Review of Different Filters for Image Processing

Richa Rana[*], Ashish Sharma
CSE & DCRUST, Murthal,
Haryana, India

Abstract— In image processing the image restoration is playing an important role. For the human being the images can be reconstructed by excluding the noise and blur from the original images. Any image acquired by a device is susceptible of being degraded by the environment of acquisition and transmission. The main motive of image processing is making the noise free image and improve the quality of an image. The main objective of image restoration is storing the image for future processing. The objective of this paper is to study the different filters for denoising the image. It also improve the quality of image.

Keywords- Image processing, Imagerestorations, Hybrid filters,Weiner filters, Noise, Impulse noise, photoelectric noise

I.   INTRODUCTION

Images are generally used for presenting the information. Images are generally used for storing the information for storing the data for further communication.Two dimensional array making a digital image. Image can be a combination of pixel. Pixel is a smallest part of information in image. Pixels are presented by small square or dot in image. The original image is created by the combination of sample of pixels. Pixel is a variable which have intensity in color system. Each pixel has typically three or four components such as red, green, and blue, or cyan, magenta, yellow, and black. Pixels are having two coordinates such as X and Y which are takingainteger value.

Image processing is a technique which is used to modifying or denoising the original image. In Image processing the image is taking as input; the output of image processing can be set of characteristics of parameters related to the image or image itself. The main importance of digital image processing stems from two principal application areas: (i) improvement of pictorial information for human interpretation and (ii) processing of scene data for autonomous machine perception. The different arithmetic operations are performed to the image processing for increasing the quality of image. In Image processing we have a problem of image restorations.

A. objective of image restoration:

In image processing the image restoration is playing an important role. For the human being the images can be reconstructed by excluding the noise and blur from the original images. Any image acquired by a device is susceptible of being degraded by the environment of acquisition and transmission. The main motive of image processing is making the noise free image and improve the quality of an image. The main objective of image restoration is storing the image for future processing. Removing a noise from the digital image is a big issue in image processing.
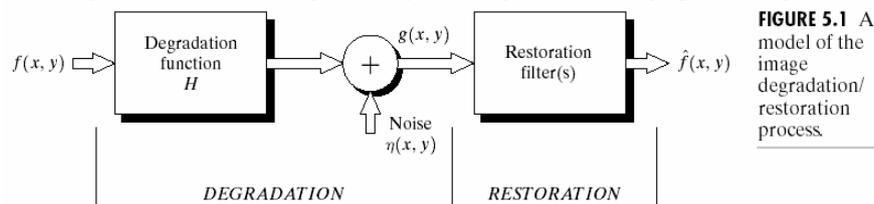

Fig 1. A model for degradation process

B. Applications of image restoration:

1. The first application of digital image restoration in the engineering   community was   in the area of astronomical imaging. Extra terrestrialobservations of the Earth and the planets were degraded by motion blur as a result of slow camera shutter speeds relative to rapid spacecraft motion. The astronomical imaging degradation problem is often characterized by Poisson noise, Gaussian noise etc.

2.   In the area of medical imaging, image restoration has played a very important role. Restoration has been   used for filtering of Poisson distributed film-grain noise in chest X-rays, mammograms and digital angiographic images, and for the removal of additive noise in Magnetic resonance Imaging.

3. Another important application of restoration technique is to restore aging and deteriorated films. The idea of motion picture restoration is often associated with digital techniques used not only to eliminate scratches and dust from old movies, but also to colorize black and white films.

4. The expanding area of application for digital image restoration is that in the field of image and video coding. As techniques are developed to improve coding efficiency, and reduce the bit rates of coded images. Much has been accomplished to model these types of artifacts and develop ways of restoring coded images as a post-processing step to be performed after decompression.

1.) terms used in image restoration:
Various terms that are commonly used in image restoration are:
*Noise:*Noise is any undesired information that contaminates an image. The term noise in digital images refers to any pixel value of an image which does not match the reality quite exactly. The noise present in the images may significantly decrease the accuracy of the operations such as feature extraction and object recognition. Image noise is the random variation of brightness or color information in images produced by the sensor and circuitry of a scanner or digital camera. Digital noise in images with digital cameras is random pixels scattered all over the photo. It degrade the quality of an image.

C. types of noise:
Common types of noise are:
1.) Impulse noise: Salt and Pepper noise is consider as the impulse noise .This type of noise is generally created by the malfunctioning of the pixel elements in the camera sensors, faulty memory locations, or timing errors in the digitization process. The images corrupted by the impulse noise the noisy pixels can take only the maximum and the minimum values in the dynamic range.Salt and pepper noise will have the dark pixel value in dark region and the dark region will have the dark pixel.
*2.) Gaussian noise:*The quantum fluctuations is generally caused by the lighter part of the image through the dominant noise. There are the variation in number of photons; this type of noise is called photon shot noise. Gaussian noise has a root-mean-square value proportional to the square root of the image intensity. The noises having different pixels are independent of each other.
3.) Electronic noise:This type of noise is generally created by the electronic motion of the component of the imaging system.
4.) Photoelectric noise:This type of noise is generally created by the statiscal nature of light and photo electronic conversion.
5.) Film grain noise:It is due to randomness of silver halide grains in the film used for recording.
*6.) Thermal noise:*the thermal energy is a stochastic source of CCD in electronic component. Due to thermal vibration electrons can be freed from CCD material itself .Due to cooling down the CCD chip the thermal noise is decrease in the original noise. As the number of thermal electrons increases, the integration time also increases. The probability distribution of thermal electrons is also a Poisson process where the rate parameter is increasing function of temperature. The dark current average, it does not reduce the dark current standard deviation.

