CHAPTER 7
SUMMARY, CONCLUSION AND FUTURE SCOPE

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CHAPTER 7
SUMMARY, CONCLUSION AND FUTURE SCOPE

The present study proposes various innovative denoising schemes to be adopted during noisy image edge detection and single stage robust edge detectors for noisy images. Most of the proposed methods are based on principle of nonlinearity. Some statistics are also derived in the process to compare the proposed methods with the existing methods. The present investigation on various images corrupted with gaussian noise and impulse noise with high noise densities proved the accuracy of denoising process by preserving exact edge locations and obtaining the edge pixels from the noisy image directly without doing denoising over the existing ones.

7.1 Conclusion

Finally from the outset of the present study the following points are noted.

1. The proposed PBIDS method in image denoising to preserve exact edge locations, reduced the overall pixels to be processed during regularization by transforming pixels notations to pixonal image and reduced the complexity. The drawbacks of the existing methods are, they may produce denoised image with reasonable PSNR value they may delocalize the presence of edge pixels in the regularized image and the regularized image may become blur if the kernel size is increased. The proposed method overcomes all these difficulties. The performance is evaluated by using measures PSNR value for denoised image, FOM value for edge image obtained by applying canny edge detector on the denoised image and ensured that both are high compared to the existing methods. Hence this method is more suitable in image denoising process to obtain denoised image with high quality.

2. The proposed color edge detectors for noisy images using nonlinear prefiltering and block-by-block rotations method preserves the edge pixels during first stage and identifies the edge pixels efficiently by applying rotation operations block-by-block basis. The proposed algorithm is more efficient than existing methods called Data fusion based color edge
detector for gaussian noisy images method and Color edge detector for Gaussian noisy images using multipass approach method. The experimental results using FOM on few images shows that the proposed method produces a more clarity edge image than the other two algorithms. The FOM value calculations on various images corrupted by various noise densities indicate that the efficiency of proposed method when compared to the existing algorithms.

3. The proposed NNSED method for noisy image edge detection, extracts all the true edge pixels efficiently by avoiding/reducing the percentage of noise content forwarded with the final edge image. The NNSED method is an efficient single stage edge detector for noisy image edge detection without taking the account of regularization. The subjective analysis shows that the quality of edge image obtained by NNSED is more clear compared to existing Nonlinear filtering scheme (NLFS). The carried noise content along with edge image may confuse the actual edge pixels in NLFS that percentage is minimized by proposed NNSED. The proposed NNSED method outperforms well even though image is corrupted with high density noise.

4. The proposed Nonlinear robust edge detector for extracting edge pixels from the noisy image gives an efficient edge image by extracting actual edge pixels even in presence of high density of noise. Based on experimental results obtained in objective analysis and subjective analysis, it is concluded that the proposed NLRED method exhibits higher performance compared to the other methods (NLFS, NNSED, RRO…etc). It identifies exactly the location of an edge pixel from the noisy image efficiently by considering more number of neighbors in different orientations. The computed FOM value is higher compared to the methods listed in the literature and results are observed by varying different noise densities. The proposed NLRED method outperforms well even though image is corrupted with high density noise.

5. The proposed Pixon based image denoising scheme approach clearly specifies that at the four pixons level, in all cases, a good denoised image
is obtained. Further it allows to increase the number of pixons to be considered during image denoising.

6. The proposed two-stage color edge detectors for noisy images will extract all color edge pixels efficiently with improved FOM value.

7. The proposed single stage NNSED scheme to detect edge pixels from noisy image shows that percentage of noise carried along with the edge image is minimized compared to the NLFS scheme and with improved FOM value.

8. The present thesis concludes that linear methods fails in obtaining the good denoised image and fails completely if images are with high density noise. This can be observed if images are corrupted with high density gaussian noise then results obtained by applying mean filter may not yield nearer to original image.

9. The single stage NLRED for noisy image is better than single stage NNSED scheme and NLFS method. The amount noise carried along with the output edge image is avoided completely with NLRED and exhibits higher FOM value even though the input image contains high density noise.

10. The proposed methodologies are applied on synthetic images and real images and observed that the results are satisfactory in comparison with methods listed in the literature.
7.2 Future scope

The innovative methods for image denoising schemes for two stage edge detectors for noisy images and design of single stage edge detectors for noisy images can be further extended by adopting other principles from spatial domain and frequency domain. Also, these proposed methods can be extended to deal with images corrupted with mixed noise types. The novel nonlinear models developed to obtain edge image directly from the noisy images is very much useful for future research scholars to generate new ideas that further optimizes the amount of noise to be suppressed or to be totally eliminated along with the edge image by proposing various principles from spatial domain by adopting principle of nonlinearity.