

## International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320-088X



*IJCSMC, Vol. 3, Issue. 9, September 2014, pg.468 – 472*

### **RESEARCH ARTICLE**

# A Study on Different Approaches for Image Restoration

**Monika Khatkar**

Student, M.Tech (ECE)  
PDM College of Engineering  
Bahadurgarh, Haryana

**Mr. Sanjay Kumar**

Assistant Professor, M.Tech (ECE)  
PDM College of Engineering  
Bahadurgarh, Haryana

*Abstract: One of the major problem while capturing the image is the improper image extraction because of bad light or the camera problem. Because of this, some of the important features or the object visibility over the image is not retrieved effectively. In this present work, a study of different problems associated with image processing along with relative solutions. The paper has discussed some common approaches to repair the images. In this paper window based analysis is analyzed based on neighbor pixels so that effective image generation will be performed.*

*Keywords: Image Restoration, Window Method, Image information Extraction*

## I. INTRODUCTION

The image enhancement is one of the most required terms effectively used to improve the image quality. The quality of image is required to identify the image so that the improved image pixel distribution and intensity distribution will be obtained. The enhancement of image is done under capturing work flow. The image enhancement is here done so that the image improvement in terms of noise reduction will be obtained. The OCR applications are defined to improve the ratio of image recognition.

The improvement to image can be done by performing the contrast enhancement so that the improvement over the image can be done under segmentation process. The contrast improvement is done for low contrast images so that the good contrast regions will be identified effectively and the region of low contrast vanish there pixel points at some positions. The method is defined to focus on the image areas under luminance conditions so that the image area will get visible in those particular areas. The image reconstruction and rational operations will be performed effectively to obtain the

accurate contrast enhancement so that region of area will be extracted from the image. The contrast enhancement over the image is identified as the effective region identification over the image so that improvement over the image will be obtained effectively.

The objective of image enhancement process so that the image become clearer and the visual quality of image will get improve. The influenced image processing includes the modality over the image under viewing conditions.

#### **A) Image Denoising**

Image denoising is one of the effective image processing activity used to resolve the problem of noise of the distortion over the image. The denoising process is used to improve the image quality and performance so that the effective image transition over the network will be obtained. The properties of image include the sparsity and multi resolution structure. There are number of denoising algorithms used to repair the image effectively. One of such approach is the wavelet based approach. The wavelet domain is defined as the effective decomposition technique used to remove the noise problem over the image. The parametric analysis is applied over the image to perform the measure measures under noise vector and later on thresholding is applied over the image to repair. The thresholding is applied under the coefficient vectors so that the quality of image will be improved. There are number of such approaches that includes the orthogonal wavelet transformation. These approaches perform the analysis over the image and perform the image pixel level change to repair the image. The tree structure based analysis is performed over the image to obtain the wavelet coefficient level analysis so that the spatial location over the image will be recovered. The tree structure analysis so that the wavelet coefficient based analysis over the image vectors will be obtained. The probabilistic models of image are obtained under wavelet coefficient analysis so that the image vectors will be generated effectively. These probabilistic models actually perform the image repair under wavelet coefficient analysis. These vectors provide the image repairing and adjustment so that more improved image will be obtained from the system.

#### **B) Other Challenges**

The complexity of the restoration process also increases in case of color images. In such case, the color value analysis is performed in terms of color tone identification in different image pixels or features. It gives the analysis under different vectors so that effective image reconstruction will be performed. Another challenge to the restoration process is the processing on compressed images or different format images. When the pixel level or object level restoration is performed on multiple compression and uncompressed image set. The complexity of the of the restoration process also increases for real time video images. In such images, the time vector based image restoration is required. It means the, features over the multiple images are arranged in order of time vector so that effective pixel level restoration will be performed. More challenging restoration process application is the medical image processing. Medical images requires more attention along with minimum information loss, because of this in such images restoration process requires more analysis. This kind of analysis can be performed based on visibility, contrast and feature level. Once the complete attribute level analysis is done, the next work is to reconstruct the images under these vectors[14][15].

In this paper, an effective image reconstruction approach is suggested based on windowing method. In section I, the exploration to the restoration process and the basic types of restoration along with characteristic analysis is defined. In section II, the work defined by earlier researchers is discussed and presented. In section III, some of the effective image restoration approaches are discussed. In section IV, the conclusion obtained from the work is presented.

## **II. EXISTING WORK**

In this section, the work defined by the earlier researchers is discussed and presented. R. Maruthi[1] has presented a restoration process based on information level analysis for multiple images. Author performed region level analysis over these images for image reconstruction. The analysis parameters considered by the author includes the spatial frequency analysis, visibility analysis. To generate the effective reconstructed image, the restoration process is implemented under the selection mode in which the magnitude values of the pixels are compared and analyzed under the activity measure used for image restoration process. Author presented a work on multi focus restoration process to regain the information loss and reconstruct the effective image over it. Shuo-Li Hsu[2] has presented an intelligent neural network based approach for region based image restoration and to reconstruct the image from it. Author presented the pixel based

restoration to replace the pixels so that the effective segmented visual image will be constructed. Author obtained the analysis under the restoration parameters so that the region proof images will be constructed and new restoration image from the work will be obtained. Author presented the region analysis under adaptive capacity and determination so that image reconstruction will be obtained.

