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# Optimization of Image Preprocessing Technique Using Neural Network (BPNN)

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**Abstract:** *Image Processing has many steps such as, Preprocessing, Data Reduction, Image Segmentation, Object Recognition, Image understanding, Optimization. Under Preprocessing there are many techniques. One of the Images preprocessing technique is Image De-blurring. The project views the application of neural network in image preprocessing. Neural network that is back-propagation neural networks for Image De-blurring. Image De-blurring is the process of obtaining the original image by using the knowledge of the degrading factors. Degradation factors such as blur, noise, and camera misfocus. In this paper, we are presenting the best validation performance of training net and also we are considering Peak signal-to-noise ratio (PSNR) of De-blurring. The key issue is that some information on the lost details is indeed present in the blurred image and this information is hidden and can only be recovered if we know the details of the blurring process. Back Propagation Neural Network (BPNN) consists of three layers - input, hidden and output layer. BPNN is used for restoring blurred image by parameter extraction.*

**Keywords:** *Image Preprocessing ; De-blurring ; BPNN ; PSNR ; parameter extraction.*

## 1. INTRODUCTION

Image restoration refers to the recovering the true image from a blurry and noisy observed image [1]. Image restoration is to improve the quality of the degraded image. It is used to recover an image from distortions to its original image[2]. The purpose of image restoration is to get back the original image. In cases like motion blur, it is possible to come up with a very good estimate of the actual blurring function and "undo" the blur to restore the original image. In cases where the image is corrupted by noise, the best way to do is to equalize for the degradation it caused. In this project, a neural network approach is introduced to restore the blurry and noisy image used in image processing techniques. Neural Network takes the collection of parameters from the blurred image. The parameters are identified using a Back Propagation Neural Network. After identifying the parameters, the image can be restored using de-blurring methods. The best validation performance of training net and also we are considering Peak signal-to-noise ratio (PSNR). The paper is organized as follows: Section 2 deals with the construction of the framework for image deblurring using BPN. Section 3 deals with algorithms. Section 4 converses the proposed neural network methodology. Section 5 explains the experimental results. Section 6 concludes with future enhancement.

## 2. FRAMEWORK FOR IMAGE DEBLURRING USING BACK PROPAGATION NEURAL NETWORK

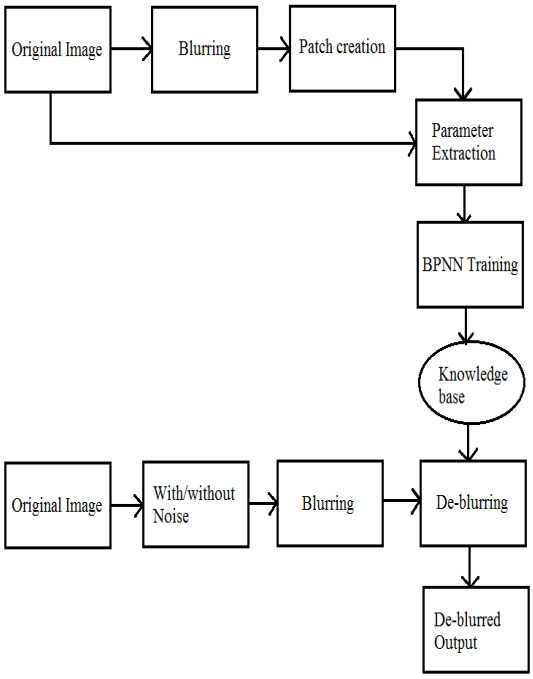

**Figure 1.** *Frame work for the proposed methodology*

Image can be selected from multi source to initiate the processing. After image is been selected, blur the image and patches are created. Thereafter, parameters are extracted from the original image and the blurred image. Parameter collection is trained to the network (BPNN) and stored in the database. Before image deblurring[4] process, information is taken from the knowledge database. We are using filters which is suited for removing the noise and blur to enhance the image.

## 3. DEBLURRING IMAGES USING ALGORITHMS

Two types of deblurring methods are being used for experimentation. They are:

- Deblurring using Lucy Richardson algorithm[3].
- Deblurring using Wiener algorithm.

### 3.1 Deblurring Using Lucy Richardson Algorithm

Step 1: Read Image

Step 2: Simulate a Blur and Noise

Step 3: Restore the Blurred and Noisy Image

Step 4: Iterate to Explore the Restoration

Step 5: Control Noise Amplification by Damping

Step 6: Create Sample Image

Step 7: Simulate a Blur

Step 8: Provide the WEIGHT Array

Step 9: Provide a finer-sampled PSF

### 3.2 Deblurring using Wiener algorithm

Step 1: Read Image

Step 2: Simulate a Motion Blur

Step 3: Restore the Blurred Image

Step 4: Simulate Blur and Noise

Step 5: Restore the Blurred and Noisy Image: First Attempt

Step 6: Restore the Blurred and Noisy Image: Second Attempt

Step 7: Simulate Blur and 8-Bit Quantization Noise

Step 8: Restore the Blurred, Quantized Image: First Attempt

Step 9: Restore the Blurred, Quantized Image: Second Attempt

## 4. PROPOSED METHODOLOGY

A major drawback of existing restoration methods for images is that they suffer from poor convergence properties; the algorithms converge to local minima. And make restrictive assumptions on the PSF or the true image that limits the algorithm's portability to different applications. In simple , deblurring filters are applied on the degraded images without the knowledge of blur and its effectiveness. We come across two types of noise; Gaussian noise and Salt and Pepper noise.

