EPSF BY ENHANCING THE IMAGES IN SAEP

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Abstract - One of the ultimate aims of image processing is to represent real-world scenes on conventional display devices. An edge may be the result of changes in light absorption, color, shade and texture, and these changes can be used to determine the depth, size, and orientation and surface properties of a digital image. In analyzing the image digitally, edge detection involves filtering irrelevant information to select the edge points. The detection of subtle changes may be mixed up by noise and this depends on the pixel threshold of change that defines an edge. Detection of these continuous edges is very difficult and time consuming especially when an image is corrupted by noise. Edge detectors have been an essential part of many computer vision systems. In this research work a new way to construct edge-preserving smoothing filter(EPSF) in SAEP is introduced. A novel filter is proposed for edge-preserving smoothing of an image enhancement using median filter to remove noise. It is different from previous filters in its locally adaptive property. An edge preserving smoothing filter (EPSF) is proposed for manipulating low contrast image in SAEP

Indexterms - Small Area Edge Preserving (SAEP), Edge Preserving Smoothing Filter(EPSF), Red Green Blue(RGB), Graphical User Interface(GUI),Histogram Modified Local Contrast Enhancement(HMLCE),Point pread Function(PSF),Laplacian Of Gaussian(LOG)

I.Introduction

Image enhancement process on an image in order to make it more appropriate for certain applications.It is used to improve the visual effects and the clarity of image or to make the original image more conducive for computer to process. The objective of enhancement is to process an image so that the result is more suitable than the original image for a specific application. It is one of the most interesting and visually appealing areas of image processing. IE is broadly divided into two categories: spatial domain methods and frequency domain methods. Spatial domain method refers to the image plane and approaches in this category are based on direct operation of pixels in an image. Frequency domain methods are based on adapting the Fourier transform of an image The aim of image enhancement is to improve the interpretability or perception of information in images for human viewers, or to provide `better' input for other automated image processing techniques.

EDGE ENHANCEMENT Edge enhancement is an image processing filter that enhances the edge contrast of an image or video in an attempt to improve it acutance (apparent sharpness).This filter works by identifying sharp edge boundaries in the image, such as the edge between a subject and a background of a contrasting color, and increasing the image contrast in the area immediately around the edge. This has the effect of creating subtle bright and dark highlights on either side of any edges in the image, called overshoot and undershoot, leading the edge to look more defined when viewed from a typical viewing distance. A modern television set's "sharpness" control is an example of edge enhancement. It is also widely used in computer printers especially for font or/and graphics to get a better printing quality. Most digital cameras also perform some edge enhancement, which in some cases cannot be adjusted.

PROPERTIES

Edge enhancement applied to an image can vary according to a number of properties; the most common algorithm is unsharp masking, which has the following parameters[19]This controls the extent to which contrast in the edge detected area is enhanced.

- Radius or aperture:This affects the size of the edges to be detected or enhanced, and the size of the area surrounding the edge that will be altered by the enhancement. A smaller radius will result in enhancement being applied only to sharper, finer edges, and the enhancement being confined to a smaller area around the edge.
- Threshold: Where available, this adjusts the sensitivity of the edge detection mechanism. A lower threshold results in more subtle boundaries of colour being identified as edges. A threshold that is too low may result in some small parts of surface textures, film grain or noise being incorrectly identified as being an edge.

In some cases, edge enhancement can be applied in the horizontal or vertical direction only, or to both directions in different amounts. This may be useful, for example, when applying edge enhancement to images that were originally sourced from analog video.

EFFECTS OF EDGE EHANCEMENT

Unlike some forms of image sharpening, edge enhancement does not enhance subtle detail which may appear in more uniform areas of the image, such as texture or grain which appears in flat or smooth areas of the image. The benefit to this is that imperfections in the image reproduction, such as grain or noise, or imperfections in the subject, such as natural imperfections on a person's skin, are not made more obvious by the process.

As with other forms of image sharpening, edge enhancement is only capable of improving the perceived sharpness or acutance of an image. The enhancement is not completely reversible, and as such some detail in the image is lost as a result of filtering. Further sharpening operations on the resulting image compound the loss of detail, leading to artifacts such as ringing. An example of this can be seen when an image that has already had edge enhancement applied, such as the picture on a DVD video, has further edge enhancement applied by the DVD player it is played on, and possibly also by the television it is displayed on. Essentially, the first edge enhancement filter creates new edges on either side of the existing edges, which are then further enhanced.

The ideal amount of edge enhancement that is required to produce a pleasant and sharp-looking image, without losing too much detail, varies according to several factors. An image that is to be viewed from a nearer distance, at a larger display size, on a medium that is inherently more "sharp" or by a person with excellent eyesight will typically demand a finer or lesser amount of edge enhancement than an image that is to be shown at a smaller display size, further viewing distance, on a medium that is inherently softer or by a person with poorer eyesight.

SCOPE AND AIM: A novel EPSF filter is proposed for enhancing image in SAEP of an image. It is different from previous filters in its locally adaptive property. The filtered image contains local means everywhere and preserves local salient edges. The reason for such a proposed method is that, in low dynamic range images the intensity variations in a very small area will be very low. So such intensity variations should result in a new edge formation. But most of the recent methods filter the edges globally. The inside intensity variations in a given area is not taken into account. In other words, one small gradient may also be an important edge locally. So the definition of salient edge should be changed and this filter is called Small Area Edge Preserving (SAEP) filter, and it will efficiently and effectively produce visually pleasing images.By using SAEP the pixel with the low contrast is identified and it has been enhanced by EPSF and also the whole image and gives better result.

II.LITERATURE SURVEY

The literature Survey studies about various edge preserving techniques and possibilities of HDR images and tone mapping images based on fuzzy and SAEP are discussed and performs its task that gives better result.

Edge Detection Method for Image Processing based on Generalized Type-2 Fuzzy Logic:[Patricia Melin, Claudia I. Gonzalez, Juan R. Castro, Olivia Mendoza and Oscar Castillo]

General type-2 fuzzy logic allows for better modeling of uncertainty, because it gives more degrees of freedom in comparison to interval type-2 and type-1 fuzzy logic. Generalized type-2 is needed in real-world devices and applications, in particular in the image processing area, because the devices that capture digital images are always exposed to external interference adding high noise levels or uncertainty to the images.

Edge-Preserving Decompositions for Multi-Scale Tone and Detail Manipulation:[Zeev Farbman,Raanan Fattal,Dani Lischinski,Richard Szeliski]

Many recent computational photography techniques decompose an image into a piecewise smooth base layer, containing large scale variations in intensity, and a residual detail layer capturing the smaller scale details in the image. In many of these applications, it is important to control the spatial scale of the extracted details, and it is often desirable to manipulate details at multiple scales, while avoiding visual artifacts. In computational photography it is often used to decompose an image into a piecewise smooth base layer and a detail layer. Such a decomposition may then be used for HDR tone mapping.

Fuzzy Logic Technique in Digital Images using Edge Detection:[Neelesh Gupta]

Edge detection significantly reduces the amount of data and filters out useless information, while preserving the important structural properties in an image.Fuzzy logic based edge detection technique uses the edge strength information derived using three masks to avoid detection of spurious edges corresponding to noise, which is often the case with conventional gradient-based techniques.

Small Area Edge Preservation for Multiscale Decomposition for High Dynamic Range Image Tone Mapping :[Yedu Manmadhan, Anto Kumar R.P]

A new way to construct edge-preserving multi-scale image decompositions is introduced. The novel filter reproduce HDR images. Edge-preserving becomes an important property in filtering design to avoid halo artifacts. This technique decomposes an image into a piecewise smooth base layer and a detail layer. The base layer is no longer contains low frequency band, but it also has salient edges (high frequency). Multi-scale can be used here to decompose progressively another detail layer from the last decomposed base layer. In other words, the high-frequency information is can be progressively decomposed from the original image. There is an important property in the decomposition, which is the residual base layer matches the large-scale shape of the original image signal. The tone mapped images using these edge-preserving filters give state-of-the-art quality, and they will be visually appealing.

