INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN: 2278 – 0211 (Online)

A Novel Edge Preserving Technique Using Interpolation Algorithm

Minhaz Shaik
M.Tech.(DECS)
Branch: ECE

&

J.Narasimha Rao
B.Tech, M.Tech,(Ph.D)
Associate Professor
ECE Depertment

Abstract: *There is a huge challenging task for the preservation of the structure of the edges in the image processing scenario for the sake of the interpolation in the images on behalf of the manipulation of the degraded form of the image to a normal better form of the image respectively. Here in this project a new algorithm or the new technique is implemented based on the fusion of the data with respect to some of the pertinent features and also the filters of The directional bank and upon integrating this to technique in the combined form as by naming interpolation. Therefore for the further process of the interpolation in which it is defined by the set of observations and from which we are going to get the estimated values of those particular pixels respectively. Here the estimates are with respect to the direction and are modeled under the measurements of noise lost pixel are placed with normalized coefficient respectively. And depending on the statistical point of view they are found under the strict process and they got values are accurate. Therefore from the above process the complexity is going to be increased and the time complexity is also going to be increased therefore in order to reduce the complexity and to work the system more effectively we are going to design the simplified model which is similar to the above model and by the normalizing the mean and the standard deviation coefficients.*

From the above process the performance of the interpolation can be incremented and by the normalized coefficients respectively which further can be worked out effectively in the modern form of the society by which the artifacts are going to be reduced and the sharpness of the edges can be preserved on behalf of the clarity purpose.

Introduction

Image processing plays a vital role in the society. Whereas the resolution has a great impact on the images that is the clarity of the images. So at the time of the processing of the images our human eye is the primary examiner for the verification of the quality of the images respectively. So whenever the capturing of the images takes place from the system hardware or the capturing device by the name of camera it can be affected by some of the external factors and some of the m includes sudden environmental changes and due to which clarity is lost by the interference of the noise and also due to the fading in the lighting effect in the system and also due to the some of the internal factors such as damage in the capturing device.

Even if there is any problem in the lenses etc. Therefore due to this the original clarity of the images is lost that is in terms of the resolution and it is of two types low resolution and high resolution respectively. Low resolution corresponds to the poor brightness, poor contrast and even color restoration comes under this. So therefore some of the algorithms are designed to work with the resolution factors in which some of them includes bilinear transformation, Duplication of the pixels, Interpolation of the convolution in bicubic system respectively.

So therefore in our proposed methodology we are going to use the interpolation as the primary concern for the resemblance of the low resolution images to a high resolution images. And in the starting process the complexity may create some of the effect complexity includes the number of additions and the number of multiplications respectively. And further for the simplicity point of view the above interpolation technique is normalized and by that time complexity is reduced due to the reduced computations in terms of the number of addition and the number of the multiplications respectively.

The pixels at the edges are highly sensitive in the case of the HVS respectively. So it is a primary concern in dealing with edge information where the original image information is placed in which in case of the clarity purpose. So in the case of the reconstruction of the edges interpolation plays a major role in this.

Interpolation Based On The Lmmse By Guided Edge

In comparison to the many of the cases or many of the scenarios there is a direct operation takes place on the low resolution image in the form of down sampling from the image with the high resolution and can be shown by the following equation as

$$I_l(n,m) = I_h(2n-1, 2m-1)$$

For all values

$$1 \le n \le N,\ 1 \le m \le M$$

Respectively and mathematically expressed by the following figure as

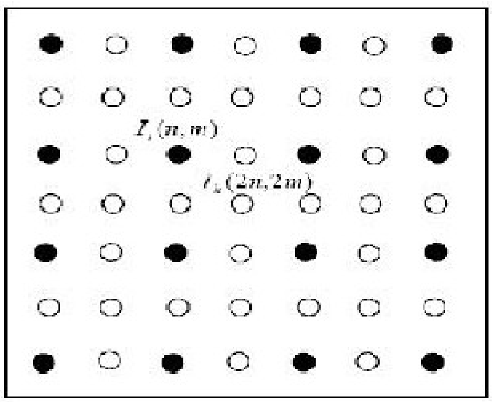

Figure 1: Figure shows the conversion of the HR to LR respectively

Up to here it is well and good now the main problem relies on the reconstruction of the lost data in the form of the pixels depending on the characteristics of the neighboring pixels or the intensity values by the help of the proposed technique by naming an interpolation. So therefore at the time of the sampling in the down mode the pixels may cross the limits and beyond it there may be chance of the occurrence of the data lost and interference of the noise and also occupying of the place of the other pixels that is disturbing the neighboring pixels by the term artifacts of ringing respectively.

So therefore the main primary concern for the interpolation technique is edge information irrespective of the neighboring pixels or the neighboring intensity values. Where the edge pixels play a vital role in the image processing scenario in terms of the clarity and also the also the important information of the image takes place.

