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TO MODIFY THE PEER GROUP FILTERING TECHNIQUE BY GENETIC ALGORITHM FOR NOISE REMOVAL

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Abstract – *In these days most of the fields and application use the image. It becoming popular in education, medical etc. But problem arises during the transmission, because during transmission the noise will be introduce. So the original image get distorted during the transmission. One more problem arises during the transmission that is the edge destruction. In this paper we firstly use the peer group filtering technique to denoise the image and calculate the various parameters like peak signal to noise ratio, mean square error,bit error rate and structure similarity index.In second step we denoise the same image by using genetic algorithm and calculate the all parameters as above. In third steps we compare the results obtained from the PGF and GA. The techniques used in this paper for image denoising were implemented in MATLAB. The objective of GA is to minimize the mean square error and maximize the value of peak signal to noise ratio The main focus of this paper is to provide some useful knowledge of denoising technique so as to provide an ease. The result obtained at the end shows that the genetic algorithm provide the better result as compared to the peer group filtering technique.*

Key Words:*GA,PGF,MSE,BER,PSNR,SSIM.*

1. INTRODUCTION

Digital image plays an important role in our daily life and in the area of research and technology. When the digital image is transmitted from one place to another place, during the transmission noise is added into the image. Any form of signal processing having image as an input and output is called image processing. Due to the imperfection of the instruments used in the image processing noise can be generated. The interference during the transmission degrade the data. Noise can also be generated by the transmission error and compression. Different types of noises are introduced by different noise sources. In this paper we use the two methods to denoise the image. first is peer group filtering and second is genetic algorithm.

1.1 **Peer group filtering technique**: It comes under the category of non linear filter. This non linear filter algorithm is used for image smoothing and impulse oise removal in image. The algorithm replace each image pixel with the weighted average of its peer group members. This algorithm effectively remove the noise and smooth the images without blurring edges and details.PGF is used as preprocessing step for color quantization. The purpose of averaging over the peer group members instead the entire local window is to avoid edge blurring. Firstly we take the original image and add some amount of random noise into it, then this noisy image is passed into the peer group filters. We get the third image that is filtered by the PGF.

Figure:1.1(a)Original image

Above image is the original image. The random noise is added into it and the value of noise can be varied as per our requirements. The noisy image is shown in next figure.

Figure:1.1(b) Noisy image

In next step we passed through the above image into the peer group filtering technique.

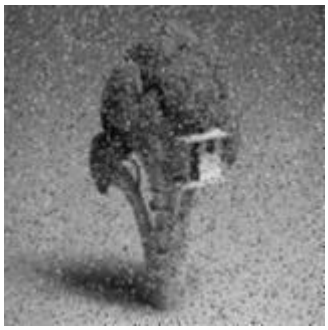

Figure:1.1(c) Filtered image by PGF

1.2 **Genetic algorithm**: Genetic algorithm is optimization technique which is inspired by natural genetic systems and this system is guided by the biological evolution process. Initial population of individuals is encoded randomly and fitness function of all individuals are calculated. The fittest individuals among all are selected for reproduction, crossover and mutation process. This process is continue until an appropriate solution is obtained. It eliminate the white Gaussian noise effectively. The objective of GA based optimization is to minimize the mean square error and maximize the peak signal to noise ratio.In genetic algorithm above procedure is repeated again and check the filtered image.

In first step original image is to be taken.

Figure:1.2(a) Original image

Some amount of random noise is added into the original image.The next image is the image that is contaminated by noise.

Figure:1.2 (b)Noisy image

Now this noisy image is passed into the GA.Then we see the filtered image by GA.

We compare both the images that are obtained from the PGF and GA.

Figure :1.2 (c)Filtered image by GA

1.3 Comparison graphs of PGF and GA:Now we compares the graphs of parameters obtained from PGF and GA. Firstly we compare the graph of mean square error.The graph shows that the mean square error of GA is less as compare to the PGF.Which fulfill the required condition.It shows that the results obtained from GA is better.

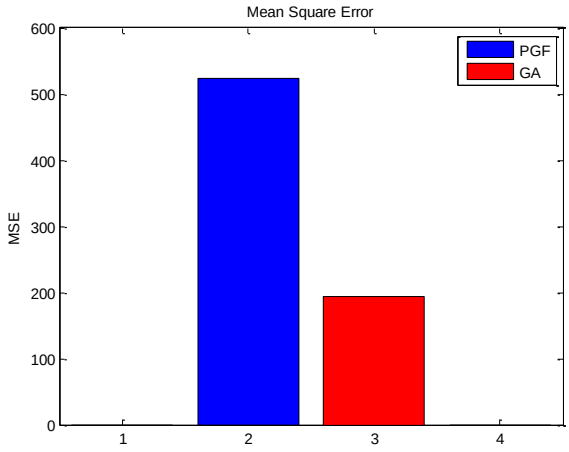

Figure:1.3(a)Mean square error

We require the less value of bit error rat and higher the value of peak signal to noise ratio.Let us see the graphs of bit error rate,peak signal to noise ratio,standard deviation and structure similarity index.

