# Reduction of Noises from Degraded Document Image using Image Enhancement Technique

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**Abstract -** Development of digital device sand computers makes an increasing attraction in document image analysis. Many paper documents are transferred and stored using digital devices in large manner. The image enhancement techniques are used to reduce the noises from degraded document images. Sample images are taken from Document Image Binarization Contest dataset images. Contrast stretching, histogram equalization, noise filtering, Laplacian transformation, global and local thresholding methods are used to remove show-through noise, uneven illumination noise and shot noise from degraded document images. Opensource software like OpenCV is used. Performance metrics were estimated to understand the efficiency of the above methods in removing the noises.

**Key Words:** Document Image Enhancement;Laplacian transformation; Thresholding; Contrast stretching; Histogram equalization

## 1. INTRODUCTION

The study of image processing has various applications in different fields. One of the applications is document image analysis. Most of the day-to-day activities are depend on the changes happening in the technological world. Since the mode of information interchange has undergone drastic changes due to digital techniques. While digitizing information authenticity, documentation and its format as well as security, storage and retrieval are the important criteria, which are taken into account. In document image analysis to transmit, process, store, analyse, enhancing and recognizing the document images Image processing techniques are very largely used. Images are degraded by uneven illumination noise, salt and pepper noise, show through noise, etc.

Noise is a random variation of image Intensity and visible as a part of grains in the image. Noise is introduced in the image at the time of image transmission. Different factors may be responsible for introduction of noise in the image. The number of pixels corrupted or loss in the image will decide the quantification of the noise. The principal sources of noise in the digital image are: a)The image in sensor may be affected by environmental conditions during image transmission. b) Insufficient Light levels and sensor

temperature may introduce the noise in the image. c) Interference or disturbance in the transmission channel may also corrupt the image. d) If dust particles are present on the scanner screen, they can also introduce noise in the image. To reduce these noises histogram equalization, Laplacian transformation ,noise filtering, contrast stretching and thresholding methods are available.

## 2. LITERATURE SURVEY

**• Filtration Based Noise Reduction Technique in an Image**
**Authors**: Vibhor Sharma1 et al[1]
**Published Year**: 2019
Image transmission is a process that is performed in all kind of multimedia systems such as space crafts and cellular phones. When an image is inputted for broadcasting it does not contain that much of quality after transmission as original image was having. Noise is the main factor that can impure the final image in distinct ways like transmission through air or decompression noise after compressed data that is stored. Then the final image can be degraded because of this. To resolve the issue of degradation different filtering steps can be applied or preprocessing can be done. Different filtration techniques are used to overcome this problem but image may be blurred after filtration. So median filtration yields best results is such a way that image won't be blurred after transmission.

**• An Image Enhancement Technique Combining Sharpening and Noise Reduction**
**Authors**: Fabrizio Russo et al[6]
**Published Year**: 2002
This method is based on a multiple output system that adopts fuzzy models in order to prevent the noise increase during the sharpening of the image details. Key features of this technique are better performance than available methods in the enhancement of images corrupted by Gaussian noise and no complicated tuning of fuzzy set parameters. In fact the overall nonlinear behavior of the enhancement system is very easily controlled by one parameter only.

**• Detection and removal of Salt and Pepper noise in images by improved median filter**
**Authors**: S. Deivalakshmi et al[3]
**Published Year**: 3 Nov 2011

A methodology based on median filters for the removal of Salt and Pepper noise by its detection followed by filtering in both binary and gray level images . Linear and nonlinear filters have been proposed earlier for the removal of impulse noise however the removal of impulse noise often brings about blurring which results in edges being distorted and poor quality. Therefore the necessity to preserve the edges and fine details during filtering is the challenge faced by researchers today. The method consists of noise detection followed by the removal of detected noise by median filter using selective pixels that are not noise themselves. The noise detection is based on simple thresholding of pixels.

•**Analysis of different filters for noise reduction in images**
 **Authors**: Bhawna Dhruv et al[7]
**Published Year**: 14 May 2018
Reducing noise from images still a challenge in the field of image processing. Image processing proves to be very successful in allowing an extensive range of algorithms to be applied to the input data set in the form of image and retrieve pivotal results. These algorithms tend to avoid problems such as noise and signal distortion. An image obtained after noise removal has higher clarity in terms of both interpretation and analysis for study in different fields such as medical, satellite imaging and radar. The performance of filtering techniques Median, Average is evaluated by performance measuring parameters execution time and entropy.