A Survey on Edge Detections and Denoise Techniques:[Mrs. Deepty Dubey]

Digital images are noisy due to environmental disturbances. The importance of the image denoising could be a serious task for medical imaging, satellite and areal image processing, robot vision, industrial vision systems, micro vision systems, space exploring etc. The noise is characterized by its pattern and by its probabilistic characteristics. There is a wide variety of noise types while we focus on the most important types of noises and de noise filters been developed to reduce noise from corrupted images to enhance image quality. Image de-noising is the technique to reduce noises from corrupted images. The important steps of image processing are de-noising and edge detection.The need of edge detection is to find the discontinuities in depth, discontinuities in surface orientation, changes in material properties and variations in scene illumination. Canny technique is very important method to find edges by isolating noise from the image before find edges of image, without affecting the features of the edges in the image and then applying the tendency to find the edges and the critical value for threshold. Denoising of images is done by using the linear and nonlinear filtering techniques where linear filtering is done using the mean filter and the LMS adaptive filter while the nonlinear filtering is performed using a median filter. These filters are good for removing noise that is impulsive in nature. Implementation of such filters is easy, fast, and cost effective.

The Use of Interval Type-2 Fuzzy Logic as a General Method for Edge Detection:[Olivia Mendoza1 Patricia Melin2 Juan R. Castro]

Edge detection in digital images is based on the morphological gradient and fuzzy logic. The goal is to improve the basic methods for edge detection in order to obtain a better result even without applying any filter to the image. The morphological gradient method for edge detection is considered as one of the basic ones, when enhanced with an interval type-2 fuzzy inference system.

A Conventional Study of Edge Detection Technique in Image Processing [Indrajeet Kumar,Jyoti Rawat ,Dr. H.S. Bhadauria]

Edge detection is a process of identifying and detecting sharp discontinuities in an image. The discontinuities are abrupt changes in pixel intensity gray level value. Edge detection is an important technique in many image processing applications such as object recognition, motion analysis, pattern recognition, medical image processing etc. comparison of edge detection techniques under different conditions showing advantages and disadvantages of these algorithmsSince Edge detection is one of the most important techniques that have been commonly implemented in image processing. It is used in image segmentation, registration and identification of image processing. It is very important to know the differences between edge detection techniques Gradient-based algorithms such as the Prewitt filter have a major drawback of being very sensitive to noise. The performance of the Canny edge detection algorithm depends heavily on the adjustable parameter sigma (σ). The bigger the value for , the larger the size of the Gaussian filter becomes. This implies more blurring, necessary for noisy images, as well as detecting larger edges. Canny's edge detection algorithm is computationally more expensive compared to Sobel, Prewitt and Robert's operator. However, the Canny's edge detection algorithm performs better than all these operators under almost all scenarios. Evaluation of the images showed that under noisy conditions, Canny, LoG, Sobel, Prewitt, Roberts's exhibit better performance, respectively.

A Review and Research of Edge DetectionTechniques for Image Segmentation:[Poonam Dhankhar, Neha Sahu]

Edge is a basic and important feature of an image. Image is a combination of edges. Edge detection is a vital step as it is a process of identifying and locating sharp discontinuities in an image. In this paper through study has been done on most commonly used edge detection techniques such as Sobel, Prewitt, Roberts, Canny, Laplacian Guassian(LoG). Edge detection is a vital step as it is a process of identifying and locating sharp discontinuities in an image. It is observed from the results LoG and Canny edge detectors produce almost same edge map. Canny result is superior one when compared to all for a selected image since different edge detections work better under different conditions. Despite of so many edges detection techniques are available in the literature, it is a challenging task to the research communities to detect the exact image without noise from the original image.

Study and Comparison of Various Image Edge Detection Techniques:[Raman Maini, Dr. Himanshu Aggarwal]

Edge detection significantly reduces the amount of data and filters out useless information, while preserving the important structural properties in an image. Since edge detection is in the forefront of image processing for object detection, it is crucial to have a good understanding of edge detection algorithms. Canny's edge detection algorithm is computationally more expensive compared to Sobel, Prewitt and Robert's operator. However, the Canny's edge detection algorithm performs better than all these operators under almost all scenarios. Evaluation of the images showed that under noisy conditions, Canny, LoG, Sobel, Prewitt, Roberts's exhibit better performance, respectively.

A Generalised Unsharp Masking Algorithm Using Bilateral Filter:[Sunkari Sridhar, Dr.Shaik Meeravali]

Unsharp masking is good tool for sharpness enhancement; it is an anti blurring filter. By using unsharp masking algorithm for sharpness enhancement, the resultant image suffering with two problems, first one is a hallo is appear around the edges of an image, and second one is rescaling process is needed for the resultant image. The aim of this paper is to enhance the contrast and sharpness of an image simultaneously and to solve the problems. The proposed algorithm is designed to address issues:1) simultaneously enhancing contrast and sharpness by means of individual treatment of the model component and the residual,2)reducing the halo effect by means of an edgepreserving filter using Bilateral filter. By using the generalized unsharp masking algorithm we solved problems associated with existing unsharp masking algorithm, first one is the haloeffect is reduced by means of an edge-preserving filter that is bilateral filter, second one is rescaling process eliminated by using tangent operations and final one we introduced a new future that is simultaneously enhancing contrast and sharpness by means of individual treatment of the model component and the residual.

Color Reduction for Complex Document Images:[Nikos Nikolaou, Nikos Papamarkos]

A new technique of color reduction of complex document images reduces significantly the number of colors of the document image (less than 15 colors in most of the cases) so as to have solid characters and uniform local backgrounds. Therefore, this technique can be used as a preprocessing step by text information extraction applications. Specifically, using the edge map of the document image, a representative set of samples is chosen that constructs a 3D color histogram. Based on these samples in the 3D color space, a relatively large number of colors (usually no more than 100 colors) are obtained by using a simple clustering procedure. The final colors are obtained by applying a meanshift based procedure. Also, an edge preserving smoothing filter is used as a preprocessing stage that enhances significantly the quality of the initial image. First, with an efficient sub-sampling technique the RGB color distribution of the original image is approximated. The selected samples are obtained after extracting the edge map of the image and selecting only those points which are local minima in a eight neighborhood. The obtained samples are then used to initially reduce the colors of the image. A mean-shift procedure, starting from the points obtained after the initial color reduction, locates the final color centers. An EPSF is applied to the initial document image in order to achieve significant reduction of the amount of noise without deforming the boundaries of the objects. The results showed its capability of producing correctly segmented images, i.e., document images where the characters are not oversegmented or fused with the background. Unwanted low contrast objects are merged with their local backgrounds and large compact areas are created. Also, small populated color classes are retained.

REVIEW OF VARIOUS IMAGE CONTRAST ENHANCEMENT TECHNIQUES [Vijay A. Kotkar , Sanjay S. Gharde]

Image enhancement is a processing on an image in order to make it more appropriate for certain applications. It is used to improve the visual effects and the clarity of image or to make the original image more conducive for computer to process. Contrast enhancement changes the pixels intensity of the input image to utilize maximum possible bins. The major goal of image contrast enhancement is to produce images without severe side effects at the same time maintain input mean brightness.The mixture of global and local contrast enhancement techniques is superior than other techniques because these techniques improve the visual effects and clarity of the image with preserving its brightness.

Image Filtering Algorithms and Techniques: A Review[Ruchika Chandel, Gaurav Gupta]

It describes the various image filtering algorithms and techniques used for image filtering/smoothing. Image smoothing is one of the most important and widely used operation in image processing .In this they explained about various algorithms and techniques for filter the images and which algorithm will be the best for smoothing and filtering the images, especially we have mainly concentrate on non-linear filtering algorithms i.e. median filtering is very important in edge preserving. In this they conclude that median filtering approach is the best approach that can be easily implemented with the help of the imagehistograms. The median filter is demonstrably better than another algorithms at removing noise because it preserves edges for a given, fixed window size.

