fusing

Figure below 1.4 shows the window with first and second image loaded on axis.

Figure 1.4: Window with Images

Figure below 1.5 windows show the fused image after clicking on button named Fused Image. Fused image is used to actually combine two images having different position with their sight such as brightness, contrast, illumination etc. but of same size. It will show the result that how two images of same size can be used to form one image with clear identity. As u see in 1st image wording written is faded and in second image foot is faded but in fused image all tow things are cleared.

Figure 1.5: Window with Fused Image

Below Figure 1.6, in this wind the Enhanced image is displayed on which HE technique is applied by selecting the button named Enhanced Image. Some contrast is changed having more brightness from the fused image.

ISSN 2349-0292
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Figure 1.6: Enhanced Image window

In Figure 1.7, shows the noisy image in gray scale without RGB color which contains speckle noise with 0.04 by clicking on button named Image with noise. This image is to be restored as to remove the noise quantity from it.

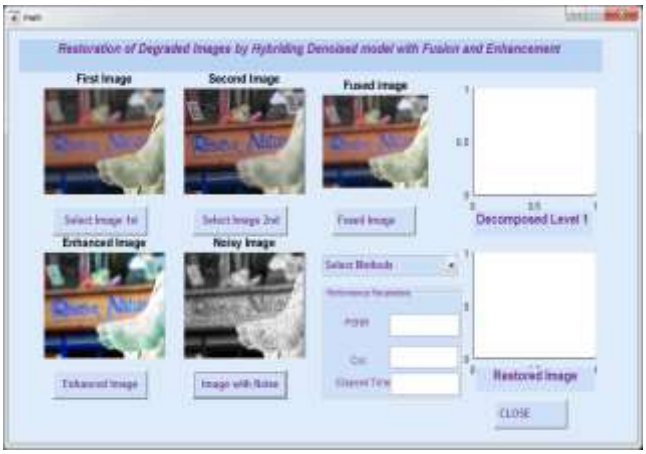

Figure 1.7: Window with Noisy Image

In Figure 1.8 to 1.12, various methods of denoising means to remove noise from images is selected one by one as to show their performance by comparing with parameters such as PSNR, Coc, and Elapsed time. Also denoised image is displayed on right side axis named under label restored image. Popup menu is used here to select the various methods.

Figure 1.8 shows the Denoised image or restored image after removing noise using Wiener filter by selecting it from Popup menu. Restored image with parameters is displayed.

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Figure 1.8: Restored Image using Wiener filter

Figure 1.9 shows the Denoised image or restored image after removing noise using Meian filter by selecting it from Popup menu. Restored image with parameters is displayed.

Figure 1.9: Restored Image using Median filter

Figure 1.10 shows the Denoised image or restored image after removing noise using Bayes Shrink Thresholding with 2-level decomposition by selecting it from Popup menu. Restored image with parameters is displayed. Now here, one more image name as decomposed image is also displayed on window which shows the decomposition level of thresholding done on it.

Figure 1.10: Restored Image using Bayes Shrink

ISSN 2349-0292
Impact Factor 3.802

Figure 1.11 shows the Denoised image or restored image after removing noise using Wavelet Thresholding with 2-level decomposition by selecting it from Popup menu. Restored image with parameters is displayed. Now here, one more image name as decomposed image is also displayed on window which shows the decomposition level of thresholding done on it.

Figure 1.11: Restored Image using Wavelet Thresholding

Figure 1.12 shows the Denoised image or restored image after removing noise using proposed method such as hybriding (Wiener, Bayes Shrink and Wavelet Thresholding) with 2-level decomposition by selecting it from Popup menu. Restored image with parameters is displayed. Now here, one more image name as decomposed image is also displayed on window which shows the decomposition level of thresholding done on it.

Figure 1.12: Restored Image using Hybrid Technique (Wiener + Bayes + Wavelet)

From below tables 1.1 describes the parameters for comparison of various Denoising techniques as for restoration of an image. Speckle Noise is used here for removing noise from images. Our Proposed method has PSNR and Coc are as high, and Elapsed Time is low as results in second lowest than wiener and median filters which show that our method has good quality and clarity as compared to other denoising methods that has been worked for restoring image. PSNR and Coc should be high and Elapsed time should be low as for comparing the quality of image.

Table 1.1: Comparing Denoising Techniques

Sr. No	PSNR			Coc			Elapsed Time		
Images / Techniques	Foot	View side	Book	Foot	View side	Book	Foot	View side	Book
Wiener	24.9107	23.2703	24.633	0.980012	0.98255	0.977448	0.164785	0.14999	0.139587
Median	24.764	22.6472	23.809	0.979198	0.97583	0.972872	0.995325	0.13787	0.129627
Wavelet	25.9057	21.0684	23.126	0.984715	0.96848	0.968092	1.02724	0.39359	0.37856
Bayes Shrink	23.2199	21.6785	23.097	0.970202	0.97117	0.967811	0.323543	0.31569	0.317472
Proposed	30.7924	28.587	30.366	1.28342	1.28402	1.2806	0.305543	0.30911	0.3045

CONCLUSION & FUTURE WORK

As Image reclamation is significant in computerized pictures. In order to keep up different strategies and systems has been connected. As we have considered from are writing review, that all systems have a few confinements and downsides. The real deficiency is that while improvement, the brilliance of the picture crumbles a considerable amount. The Image Fusion strategies perform well spatially yet more often than not present unearthly twisting. Which implies that the variety of tone when the combination procedure has showed up? There is shading bending when the combination is showed up in the shading pictures. There is human representation and target assessment criteria related issues when the combination of two pictures happened. The Hue, Saturation and the Intensity of the shading pictures affected because of combination. Image denoising is a basic prerequisite of Image handling as the pictures contain firmly situated music and edge discontinuities. Along these lines, as presume that all procedures have a few inconveniences. To conquer these issues we will utilize some joined methods which are having best outcomes as our proposal work.

Combination of two images are finished by utilizing best procedures as hybriding the PCA with Discrete and Stationary wavelet change both as one joined. Improvement is finished by Spatial separating method known as Histogram Equalization. Results are estimated by parameters, for example, PSNR, CoC and Elapsed Time. We have done correlation with our proposed strategy in which we crossover the Median Filter with Bayes shrink Wavelet thresholding method for Denoising and improving the pictures as to safeguard brilliance more, brings about better representation. Coming about parameters, for example, PSNR, CoC and Elapsed Time which demonstrates our half and half procedure has best outcomes from different strategies that are looked at, for example, Median filter, wiener Filter, Wavelet thresholding, Bayes shrink Method and so on.

In this work, Bayes Shrink wavelet with Wiener filter is executed with delicate systems; Further, this work can be upgraded for better commotion expulsion proficiency by including more reclamation methods like VISU Shrink, SURE Shrink, Stationary Wavelet Transform (SWT) and Normal Shrink thresholding procedures. Additionally, more wavelet disintegration levels can be utilized for better PSNR values. Rather than Soft, we can use in future with Hard Threshold method.

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