Manjusha Deshmukh[3] has defined a quality analysis based work to perform the restoration on multi focus images. Author presented a PCA based approach along with wavelet decomposition. At the initial step author implemented the DWT approach for image decomposition and to obtain the sub images from the main image. Once the image decomposition is done, the next work is to perform the pixel value analysis over these decomposed objects to perform the information restoration so that new image will be reconstructed. Author considered the random space analysis over the image for pre analysis and to regenerate the quality image to perform the image enhancement after the restoration process. Author defined the restoration process based on the plentiful information and analysis and reconstruction. Milad Ghantous[4] has presented an object extraction approach along with image restoration to regenerate the feature image by performing the gradient level enhancement and the pixel level enhancement. Author defined the work in two stages. In first stage, the separation of background and foreground is done and later on the reliable feature selection is performed to reconstruct the result image. Tao Wan[5] has defined the image restoration for compressed image. Author performs the sample based pattern analysis over the image so that the performance of the reconstruction process will be improved. Author defined the restoration algorithm along with compressive sampling pattern. Author presented the image restoration under the acceptability analysis and the compressive vector analysis so that effective sample selection will be obtained that will result the generation of effective image from the set.

Andreja Svab[6] has presented a image restoration process for high resolution images by preserving the spatial and spectral resolution images. Author defined the high resolution image analysis under the restoration process. Author defined the panchromatic image processing under multispectral analysis so that new high resolution image will be constructed. Saurabh Singh[7] has defined a restoration approach for reconstruction of biometric images. The biometric face images are considered by the author that are extracted with partial occlusion. Author defined the eigen space domain analysis along with genetic algorithms to generate the new restoration image so that the regeneration of the image will be done. Author also combined the eigen space analysis along with genetic process with optimum strategy analysis for restoration process. Author has improved the recognition process by using the restoration experimentation. Hong Zheng[8] has presented parameteric analysis approach along with wavelet decomposition for image reconstruction using restoration process. Author performed multi-level wavelet decomposition to apply the restoration rule under different levels and to perform the generation of effective result image. G. Simone[9] has presented an effective approach along with image acquisition, process so that the region value analysis will be performed and the reconstruction of image will be done. Author defined the wavelet based analysis for quality analysis on decomposed objects and the generation of effective result image based on restoration process. Author defined the restoration method under quality assessment so that the multi band based image reconstruction will be done. Wenzhong Shi[10] has presented a transformation approach under two band wavelet analysis for image reconstruction. Author divided the complete image in high frequency and low frequency images. Author defined the performance analysis under different vectors and taken the intelligent decision for reconstruction of images. The quality assessment is here defined for reformation of image so that the restoration image will be improved.

### III. IMAGE RESTORATION METHODOLOGIES

Digital images are generally contaminated by impulse noise during acquisition or transmission through noisy channel. Color Image Filtering is of paramount importance in the field of digital image processing. A number of filtering methods available in literature are studied in this chapter. Objective of image filtering is to obtain a close approximation to original image from image corrupted through different types of noise.

Image filtering methods are divided in two categories:

- (a) Spatial Domain Filtering
- (b) Frequency domain filtering

In spatial domain filtering, operations are performed on the image pixel using the values of neighborhood of current pixel. The subimage of size equal to neighborhood and consisting of values corresponding to these neighborhood values

is called a mask, filter, template or window. The spatial filtering is simply moving the filter mask from point to point in an image. At each point response of filter is calculated using some predefined relationship. If the response is given by sum of product of filter coefficients and pixel values in the area spanned by filter mask, the filter is called Linear Spatial Filter. While in Nonlinear Spatial Filters the response is based on ordering (ranking) the pixels contained in the image area encompassed by the filter, and then replacing the value of central pixel with the value determined by the ranking results. Mean filter is an example of linear spatial filter and median filter is most common example of nonlinear spatial filter.

**A) Median Filter**

Median filter is an order statistics filter. As the name suggests it replace the value of a pixel by median of gray levels in the neighborhood of that pixel. Median function is applied independently on each color component (or color channel). The output of median filter is given by:

$$Z_{i,j} = (z_{i,j}^{(1)}, z_{i,j}^{(2)}, z_{i,j}^{(3)})$$

Where  
 $z_{i,j}^{(k)} = \text{median}(W^{(k)})$  (1)

W is the filtering window consist of the subimage area in the neighborhood of current pixel. For a 3x3 median filter

$$W = [ I_{i-1,j-1}, I_{i-1,j}, I_{i-1,j+1}, I_{i,j-1}, I_{i,j}, I_{i,j+1}, I_{i+1,j-1}, I_{i+1,j}, I_{i+1,j+1}]$$
 (2)

Where **I** is the image corrupted by noise and (i, j) are the spatial coordinates in digital image **I**.