III.EXISTING SYSTEM: The drawback of General type-2 fuzzy logic allows for better modeling of uncertainty, because it gives more degrees of freedom in comparison to interval type-2 and type-1 fuzzy logic. Generalized type-2 is needed in real-world devices and applications, in particular in the image processing area, because the devices that capture digital images are always exposed to external interference adding high noise levels or uncertainty to the images.

SMALL AREA EDGE PRESERVING FILTER (SAEP)

The drawback of a novel filter is proposed for edge-preserving decomposition of an image. It is different from previous filters in its locally adaptive property. The filtered image contains local means everywhere and preserves local salient edges. The salient edges are no longer thought of as large gradients of the whole image, and they are locally adaptive. The reason for such a proposed method is that, in high dynamic range images the intensity variations in a very small area will be very high. So such intensity variations should result in a new edge formation. But most of the recent methods filter the edges globally. The inside intensity variations in a given area is not taken into account. In other words, one small gradient may also be an important edge locally.So the definition of salient edge should be changed. The Weighed Least Square filter approach has defined a salient edge as a large gradient globally while we are defining a salient edge as a relatively large gradient locally. Therefore the decomposition process is different in that a locally salient but small gradient will be decomposed into the base layer. The filter is called Small Area Edge Preserving (SAEP) filte and it will efficiently and effectively produce visually pleasing images.

IV.PROPOSED SYSTEM

Based on the drawbacks a new technique is proposed in this research work is **EDGE PRESERVING SMOOTHING FILTER (EPSF) .**A common technique for removing noise from images is by blurring them with a weighted mean or a Gaussian filter. Through these processes noise reduction is achieved, but unfortunately, valuable information is lost and the details of object boundaries are deformed. A solution to this problem is the use of an edge preserving smoothing technique where the amount of blurring for each pixel is determined after gathering local information in a specified n × n neighborhood (Harwood et al., 1987; Perona and Malik, 1990). For this reason, the proposed filter can be considered as edge preserving smoothing filter(EPSF). The EPSF filter can be applied to reduce the amount of unwanted noise in a particular image and improve the visual quality of the image and smooth the chosen region also the whole image.

V.METHODOLOGY

TECHNIQUES USED

- **IMAGE ENGANCEMENT**
- **CONTRAST ENHANCEMENT TECHNIQUE**
- **UNSHARP MASKING**
- **EDGE PRESERVING SMOOTHING FILTER**
- **REMOVE NOISE BY MEDIAN FILTER**

IMAGE ENHANCEMENT: This technique is used to enhance the images in order to make it more appropriate for certain applications.It is used to improve the visual effects and the clarity of image or to make the original image more conducive for computer to process. Image enhancement process consist of a collection of techniques that seek to improve the visual appearance of an image or to convert the image to a form better suited for analysis by a human or machine which means it improves the appearance of an image by increasing the dominance of some features or by decreasing the ambiguity between different regions of the image. The objective of enhancement is to process an image so that the result is more suitable than the original image for a specific application. It is one of the most interesting and visually appealing areas of image processing. The aim of image enhancement is to improve the interpretability or perception of information in images for human viewers, or to provide `better' input for other automated image processing techniques.

CONTRAST ENHANCEMNT TECHNIQUE

The contrast enhancement is one of the commonly used image enhancement methods. Many methods for image contrast enhancement have been proposed which can be broadly categorized into two methods: direct methods and indirect methods. Among the indirect methods, the histogram modification techniques have been widely utilized because of its simplicity and explicitness in which the histogram equalization (HE) is one of the most frequently used techniques. The fundamental principle of HE is to make the histogram of the enhanced image approximate to a uniform distribution so that the dynamic range of the image can be fully exploited. Contrast enhancement changes the pixels intensity of the input image to utilize maximum possible bins. Contrast enhancement is based on five techniques such as local, global, partial, bright and dark contrast.In this research work it increases the contrast of the background image and enhance the background of that image in order to identify the low contrast of a small area in that image and smooth it by the proposed work.

UNSHARP MASKING

The unsharp filter is a simple sharpening operator which derives its name from the fact that it enhances edges (and other high frequency components in an image) via a procedure which subtracts an unsharp, or smoothed, version of an image from the original image. The unsharp filtering technique is commonly used in the photographic and printing industries for crispening edges. This techniques results that images are having their back ground intensity levels are near to black, but sometimes we require sharpness enhancement in the image itself, for this case unsharp masking is usefull. The former is less sensitive to noise and latter it does not smooth sharp edges.

EDGE PRESERVING SMOOTHING

A common technique for removing noise from images is by blurring them with a weighted mean or a Gaussian filter. Through these processes noise reduction is achieved, but unfortunately, valuable information is lost and the details of object boundaries are deformed. A solution to this problem, , is the use of an edge preserving smoothing technique where the amount of blurring for each pixel is determined after gathering local information in a specified n × n neighborhood (Harwood et al., 1987; Perona and Malik, 1990). In our method, we use a simple and effective EPSF, which performs its task with low computation time. When the EPSF is applied to boundary pixels (edge pixels) of an object, for example a character, the color distances di take large values for the neighboring pixels that do not belong to the object, and hence the colors of these neighboring pixels have a small effect on the final color received by the central pixel. For this reason, the proposed filter can be considered as edge preserving smoothing filter

REMOVE NOISE BY MEDIAN FILTER

What a median filter is and what it does?

Median filtering follows this basic prescription. The median filter is normally used to reduce noise in an image, somewhat like the mean filter. However, it often does a better job than the mean filter of preserving useful detail in the image. This class of filter belongs to the class of edge preserving smoothing filters(EPSF) which are non-linear filters. This means that for two images *A(x)* and *B(x)*:

$$median[A(x) + B(x)] \neq median[A(x)] + median[B(x)]$$

These filters smooths the data while keeping the small and sharp details. Consequently, median filtering is very effective at removing various kinds of noise. Like the mean filter, the median filter considers each pixel in the image in turn and looks at its nearby neighbors to decide whether or not it is representative of its surroundings. Median filtering is therefore better able to remove these outliers without reducing the sharpness of the image.

IMAGE NOISE TYPES

There are many types of noise types in image some of them are shown below[11]

Gaussian noise*:*The standard model of amplifier noise is additive, Gaussian, independent at each pixel and independent of the signal intensity, caused primarily by thermal noise, including that which comes from the reset noise of capacitors[12].

Salt-and-pepper noise*:* An image containing salt-and-pepper noise will have dark pixels in bright regions and bright pixels in dark regions.

Film grain : The grain of photographic film is a signal-dependent noise, with similar statistical distribution to shot noise.

Shot noise : The dominant noise in the lighter parts of an image from an image sensor is typically that caused by statistical quantum fluctuations, that is, variation in the number of photons sensed at a given exposure level; this noise is known as photon shot noise.

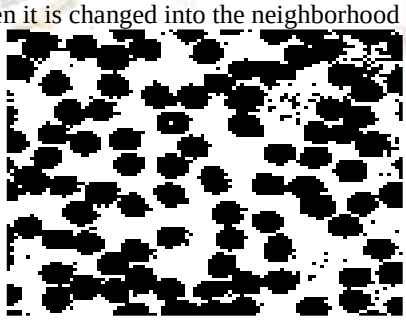
Quantization noise: The noise caused by quantizing the pixels of a sensed image to a number of discrete levels is known as quantization noise.

Anisotropic noise *:*Some noise sources show up with a significant orientation in images.

Speckle Noise : Speckle noise is a multiplicative noise. This type of noise occurs in almost all coherent imaging systems such as laser, acoustics and SAR imagery.