II. RELATED STUDY

P. Sureka1, G. Sobiyaraj2, R. Suganya3, T.N.Prabhu   Image restoration is a technique which restore the degraded face images such as faxed images, scanned passport photos and printed images by removing noise in the image. The degradations include half toning, dithering and security watermarks. An iterative image restoration scheme is used to restore the severely degraded face images which improve the recognition performance and the quality of the restored image. In this paper, Viola and Jones face detection algorithm which is to localize the spatial extent of the face and determine its boundary. In next step, geometric normalization is applied to both original and degraded images. It holds two processes namely automatic eye detection and affine transformation that matches the images in the database and constructs the canonical faces. Low pass filtering is done using Wiener filter which reduces the noise in the image and the invariant wavelet transform reduces artefacts.

Taeg Sang Cho, Student Member, IEEE, C. Lawrence Zitnick, Member, IEEE, Neel Joshi, Member, IEEE Sing Bing Kang, Senior Member, IEEE, Richard Szeliski, Fellow, IEEE,and William. T. Freeman, Fellow, IEEE the restoration of a blurry or noisy image is commonly performed with a MAP estimator, which maximizes a posterior probability to reconstruct a clean image from a degraded image. A MAP estimator, when used with a sparse gradient image prior, reconstructs piecewise smooth images and typically removes textures that are important for visual realism.Author'salternative DE convolution method called iterative distribution reweighting (IDR) which imposes a global constraint on gradients so that a reconstructed image should have a gradient distribution similar to a reference distribution. In natural images, a reference distribution not only varies from one image to another, but also within an image depending on texture. They estimate a reference distribution directly from an input image for each texture segment. Their algorithm is able to restore rich mid-frequency textures. A large scale user study supports the conclusion that their algorithm improves the visual realism of reconstructed images compared to those of MAP estimators.

Easwara.M IV Sem, M.Tech, Guide: SatishBabu. J Asst. Professor. The fact that makes image denoising a difficult task is uncertainties in the impulse noise. The most knowledge in dayflies is uncertainty and erratic, unfortunately it is similar to impulse noise. The mathematic implements for handling uncertainty mostly are probability theory and fuzzy mathematics. That means, among the uncertainties involved in impulse noise, the randomness and the fuzziness are the two most important features. In this paper they use a detail-preserving filter based on the Cloud Model (CM) to remove severe impulse noise. CM is an uncertain conversion model, between qualitative and quantitative description that integrates the concept of randomness and fuzziness.

AnamikaMaurya, Rajinder Tiwari 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. Aim of this research paper is to provide a concise overview of most useful restoration models .Different types of image restoration techniques like wiener filter, inverse filter, regularized filter, Richardson –Lucy algorithm, neural network approach ,wavelet based approach, blind deconvolution are described and strength and weakness of each approach are identified.

Priyanka Rajesh GulhaneV.T.Gaikwad -The filling-in of missing information is a very important technique in image processing. While transmission of image if some blocks of image are lost then instead of using common retransmission query protocols, they aim to reconstruct the lost data using correlation between the lost block and its neighbors. Removing a target object and filling the missing regions of an image is the key technology generally applied to image restoration. The basic idea is fill-in the missing block with the information propagating from the surrounding pixels. Here the aim is to fill-in the gap of missing data in a form that is non-detectable by an ordinary observer.

TABLE I. COMPARISON OF VARIOUS TECHNIQUES:

Sr No.	Author	Year	Based on	Comparison with	Advantages	Disadvantages
I	P. Sureka1, g. Sobiyaraj2, r. Suganya3, t.n.prabhu	2013	Based on filter design and is used to improve the appearance of an image.	Wiener filter which reduces the noise in the image and the invariant wavelet transform reduces artefacts.	Prior on the spatial distribution of the image gradient for frontal face images.	Stability of principal lines and wrinkles has not been systemically investigated.
II	Priyanka a. Manetaeg sang cho, student member, ieee, c. Lawrence zitnick, member, ieee, neeljoshi, member, ieee Sing bingkang, senior member, ieee, richardszeliski, fellow, ieee, and william. T. Freeman, fellow, ieee,	2011	Map estimator, which maximizes a posterior probability to reconstruct a clean image from degraded image.	Iterative distribution reweighting(idr)	Improves the perceived quality of reconstructed images.	
III	EaswaraMtech IV sem guideSatishbabuJ.Asst.professor	2013	Cloud model (CM) to remove Severeimpulse noise.	Compared with the traditional Switching filters, the Cm fiter makes a great improvement in image denoising	First, the accuracy of the noise detection, it will directly influence the results of the image Denoising. Second, the computational effienecy, for the real time work, the filters with the lower computational effiency may not obtain the satistfactory results. Finallly, large uncertainities exist in the noise.	This research work dose not use high-resolution approach.

IV	Anamikamaurya, RajinderTiwari	2014	Blurring and deblurring techniques	Image restoration compared with the image enhancement	It help for the researchers in understanding the concept of image restoration and deblurring techniques	
V	Priyankarajeshgulhane V.t.gaikwad	2012	Provides a means to restore damaged region of an image, such that the image looks complete and natural after restoration.	Reconstruct the lost data using correlation between the lost block and its neighbors.	An effective way of restoring the missing blocks of an image in minimum time reducing the need for retransmission.	

III.   CONCLUSIONS

The image processing are generally used for improve the quality of image. Image Restorations are restored the image Different filters are used for image processing.PSNR evaluates the performance of image. Weiner filter and hybrid filter are used for denoisingthe image. For missing blocks the filling techniques are used. The data can be reconstructed by using different filters.

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