**B) Vector Median Filter**

To overcome the problem of color artifacts in case of median filtering, vector processing is applied which utilizes the inter-channel correlation existing between different color components of a pixel value. In color images the pixel value is a vector quantity. Vector median filter (VMF) focuses on minimizing the distance between these pixel vectors in the filtering window.

Let W be the processing Window of size n and Let  $x_i, i=1$  to n be the n pixels in W. Image function at pixel be  $f_i$ . Then the filtering criterion for VMF at a pixel is defined as

$$L_i = \sum_{j=1}^n \|f_i - f_j\|, \quad i = 1 \text{ to } n$$
 (3)

The Vector  $f_i$  for which  $L_i \leq L_j \forall i=1$  to n, is the output of Vector median filter.

Where  $\|\cdot\|$  shows the Euclidean norm.

VMF minimizes the accumulated sum of distances among pixels within filtering window. Vector median filter may be identified either using robust ordering statistics or as a maximum likelihood estimator.

**IV. CONCLUSION**

In this paper, a study on different restoration processes is shown for real time images. The paper has discussed, the type of restoration under the feature vector analysis as well describe the challenging areas of image restoration. Later on the research methodology of some of the most effective restoration algorithms is defined in this paper.

## REFERENCES

- [1] Q. Ye, W. Shi and Y. Li, "Sentiment Classification for Movie Reviews in Chinese by Improved Semantic Oriented Approach", Proceedings of the 39th Hawaii International Conference on System Sciences, pp 1-5, 2006
- [2] R. Colbaugh and K. Glass, "Estimating Sentiment Orientation in Social Media for Intelligence Monitoring and Analysis", International Conference on Intelligence and Security Informatics, pp 135 - 137, 2010
- [3] X. Yuy, Y. Liu and A. Anz, "An Adaptive Model for Probabilistic Sentiment Analysis", IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology, pp 661-665, 2010
- [4] X. Yu, Y. Liu, J. X. Huang and A. An, "Mining Online Reviews for Predicting Sales Performance: A Case Study in the Movie Domain", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 24, NO. 4, APRIL 2012
- [5] C Liu, W. Hsaio, C. Lee, G. Lu, and E. Jou, "Movie Rating and Review Summarization in Mobile Environment", IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART C: APPLICATIONS AND REVIEWS, VOL. 42, NO. 3, MAY 2012
- [6] K. Glass and R. Colbaugh, "Estimating the Sentiment of Social Media Content for Security Informatics Applications", IEEE International Conference on Intelligence and Security Informatics, pp 65 - 70, 2011
- [7] S.M. S. Hasan and D. A. Adjeroh, "Proximity-Based Sentiment Analysis", 4<sup>th</sup> International Conference on Applications of Digital Information and Web Technologies, pp 106 - 111, 2011
- [8] A. Hogenboom, P. v. Iterson, B. Heerschop, F. Frasincar, and Uzay Kaymak, "Determining Negation Scope and Strength in Sentiment Analysis", pp 2589 - 2594, 2011
- [9] M. Hao, C. Rohrdantz, H. Janetzko and U. Dayal, "Visual Sentiment Analysis on Twitter Data Streams", IEEE Conference on Visual Analytics Science and Technology, pp 277 - 278, 2011
- [10] C. B. Ward, Y. Choi, S. Skiena and E. C. Xavier, "Empath: A Framework for Evaluating Entity-Level Sentiment Analysis", International Conference & Expo on Emerging Technologies for a Smarter World, pp 1 - 6, 2011
- [11] M. Wöllmer, F. Wening, T. Knaup, and B. Schuller, "YouTube Movie Reviews: Sentiment Analysis in an Audio-Visual Context", IEEE Intelligent Systems, pp 46 - 53, 2013
- [12] K. Mouthami, K. Nirmala Devi and V. M. Bhaskaran, "Sentiment Analysis and Classification Based On Textual Reviews", International Conference on , pp 271 - 276, 2013.
- [13] V.K. Singh, R. Piryani, A. Uddin and P. Waila, "Sentiment Analysis of Movie Reviews and Blog Posts", IEEE International Advance Computing Conference, pp 893 - 898, 2013
- [14] S. Kamath, S. A. Bagalkotkar, A. Khandelwal, S. Pandey and K. Poornima, "Sentiment Analysis Based Approaches for Understanding User Context in Web Content", International Conference on Communication Systems and Network Technologies, pp 607-611, 2013
- [15] V.K. Singh, R. Piryani, A. Uddin and P. Waila, "Sentiment Analysis of Movie Reviews", International Multi-Conference on Automation, Computing, Communication, Control and Compressed Sensing, pp 712 - 717, 2013