1 Removal of Salt-and-Pepper Noise

The presence of single dark pixels in bright regions, or single bright pixels in dark regions, is called “salt and pepper noise”. The analogy to real life is obvious. Often, salt and pepper noise is the natural result of creating a binary image via thresholding. Salt corresponds to pixels in a dark region that somehow passed the threshold for bright, and pepper corresponds to pixels in a bright region that were below threshold. Salt and pepper might be classification errors resulting from variation in the surface material or illumination, or perhaps noise in the analog/digital conversion process in the frame grabber. In some cases, these isolated pixels are not classification errors at all, but are tiny details contrasting with the larger neighborhood, such as a button on a shirt or a clearing in a forest, etc. and it may be that the description needed for the problem at hand prefers to ignore such detail. The operations on the input image are expressed in terms of masks given at the bottom of the figure. If the input image neighborhood matches the mask at the left, then it is changed into the neighborhood given by the mask at the right.



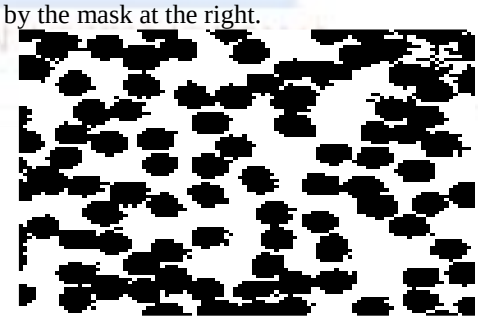


Figure :5.1 Original blood cell image **Fig 5.2 Image with salt and pepper noise removed**

VI.EXPERIMENTAL SECTION

RESEARCH PROBLEM

Image enhancement process consist of a collection of techniques that seek to improve the visual appearance of an image or to convert the image to a form better suited for analysis by a human or machine which means the improvement of an image appear by increasing dominance of some features or by decreasing ambiguity between different regions of the image. The objective of enhancement is to process an image so that the result is more suitable than the original image for a specific application. It is one of the most interesting and visually appealing areas of image processing which is mainly utilized to improve the visual effects and the clarity of the image, or to make the original image more conducive for computer to process The contrast enhancement is one of the commonly used image enhancement methods that is used to contrast and enhance the background of image In this research work

based on the drawback of fuzzy (ie in fuzzy the large object is taken into account whereas the small intensity is not considered),and SAEP(ie it mainly focus on only small intensity and does not take the larger intensity into an account) ,so based on these drawbacks a new technique edge preserving smoothing filter (EPSF) has been proposed to enhance not only selected edge but also the whole image and gives better result.

RESEARCH METHODS

SMALL AREA EDGE PRESERVING FILTER (SAEP)

A novel filter is proposed for edge-preserving decomposition of an image. It is different from previous filters in its locally adaptive property. The filtered image contains local means everywhere and preserves local salient edges. The salient edges are no longer thought of as large gradients of the whole image, and they are locally adaptive. The reason for such a proposed method is that, in high dynamic range images the intensity variations in a very small area will be very high. So such intensity variations should result in a new edge formation. But most of the recent methods filter the edges globally. The inside intensity variations in a given area is not taken into account. In other words, one small gradient may also be an important edge locally.So the definition of salient edge should be changed. The Weighed Least Square filter approach has defined a salient edge as a large gradient globally while we are defining a salient edge as a relatively large gradient locally. Therefore the decomposition process is different in that a locally salient but small gradient will be decomposed into the base layer. The filter is called Small Area Edge Preserving (SAEP) filter[17], and it will efficiently and effectively produce visually pleasing images.

STEPS FOR SAEP TECHNIQUE:

i. Read HDR image

ii. Change the input image to double precision of HDR image

iii. Convert the RGB image to HSV colour model

iv. Compute the intensity (I) by averaging the colour channels.

v. Compute the log intensity: L = log2(I)

vi. Scale the image in the range [0,1]

vii. Filter the base layer with a SAEP filter

viii. Find the detail layer using D = L - B

ix. Repeat the filtering to find 3 detail layers

x. Apply the gaining coefficients to each detail layers

xi. Reconstruct the log intensity

xii. Put back the colours and output image is obtained

VII. PROPOSED

EDGE PRESERVING SMOOTHING FILTER (EPSF)

A common technique for removing noise from images is by blurring them with a weighted mean or a Gaussian filter. Through these processes noise reduction is achieved, but unfortunately, valuable information is lost and the details of object boundaries are deformed. A solution to this problem is the use of an edge preserving smoothing technique[9] where the amount of blurring for each pixel is determined after gathering local information in a specified

n × n neighborhood (Harwood et al., 1987; Perona and Malik, 1990). For this reason, the proposed filter can be considered as edge preserving smoothing filter(EPSF). The EPSF filter can be applied to reduce the amount of unwanted noise in a particular image and improve the visual quality of the image and smooth the chosen region also the whole image.The proposed steps of EPSF is shown below.

PROPOSED STEPS OF EDGE PRSERVING SMOOTHING FILTER (EPSF) TECHNIQUE

Step 1.Read the image.
Step 2:Convert the RGB to Gray color model
Step 3:Analyze the image by the following steps
1.Estimate the background.
2.Increase the contrast of an image.

Step 4:Enhance the grayscale image.
Step 5:Select the edges to get the pixel value.
Step 6:Filter the image by unsharp masking.
Step7:Remove noise in image .
Step 8:Smooth the image by the chosen edges.
Step 9:Output is obtained by EPSF in image.