Therefore the interpolation samples are given by the following figure where it is mainly concentrates on the edge information of an image is shown below

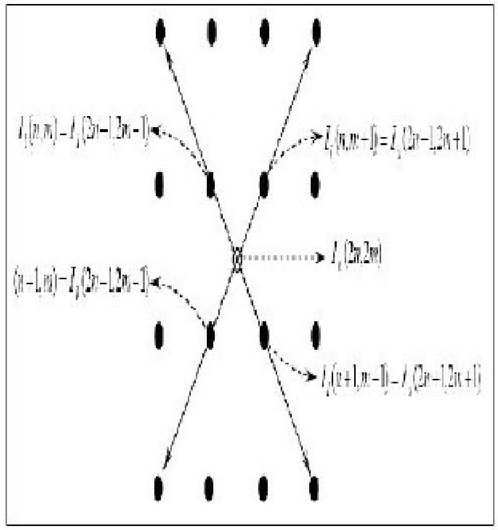

Figure 2: Figure shows the application of interpolation technique on the edges with respect to the neighboring pixels respectively

Therefore from the above figure the missing pixels or the lost pixels can be restored or may be reconstructed by the following condition or the following case

$$\hat{I}_{45}(2n,2m) = I_h(2n,2m) + \upsilon_{45}(2n,2m)$$

$$\hat{I}_{135}(2n,2m) = I_h(2n,2m) + \upsilon_{135}(2n,2m)$$

Interpolation on Simplified Lmmse

Samples of the HR got interpolated μ_h, σ_h^2, R_{V} is got to be estimated by the LMMSE and 2*2 inverse matrix has to be computed. Therefore by the above said procedure there may be a necessity of the huge computations and also the time complexity also got increased.

Therefore the computational complexity can be reduced by applying the interpolation method in the smooth regions of the image with respect to the neighboring pixels. Total pixels can be represented by the pixels in the image by naming as the minority values or the minority elements where there is huge outcome takes place in the form of the reduced complexity.

In the HR sample and can be formed by combining linearly with μ_h phase shift if I with respect to 135 and 45 degrees respectively. And can be represented by the following equation

$$\hat{I}_h = \Gamma_1 \cdot \hat{I}_{45} + \Gamma_2 \cdot \hat{I}_{135} + (1 - \Gamma \cdot 1)\mu_h$$

Whereas Γ can be classified into Γ_1 and Γ_2 respectively and by treating the condition $(1 - \Gamma \cdot 1)$=0 empirically. Therefore the mean value of I with phase shift of 135 and with a phase shift of 45 respectively. R_V Holds the importance of all the weights respectively. Computing the $\hat{I}_h$ is a huge advantage compared to the Ih where the reduced complexity takes place and also the time complexity also reduced. And therefore it is given by the equation as follows.

$$\hat{I}_h = w_{45} \cdot \hat{I}_{45} + w_{135} \cdot \hat{I}_{135}$$

Therefore the weights are somehow matched up to certain limit and it is quite beneficiary across the edges of an image. And can be represented by the following equation as

$$w_{45} = \frac{Var(\upsilon_{135})}{Var(\upsilon_{45}) + Var(\upsilon_{135})},\ w_{135} = 1 - w_{45}$$

Therefore the variance can be computed by the following equation and can be summarized from the weighting equation or from the above equation are as follows

$$Var(\upsilon_{45}) \cong \left(\sum_{k=1}^{5} \left|Z_{45}(k) - \mu_h\right|\right)^2,\ Var(\upsilon_{135}) \cong \left(\sum_{k=1}^{5} \left|Z_{45}(k) - \mu_h\right|\right)^2$$

Therefore there is a huge variation in between the existing method and the proposed method respectively and can be shown with the reference of the computations that is the number of the additions and as well as the number of the multiplications takes place in the system can be summarized below

Operation	Addition	Multiplication	Division
LMMSE algorithm	39	32	3
Simplified algorithm	24	4	2

Table 1

Conclusion

Here in this above project we have developed a new interpolation process on the image based on the LMMSE guiding edge respectively. Here the interpolation is applied on the every single pixel depending on the directions of the orthogonality the partition process takes place with preference to the neighbor pixels. These are processed as the measurements of noise by a sample. Therefore by the above preferences we are going to find the accurate values or the accurate noise coefficients and by naming the term as the estimation of the square error with a linear mean. In the above process there is a huge complexity and by introducing the average weighting this can be eliminated.

Reference

1. H. S. Hou et al, "Cubic splines for image interpolation and digital filtering," **IEEE Trans. Acoustic, Speech and Signal Processing, vol. ASSP-26, pp. 508-517, 1978.**
2. R. G. Keys, "Cubic convolution interpolation for digital image processing," **IEEE Trans. Acoustic, Speech and Signal Processing, vol. ASSP-29, pp. 1153-1160, 1981.**
3. T. M. Lehmann, Claudia Gönner and K. Spitzer, "Survey: interpolation methods in medical image processing," **IEEE Trans. Medical Imaging, vol. 18, pp. 1049-1075, Nov. 1999.**