•**Image Noise Reduction and Filtering Techniques**
**Authors**:Abdalla Mohamed Hambal et al[2]
**Published Year**: 3 March 2017
Images are degraded by noises. Noise can occur and obtained during image capture, transmission. So noise removal is an important task in image processing. Several techniques for noise removal are there in image processing. The nature of the noise removal problem depends on the type of the noise corrupting the image. In the field of image noise reduction several linear and nonlinear filtering methods have been proposed. Linear filters are not able to effectively eliminate impulse noise as they have a tendency to blur the edges of an image. Nonlinear filters are suited for dealing with impulse noise.

**3. PROPOSED SYSTEM METHODS:**

**1) Contrast Stretching :**
Show-through effect is the formation of the back-side of the document information in the front-side of the document while taking photocopy or other means of reprint. Show-through noise affected image will taken from DIBCO dataset. Contrast stretching is chosen to reduce the show-through noise from document images. The image is enhanced by increasing or decreasing the intensity values of the respective pixels in contrast stretching. Foreground pixels have higher intensity value than background pixel. To adjust the brightness of an image increasing or decreasing the output pixel value by adding a constant value with the input

pixel value for high contrast image. While subtracting a constant value from the input pixel results a low contrast image.

**2) Noise Filtering**
To filter out the unwanted information from an image noise filtering is used. Implementation of median filter is used for removing the noise present in the document images. The median filter is well suited in removing the salt and pepper noise or shot noise. This noise is represented occurring of white and black pixels in an image in a random manner. So it is used to smoothing the degraded document image. It is also called as rank filter Consider a 3x3 kernel in the matrix image. As compared with mean filter median filter is good at preserving the edge pixels and higher kernel value which produces good smoothing.

**3) Histogram**
In image enhancement technique histogram is vital tool for representing the characteristics plot of an image. If the histogram changes image characteristics can also change. Histogram equalization is used to remove the uneven illumination noise in document images. Histogram equalization changes the contrast of an image by introducing the non-linear stretching of the intensity range. Equalization maps narrow distribution of intensity values to wider distribution of intensity values.

**4) Laplacian Transformation**
Laplacian transformation is also named as zero-crossing detector. Laplacian operator is the second order derivative operator which finds out the edges in document images. For implementing the Laplacian operator the degraded original document image is converted into gray scale image. Noise is removed using Gaussian smoothing filter. The output of the smoothing operation is convoluted with the Laplacian mask .

**5) Thresholding**
Thresholding is the main techniques used in image segmentation. It is a process of converting grey-level to a binary level image by selecting a single threshold value.

a) Global thresholding**:** This method creates binary images from grey level ones by turning all pixels having values below the threshold value to zero and above the threshold value to one. It is very fastest technique compared to other methods but it is not suitable for all type of document image. The document images containing picture, object and text.

b) Local Thresholding: Local threshholding is also called as adaptive thresholding which selects a particular threshold value automatically for each pixel of an image based on the range of intensity values in its neighbourhood pixels. According to the intensity statistics it examines the relationships between brightness of neighbouring pixels to adapt the thresholding .

## 4. LIMITATIONS OF EXISTING SYSTEM

a)Histogram Equalization imbalance the color of the output image

b)Global And Local image Contrast enhancement improvement in the case of low-contrast images factor statically

c)histogram equalization based methods (HEBM) and an multiscales unsharp masking based methods (UMBM) lead to degraded edges

d)Global contrast enhancement lead to degraded edge

e)Automatic contrast enhancement method based on stochastic resonance imbalance the color of the output image

## 5. ADVANTAGES

a) It is easy to implement.

b) Used for de-noising different types of noises

## 6. CONCLUSIONS

Several algorithms will develope and test in degraded document images in OpenCV platform. The proposed enhancement algorithms reduced the show-through and uneven illumination noises from document images effectively and the quality of document will be improve while storing it.

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