FIGURES OF PROPOSED WORK

EDGE PRESERVING SMOOTHING FILTER (EPSF) IMAGE

Fig 7.1 :Initial image

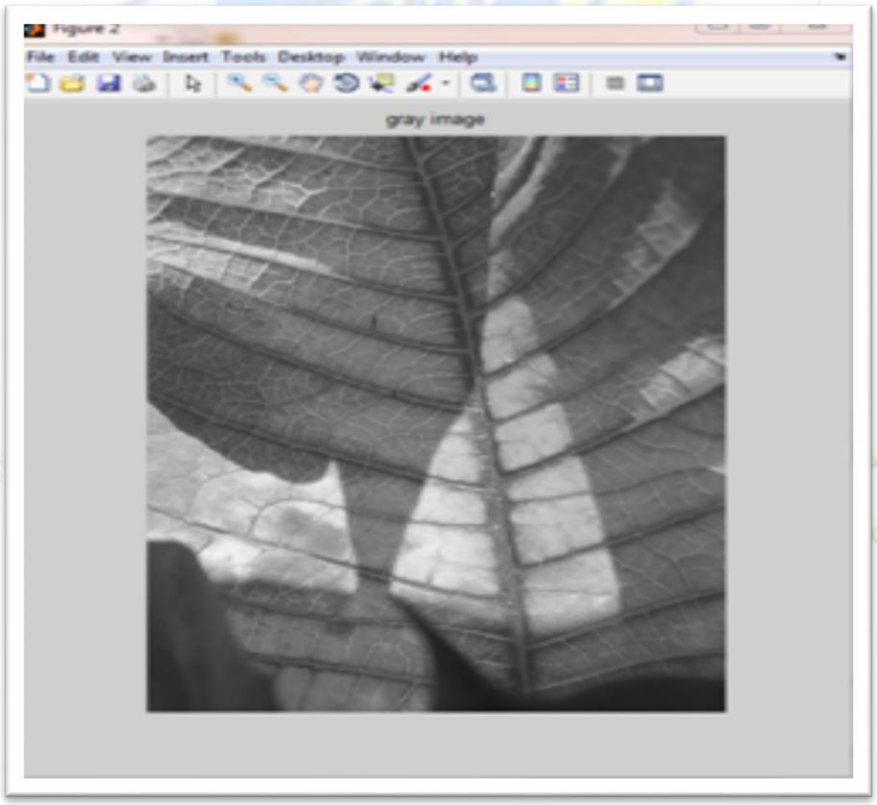


Fig 7.2:Gray image

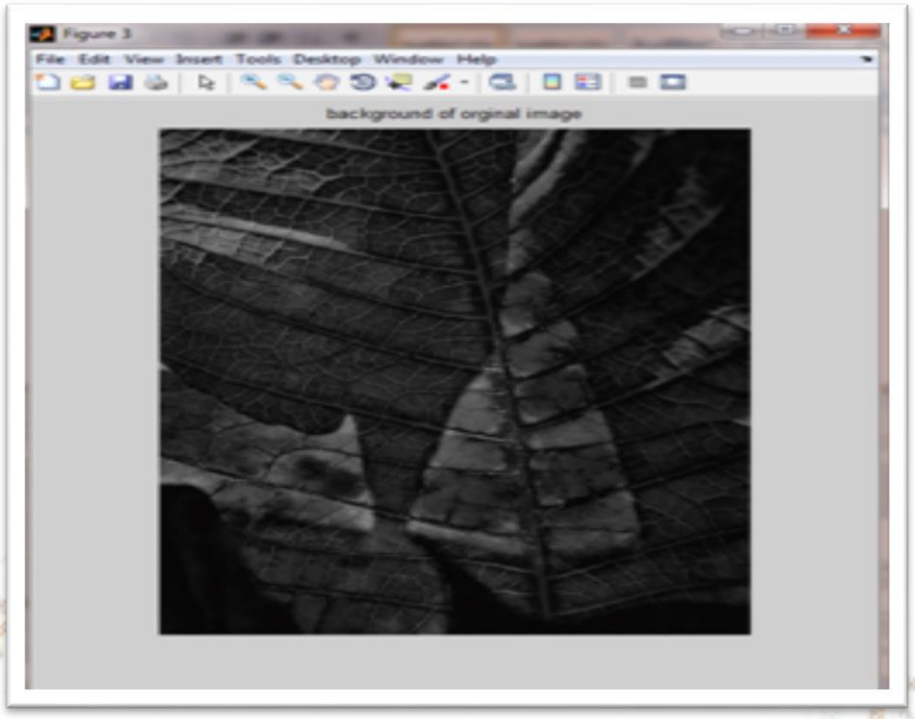
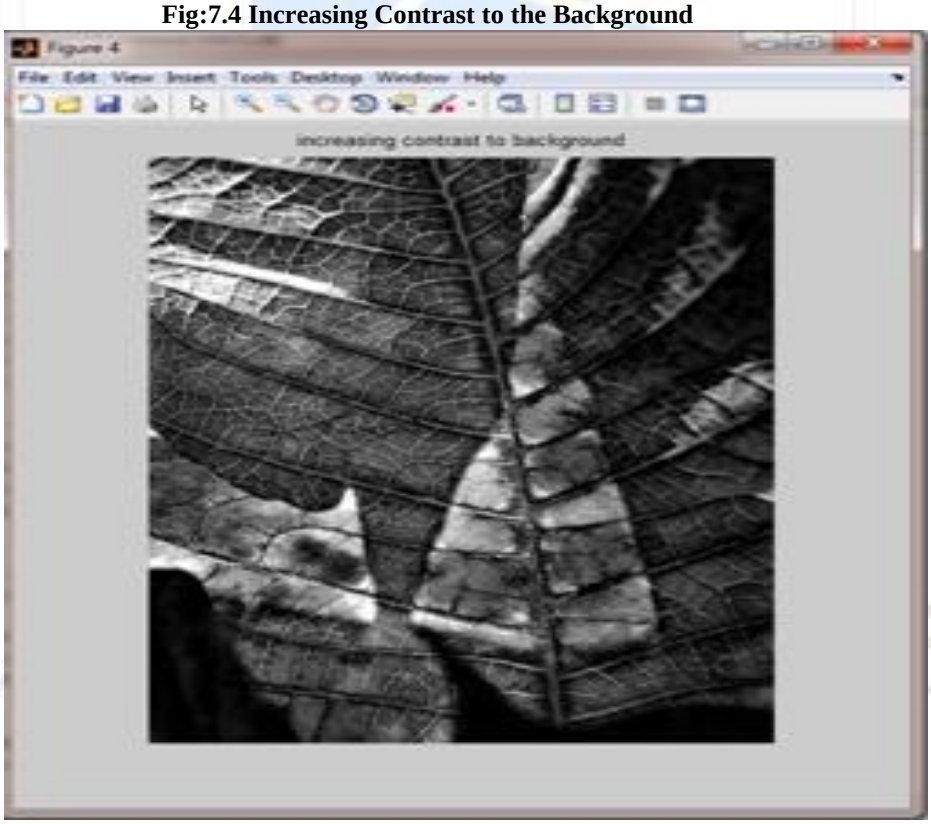