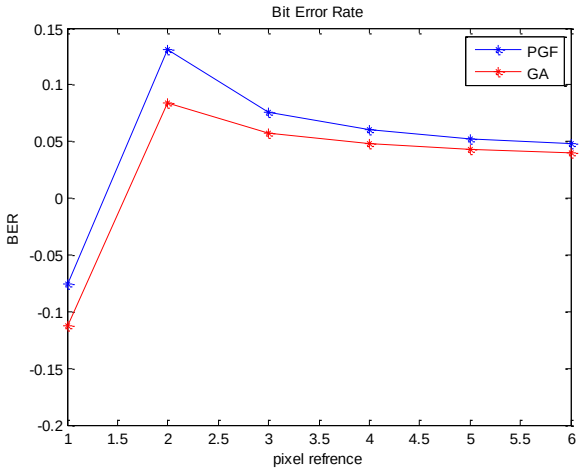

Figure:1.3(b)Bit error rate

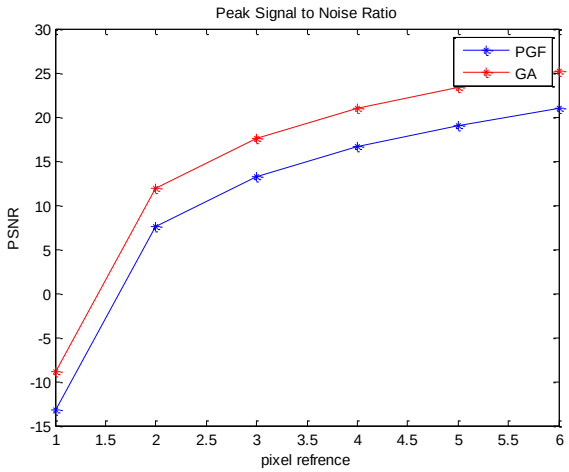

Figure:1.3(c)Peak signal to noise ratio

The graphs shows that the bit error rate of GA comes under the bit error rate of PGF.Therefore GA shows the better results in case of bit error rate also.In case of peak signal to noise ratio GA lies above the PGF graph.In this case the GA also gives better results as compared to the PGF.

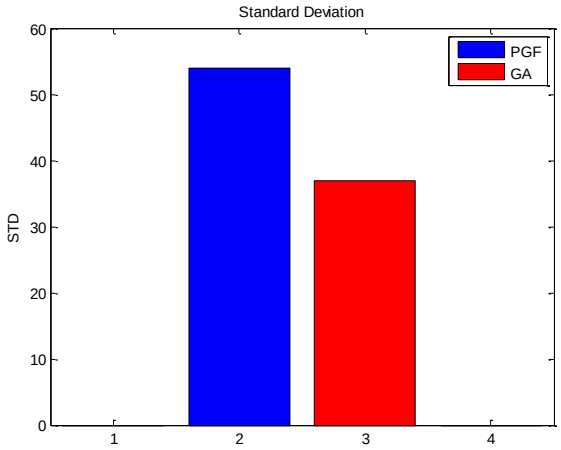

Figure:1.3(d)Standard deviation

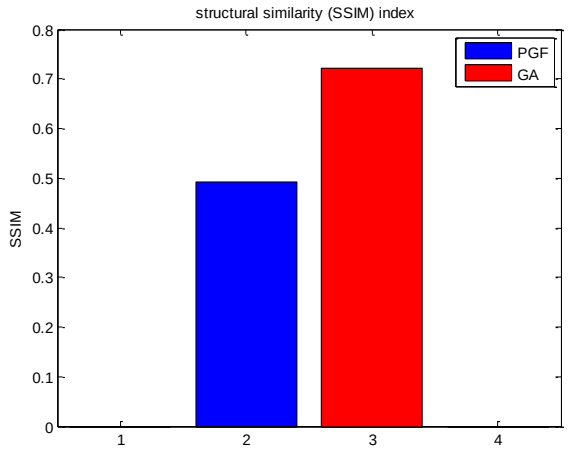

Figure:1.3(e)Structure similarity index

The graphs of standard deviation and structure similarity index also shows better results in case of GA..

Conclusion: Digital images have vital role in our daily life.During transmission because of noise the properties of an image get chaned.So tat the denoising the image is very ecessary in image processing.We use two techniques in this paper to denoise the image.From results it is cleared that GA gives better results as compared to PGF.

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