A neural network based on Back propagation neural network is used for the parameters identification [5]. After the parameter is been identified from the image, it is restored back by back propagation neural network. We are more concentrated on deblurring timing compared to the existing. In this methodology we will be getting best validation performance and also we are considering the peak signal to noise ratio (PSNR) of blurred and deblurred image.

### 4.1 Parameter extraction/collection

Parameters are fed as a training input to the Back propagation neural network. It takes the blur parameters from the blurred image of the selected image. Point spread function is the main reason for the blur's PSF is response of an imaging system to a point source or point object.

### 4.2 Back Propagation Neural Network

Back propagation is a type of artificial neural network. Input vectors and the corresponding target vectors are used to train a network until it can approximate a function, associate input vectors with specific output vectors. Networks with biases, a sigmoid layer, and a linear output layer are capable of approximating any function with a finite number of discontinuities. The BPN contains three layers : input, hidden, and output layers. During the training phase, the training data is fed into to the input layer. The data is propagated to the hidden layer and then to the output layer. This is called the forward pass of the back propagation algorithm [6].

## 5. EXPERIMENTAL RESULTS

During training, the progress is constantly updated in the training window. The performance, the magnitude of the gradient of performance and the number of validation checks are of the most interest. The magnitude of the gradient and the number of validation checks are used to terminate the training.

Below are the plots of performance, training and regression.

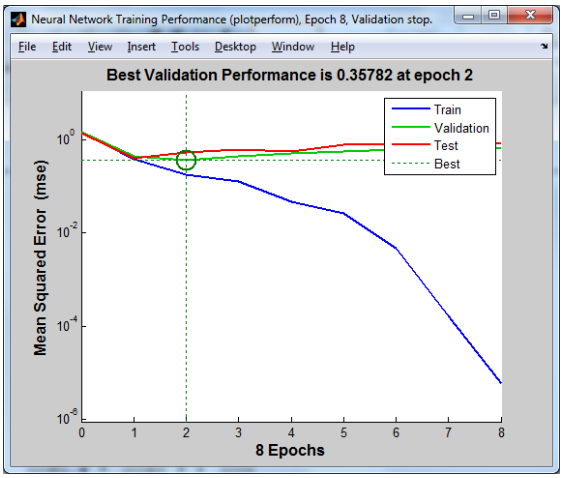


**Figure 9(a)**

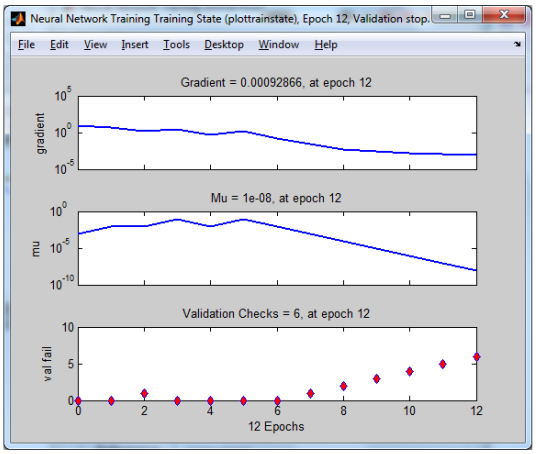


**Figure 9(b)**

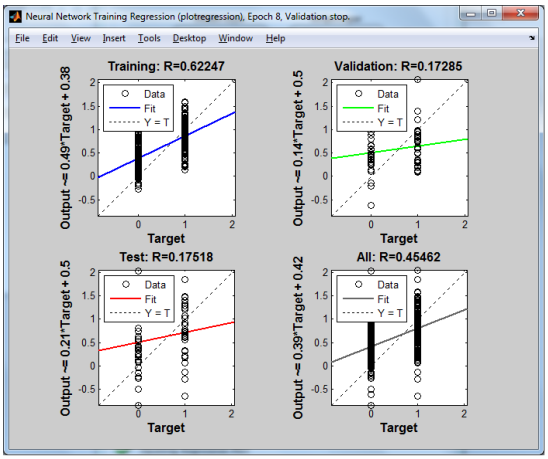


**Figure 9(c)**

**Figure9.** *(a).Performance plot (b).Training plot (c).Regression plot*

**Table1.** *The PSNR of blurred and de-blurred image.*

| Image | Blurring | De-blurring |
|---|---|---|
| PSNR | 26.8985 | 32.802 |
| (dB) Time | | 0.3sec |

**Table2.** *The Best Validation Performance and Regression.*

| Image | BPNN |
|---|---|
| Performance | 0.35782 |
| Regression | 0.17285 |

## 6. CONCLUSION

In this paper, we have reduced the de-blurring timing compared to the existing using Back propagation neural network. This neural network is implemented and it is trained. Peak signal to noise ratio is shown for blurred and de-blurred image. We are getting the best validation performance and regression using BPNN. This can be extended to other image processing techniques like segmentation.

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