Fig:7.3Background image

Fig:7.4 Increasing Contrast to the Background



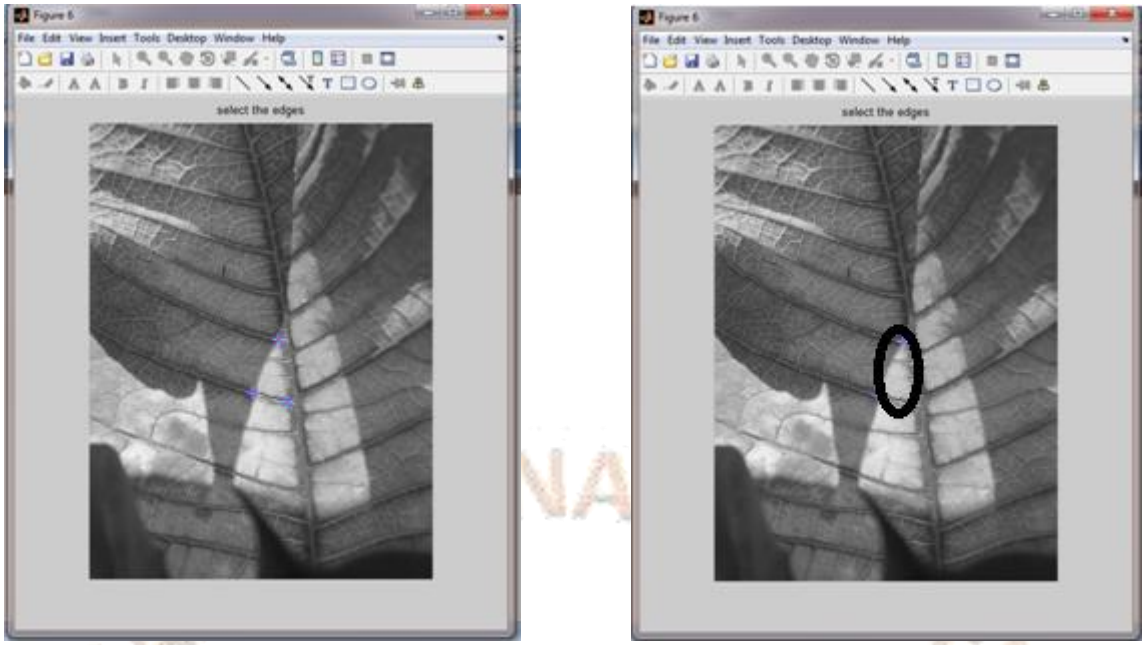


Fig:7.5 Select the pixel

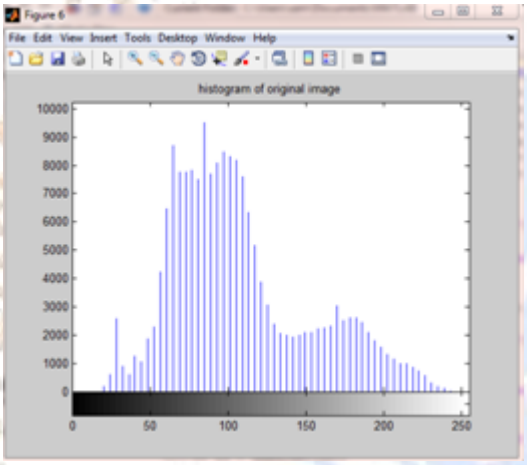


Fig:7.6 Histogram of original image

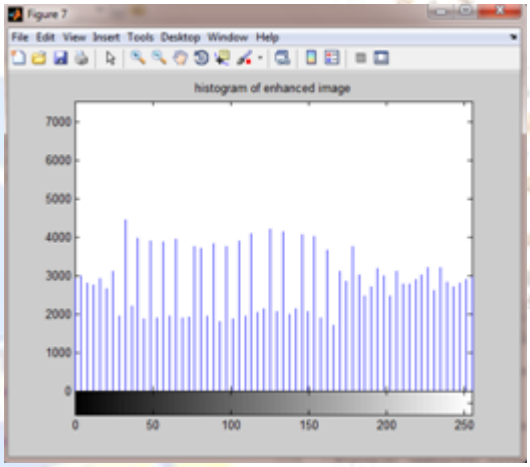


Fig:7.7 Histogram of enhanced image

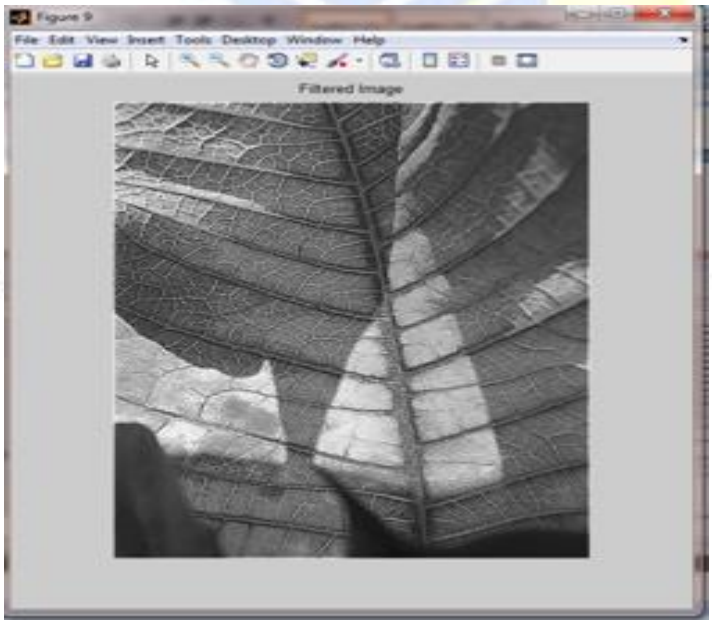


Fig: 7.8 Filtered image

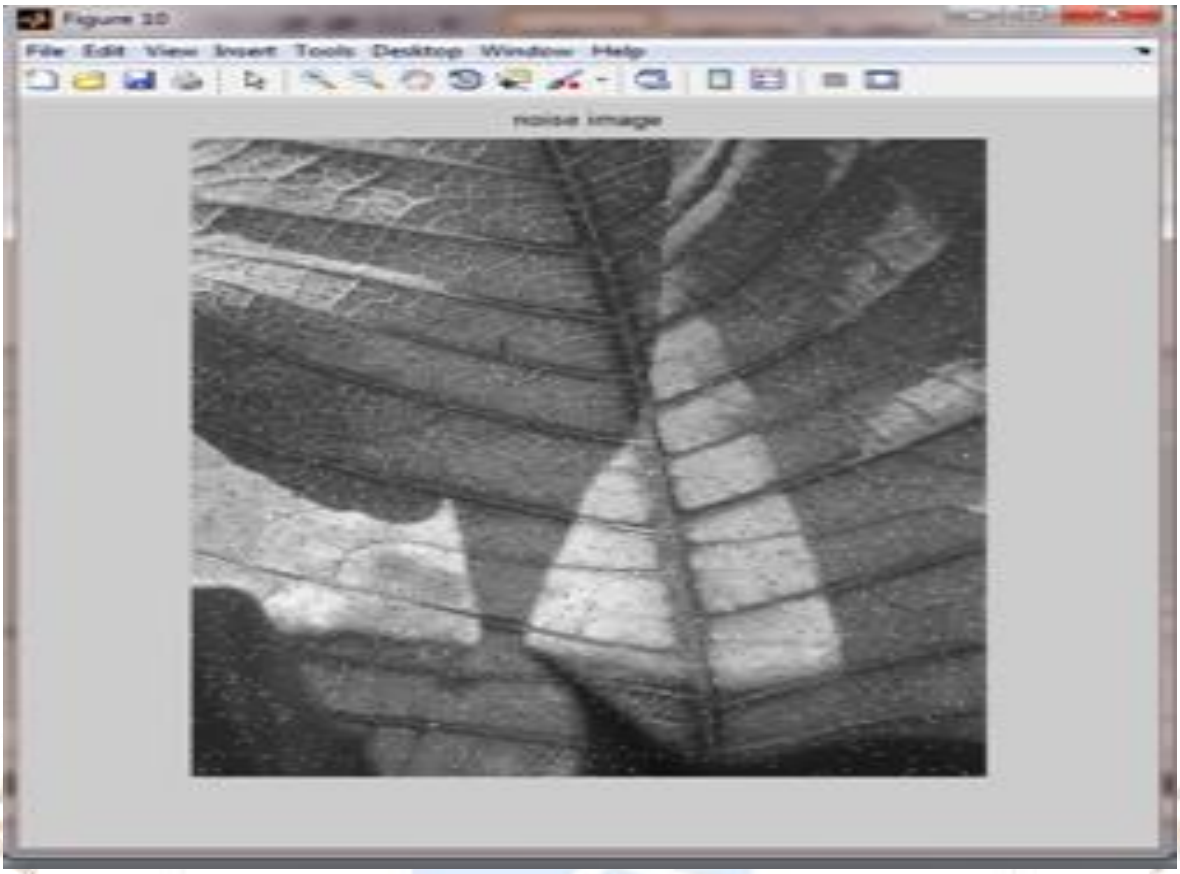


Fig :7.9 Noise added to image

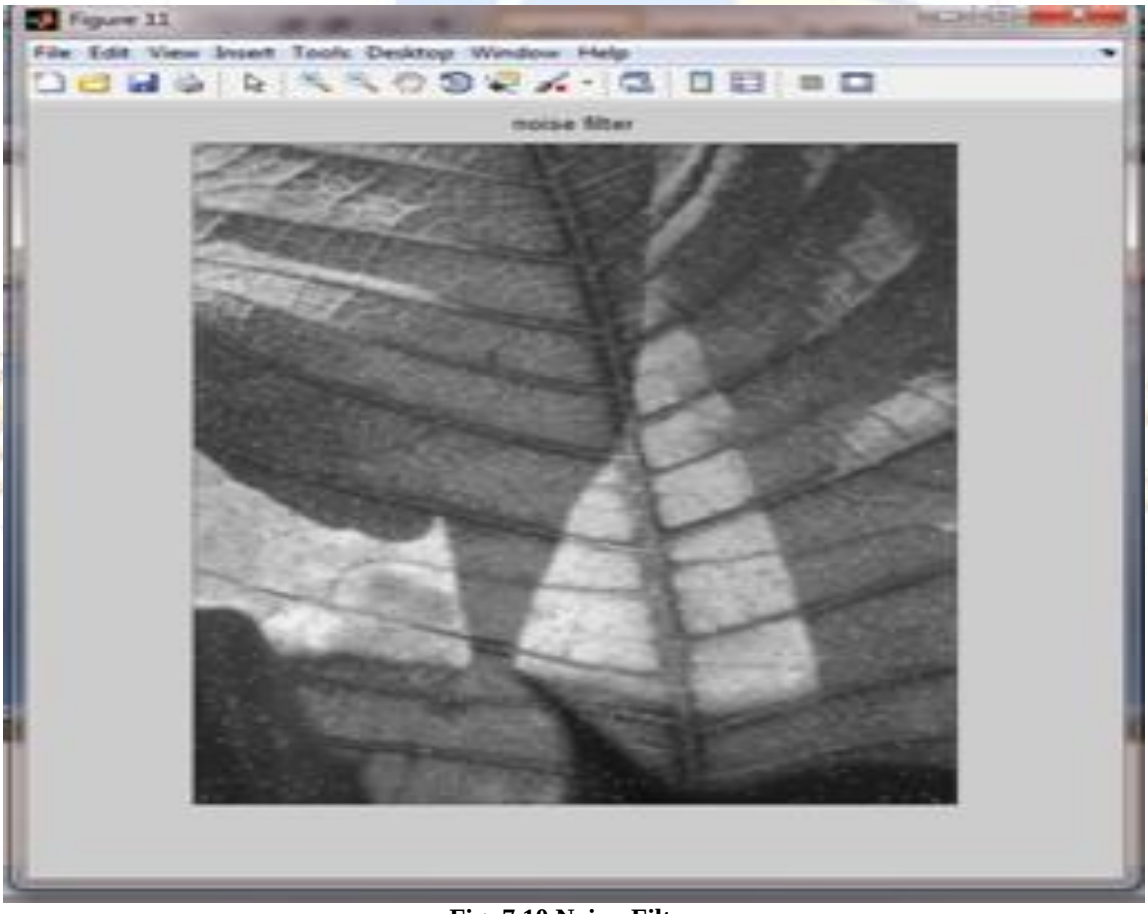


Fig :7.10 Noise Filter

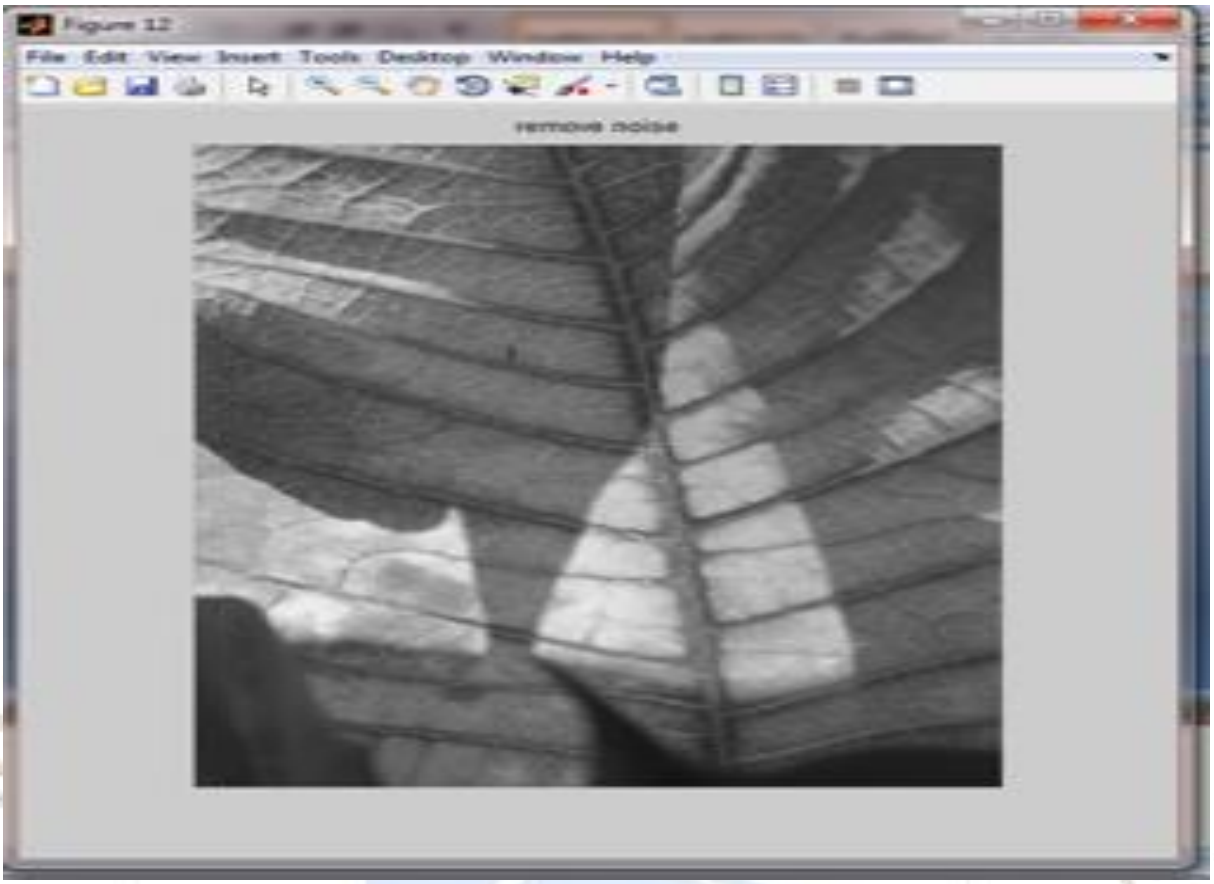


Fig :7.11 Noise Removed from image

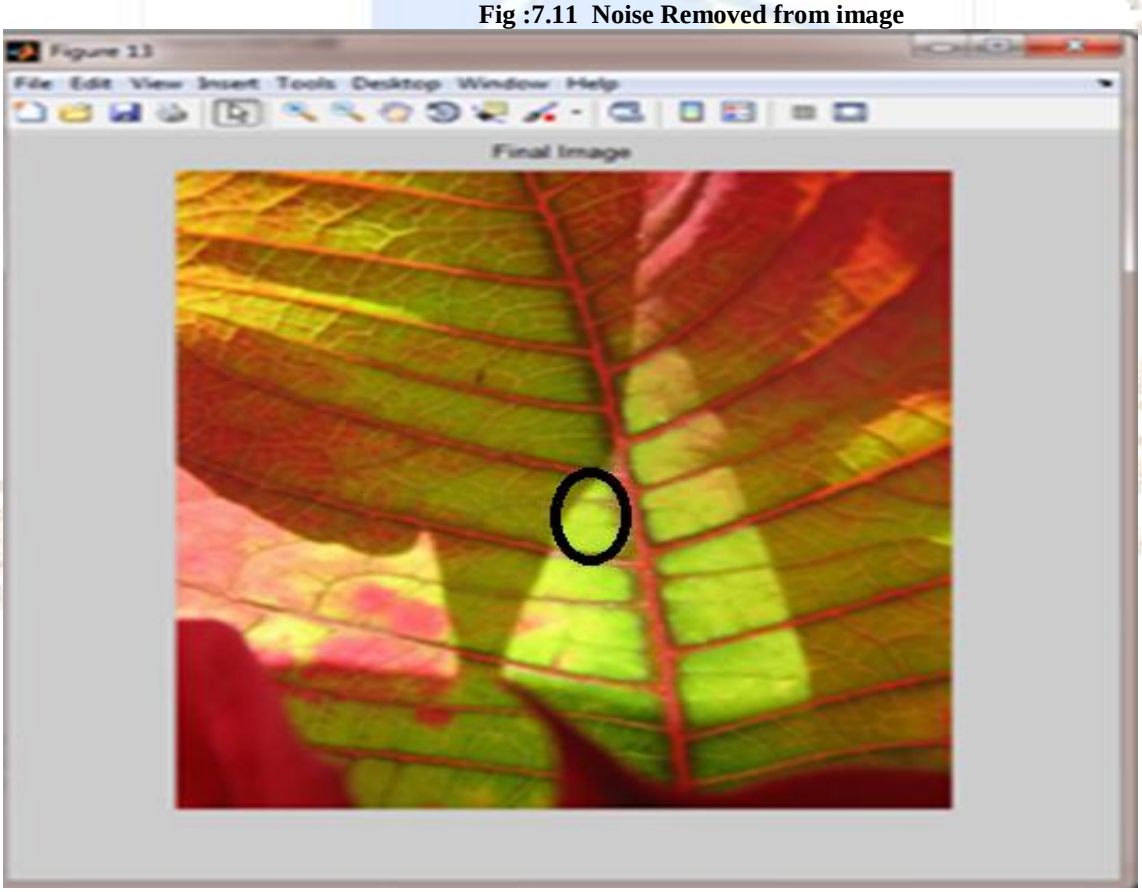


Fig :7.12 Final Smooth Image

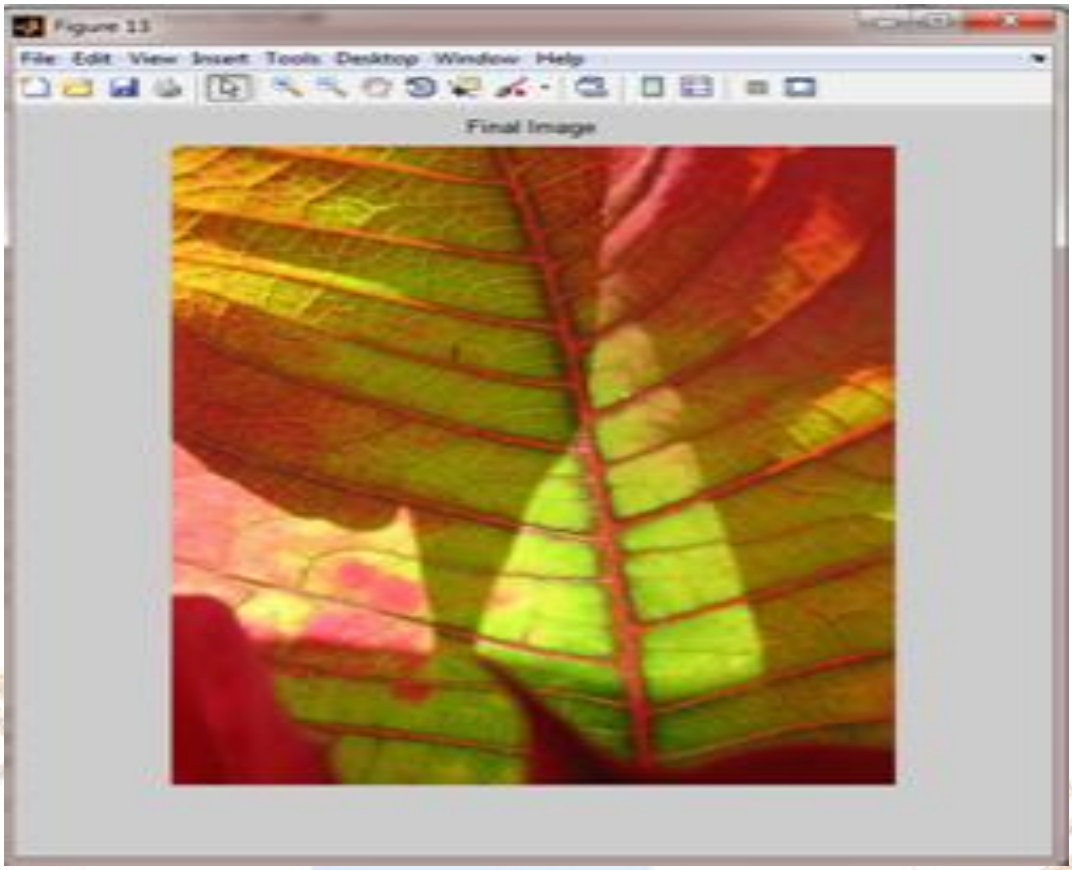


Fig :7.13 Final image

CONCLUSIONS

Edge-preserving becomes an important property in filtering design to avoid halo artifacts. A common technique for removing noise from images is by blurring them with a weighted mean or a Gaussian filter. Through these processes noise reduction is achieved, but unfortunately, valuable information is lost and the details of object boundaries are deformed. A solution to this problem. is the use of an edge preserving smoothing filter (EPSF) technique by enhancing the images is proposed based on the drawback of fuzzy and SAEP .Image enhancement process is used to improve the visual appearance of an image or to convert the image to a form better suited for analysis by a human or machine. The objective of enhancement is to process an image so that the result is more suitable than the original image for a specific application.In this research work an simple or natural image is selected and the pixel is chosen as edges and it has been enhanced by using contrast enhancement technique and filtered and the noise is removed by median filter as a result of this the final output is obtained by smoothing the specified pixel region and also the whole image by the newly proposed technique (EPSF) that performs its task and gives better result with low computation time.

