A Novel System for Image Restoration based on RBF NN and Filling in Technique

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Abstract— Image restoration is known as recovery of images. Usually with operation such as noise and transmitting of images make it damaged and it is difficult to restore. Color image restoration criteria are put forward based on Filling in Technique and RBF neural network. First of all, the feedback image is trained by the RBF neural network. Many restoration techniques are available and applied for restoration of the damaged images. Completing strategy gives the valuable impact for restoration of images. Filling-in of losing details is a very important strategy in image handling. While segmentation of image if some prevents of image are losing then instead of using common retransmission question methods, renovation of the losing data using connection between the losing prevent and its others who live nearby has been used. Removing a target item and filling the losing areas of a image is the key technology generally applied to image restoration. The essence is fill-in the losing prevent with the details propagating from the surrounding p. Completing strategy consider the damaged portion of the image as the losing part of the image. Filling with use of environment some time break down the quality of retrieved image. In this paper, we used HSV techniques to restore the image after applying Filling in Technique.

Keywords—Filling in Technique, HSV Method, Image Recovery, RBF NN.

I. INTRODUCTION

IMAGE processing is a wide area including various applications in it. Since the early days of art and photography, filling-in and in painting has been done by professional artist. Imitating their performance with semi-automatic digital techniques is currently an active area of research. The filling-in of missing information with applications including image coding and wireless image transmission (e.g., recovering lost blocks), special effects (e.g., removal of objects), and image restoration (e.g., scratch removal) is a very important in image processing Image processing basically includes the following three steps. One is importing the image with optical scanner or by digital photography. Second one is analyzing and manipulating the image which includes data compression and image enhancement and restoration. And finally the third one is output is the last stage in which result can be altered image or report that is based on image analysis. The basic idea is fill-in the missing block with the information propagating from the surrounding pixels. The main aim of filling in technique is to fill-in the gap of missing data in a form that is non-detectable by an ordinary observer. This technique provides a means to restore damaged region of an image, such that the image looks complete and natural after restoration.

II. RBF NEURAL NETWORK

The term neural network was traditionally used to refer to a network or circuit of biological neurons. A Radial Basis Function (RBF) neural network has an input layer, a hidden layer and an output layer. The neurons in the hidden layer contain Gaussian transfer functions whose outputs are inversely proportional to the distance from the centre of the neuron. RBF is the activation function of the hidden nodes, which is a local distributive center symmetrical nonlinear function. The Gaussian function is usually be used. The topological structure of the RBF neural network is shown in Fig.1.

Fig.1 Topological structure of RBF NN

III. HSV MODEL (HUE, SATURATION, VALUE)

Hue-saturation centered shade areas were presented when there was a need for the customer to specify shade qualities numerically. Hue describes the prominent shade (such as red, green, violet and yellow) of a place, vividness actions the colorfulness of a place in percentage to its lighting. The"intensity","lightness" or"value" is relevant to along with luminance.

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IV. PROPOSED WORK

In this document we will recover the blurry image by implementing various Filling in Technique procedure and techniques. For the benefit of this, first of all we take an feedback image as per our concern and upon which we will execute overall procedure of our suggested work.

Start

Collect a set of data set for input images

Train the input image with RBF NN

Blurred the image using noise and get the results for PSNR & RMSE as metric

Applying segmentation and filling in technique for the blurred image

Apply HSV model for image restoration and filling process

Get the de blurred image and evaluate the result for requisite metric like PSNR & RMSE

Result Analysis and comparison for blurred and de blurred image

End

Fig.3 Methodology for the proposed work

So, originally the feedback picture is qualified through various RBF neural network procedures. Furthermore, we have included Gaussian disturbance to make the image blurry. Now, we have blurry image .Now, we have to further proceed the procedure by implementing the filling in procedure of segmentation. In easy terms, segmentation is the procedure for the recognition of the images on the reasons for their areas. The segmentation procedure contains various procedure which we will do and describe as follows. We use entropy narrow which profits an range where each outcome pixel contains the entropy value of the 9-by-9 community around the corresponding pixel in the feedback image. Again, we have designed difficult cover up for the feedback image for the top and base structure one by one and loaded the associated area entirely one by one as per relevant procedure and guidelines.

Now, as we are using HSV Design for recovery of image. So, HSV model first describes the associated hue, vividness and value for the essential shade image and measured its pixel as per their areas to be loaded and lastly recover and de blurry the feedback image by implementing the associated operate using in it. Here, we are using PSNR and RMSE as our analytics for efficiency assessment and evaluate the outcomes of these factors for blurry and de blurry image or after image recovery for the set of dataset images.

V. EXPERIMENTAL RESULTS AND PERFORMANCE ANALYSIS

The trial results of the suggested work was carried out in various actions such as data training, blurry image, segmentation and filling in process and finally image recovery and de blurry the feedback image. The following screenshots are the trial assessment actions for the feedback image.
The efficiency research of the suggested performs for essential set of dataset images are performed for the following factors.

VI. PARAMETERS USED FOR COMPARISON

PSNR is generally used to analyze high top quality of image, sound and video clips in dB (decibels). In other words, PSNR is to measure the high top quality of reconstructed images that have been compacted. Mathematically, the PSNR values will be calculated using following formula:

$$PSNR = 10 \cdot \log_{10} \left( \frac{MAX^2}{MSE} \right)$$

$$= 20 \cdot \log_{10} \left( \frac{MAX}{\sqrt{MSE}} \right)$$

$$= 20 \cdot \log_{10} (MAX) - 10 \cdot \log_{10} (MSE)$$
The above Fig.4 clearly depicts that the PSNR values for Deblurred image for the requisite set of data set image is high as compare to blurred image which is quiet good and tangible.

RMSE (Root Mean Square Error)

The root-mean-square deviation (RMSD) or root-mean-square error (RMSE) is a frequently used measure of the differences between values predicted by a model or an estimator and the values actually observed.

\[
\text{RMSD} = \sqrt{\frac{\sum_{t=1}^{n} (y_t - \hat{y}_t)^2}{n}}.
\]

The RMSE is the square root of the variance, known as the standard deviation. On the other hand, Mean Square error is only the variance for the estimator.

![Fig.5 Comparison Chart for blurred and de blurred image for RMSE for set of Dataset](image)

Fig.5 Comparison Chart for blurred and de blurred image for RMSE for set of Dataset

VII. CONCLUSION & FUTURE SCOPE FOR COMPARISON

In this dissertation research we are going to use neural networks and filling in techniques to accomplish fast recovery of an image. We are here using set of information set of structure images and determined that the outcomes for the preferred feedback factors like PSNR and RMSE is silent good and efficient for the deblurry images as evaluate to blurry image. In upcoming neural networks are along with some other strategy and techniques with comparison of varieties of noise added to the input image.

Image restoration is a very wide area of research so we can recover images by using any other techniques for better results.

REFERENCES