REFERENCES

[1] R.C.Gonzalezand R.E.Woods,"*Digital image processing"*,Pearson Education,Singapore,second edition 2002.
[2] R.C.Gonzalez and R.E.Woods,"*Digital image processing"*,Pearson Education,Singapore,Third edition 2009.
[3] D.Marr, E.C.Hildreth." Theory of edge detection, proceeding of the Royal Society", 201b, pp187-217, 1980.
[4] Indrajeet Kumar ,Jyoti Rawat, Dr. H.S. Bhadauria ,"A Conventional Study Of Edge Detection Technique in Digital Image Processing", *International Journal of computer science and Mobile Computing, IJCSMC, Vol. 3, Issue. 4, April 2014, pg.328 – 334*
[5] Rohit Goel ,Pushpendra Kumar Vashishtha ,Priayanka Sahni ,Ashwini Kumar "Survey on Image Processing With Edge Detection Techniques ",Vol 3 , Issue 5, May 2014.
[6] Raman Maini and Dr. Himanshu Aggarwal "Study and Comparison of various Image Edge Detection Techniques", *International Journal of Image Processing (IJIP) Vol 3 Issue 1.*
[7] Vijay A. Kotkar ,Sanjay S. Gharde ,"Review Of Various Image Contrast Enhancement Techniques", *International Journal of Innovative Research in Science, Engineering and Technology Vol. 2, Issue 7, July 2013.*
[8] Sunkari Sridhar, Dr.Shaik Meeravali,"A Generalised Unsharp Masking Algorithm Using Bilateral Filter", *International Journal of Engineering Trends and Technology (IJETT) – Volume 4 Issue 7- July 2013.*
[9] Nikos Nikolaou, Nikos Papamarkos," Color Reduction for Complex Document Images",2008.
*[10]*Ruchika Chandel, Gaurav Gupta," Image Filtering Algorithms and Techniques: A Review", *International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 10, October 2013.*
[11] Toran Lal Sahu, Deepty Dubey, "A Survey on Edge Detections and Denoise Techniques ", *International Journal of Science, Engineering and Technology Research (IJSETR),Volume 2, Issue 1, January 2013*.
[12] Types of image noise, From Wikipedia, the free encyclopedia.
[13] Gao W., Yang L., Zhang X. and Liu H. 2010," An Improved Sobel Edge Detection" , IEEE international conference on computer science and information technology (ICCSIT), vol. 5, 67-71.
[14] Jing L., Peikang H., Xiaohu W. and Xudong P. 2009," Image edge detection based on beamlet transform", Journal of Systems Engineering and Electronics, Vol. 20, No. 1, 1–5.

[15] M. Paulinas and A.Usnskas, "A survey of generic algorithm application for image enhancement and segmentation", information technology and control vol. 36, no 3, pp. 278-284, 2007.
[16] R.A.Kirsch, Computer determination of the constituent structure of biomedical images, comput Eiorned.Res. Vol. 4, pp315-325 1971.
[17] Yedu Manmadhan, Anto Kumar R.P," Small Area Edge Preservation for Multiscale Decomposition for High Dynamic Range Image Tone Mapping", *International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 3 Issue 4, April 2014.*
[18] Patricia Melin, Claudia I. Gonzalez, Juan R. Castro, Olivia Mendoza and Oscar Castillo," Edge Detection Method for Image Processing based on Generalized Type-2 Fuzzy Logic**",** IEEE Transactions on Fuzzy System,2013.
[19] http://en.wikipedia.org/wiki/Edge_enhancement.
[20] S.Lakshmi and Dr.V.Sankaranarayanan "A study of Edge Detection Techniques for SegmentationComputing Approaches" , IJCA Special Issue on Imaging and Biomedical Applications" CASCT, 2010