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Image Enhancement for Medical Images Using Improved HSF

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Abstract: Image enhancement involves mainly the borders, edges or sharpens image features such as contrast and reduces ringing artifacts. Increase the images so that the information contained in them can be extracted in a meaningful sense of quality improvement. The biggest difficulty in image enhancement and image enhancement techniques to increase due to a large number of empirical criterion increases and requires interactive processes to achieve satisfactory results. Digital image processing in industrial X-ray image processing such as image enhancement, micro-imaging, remote sensing, and medical image analysis plays an important role in many areas. Improve the image of either a human observer or a philanthropic vision of a computer program such as visual sense or detect targets high-level image analysis, can be a kind of performance.. In the current work we are going to present Improved HSF selection of filter which in addition uses the thresholding of local tiles. We have compared the results with different performance matrices.

Keywords: Image enhancement, HSF, Threshold, Rayleigh CLAHE.

I. INTRODUCTION

Image enhancement is mainly two-point operations or spatial digital filtering technique involves modifying the histogram. Some of the other domains in more complex ways, such an image of a linear transformation coefficient domain involves modifying the image content. Extraction features a good contrast of the image such as an image feature further work processes. Decodes these blurry images, noise, artifacts and artifacts to improve the image of an image coding sequence is used to improve the quality of Image as reflecting problems. A complex image in a filter will not produce good quality at all locations. A suite of linear or nonlinear filter image of the areas for which it is best suited to being implemented. Hypothesis is a new approach to the selection filter to enhance image quality.

Set of filters containing areas with different characteristics in order to improve the quality of a distorted image are used. Predict the outcome of each filter which is used to obtain the final processed output ratio determines. HSF has a number of different user-selected filters, each best suited to a different area of the image to the output serves as a framework for combining. With this scheme, the image content on a variety of different characteristics to improve the quality of the decoded image. Develop an effective method of image enhancement, computed in terms of efficiency, the design of the possible structures that lead to an easy implementation is the key to better image contrast enhancement.

II. HYPOTHESIS SELECTIVE FILTER

In many applications, a typical image enhancement filters to produce a complex image quality will not be good at all locations. For example, a Gaussian filter, an image from the smooth areas is designed to remove noise, edge detail will tend to blur. Or a non-linear filter is designed to preserve the edge detail, smooth noise in an image can produce undesirable artifacts. Ideally, we use a suite of linear or nonlinear filters, each filter image is most suitable for which it is being applied to areas with good quality to be able to get the results you want. However, the approach of an image at each location, the best filters available to choose between a set of filters requires some practice.

Hypothesis Selection Filter (HSF) different filters, each of which in an image to improve a particular type of material chosen is a new approach for combining the output. Our objective is to achieve an overall good quality results is to combine the filter outputs. The construction plan for the defined class M where each pixel is associated with image filters selected one of M pixel sections. During the processing of an image, HSF, a feature vector calculated through the use of locally M pixel sections of each pixel performs a soft classification. After classification, the resulting filter class weighted by probabilities and combined to outputs are as the final processed output. Based on this model, there is an unsupervised classifier training process for the designs are extracted. The training process is conditioned on each pixel square to estimate the probability distribution of the feature vector illustration degraded images and their corresponding uses a set of high-quality original images. An example of his ability to perform as, HSF JPEG encoded document to reduce artifacts in the images as a post-processing step is applied. Layout. Each type of material in a complex text, graphics, and natural images because of its unique features is a

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document image typically consist JPEG artifacts are distorted differently. In this application, is used in four image filter HSF. Of image materials for different types of image filters for reducing JPEG artifacts are selected. Compared with many other state-of-the-art approaches, HSF content. A variety of perspectives on different types of image decoding more consistently to improve the quality of the image has been proposed is to enhance the quality. Main advantage traditional linear filter is simplicity. nonlinear filtering, median filtering, the weighted average filter, order data filter, and the filter stack, nonlinear filters that have been studied are examples of wide range. Recently, several spatial adaptive filtering methods to address different aspects of the image quality has been developed.

III. OUR PROPOSED IMPROVED HSF

Hypothesis image with selective filter using the Threshold tiling technique. Hypothesis Selection Filter (HSF) in a general framework of image filters, linear or nonlinear, provides a systematic method for combining the advantages. We believe that a set of filters containing areas with different characteristics in order to improve the quality of a distorted image has been selected a priori. At each pixel, HSF original undistorted image corresponding pixel intensity in assessing the relative performance of the filter to predict a locally calculated feature vector uses. Predicting the final result is used to process the output of each filter is set to be proportional. And two filters to remove ringing artifacts are used for coding. Without blurring the edges of a bilateral filter first removes coding artifacts. Second, without a median blur the edges used to achieve noise reduction filter. This is a nonlinear operation. When the noise spikes consist of patterns and characteristics of edge sharpness that it is an effective way to protect. In threshold tiling we divide the image in different tiles of window and then we compute the threshold for each tile. For each tile we get desired rank and applying set of HSF accordingly instead of using histograms, define a single pixel in the neighbourhood.

A. Algorithm Steps

- Input the image for contrast enhancement
- Set the tiles window
- Get threshold level of brightness for each tile
- Apply HSF on the basis of threshold of brightness
- Obtained Enhanced Image

B. Parameters Used

We have applied current algorithm using three performance matrices:

- PSNR
- MSE
- NAE

We have applied our technique on medical image and compared the results and found that there is greater betterment in the proposed technique for image qualities Also in visual perception image has very good contrast. Image enhancement process seeks to enhance the apparent visual quality of an image or to emphasize certain image features. The parameters used for measurement of image quality are:

- Peak Signal to Noise Ratio: The PSNR that is peak signal to noise ratio is the measure of the quality of the filtered or de-noised image. Smaller the value of peak signal to noise ratio means that image is of poor quality. The PSNR is defined as

$$\text{PSNR} = \frac{10 \log (255\text{^}2)}{\text{MSE}};$$

$$\text{PSNR} = \frac{10 \log (2^{n}-1)^{2}}{\text{MSE}}$$

255^2 is the maximum intensity of unfiltered image. High PSNR would normally indicate that the reconstruction is of higher quality.

- Mean Square Error: Mean Square Error is the most widely used image quality measurement. MSE is frequently used in signal processing. MSE is defined as

$$\frac{1}{MN}\sum_{j=1}^{M}\sum_{k=1}^{N}(X_{jk} - X'_{jk})^{2}$$

Where X_{jk} denotes the samples of original pixel and X'_{jk} samples of filtered image. M and N are pixel in row and column directly.

- Normalized Absolute Error: The large value of Normalized Absolute Error means that the quality of image is poor.

$$\text{NAE}=\frac{\sum_{j=1}^{M}\sum_{K=1}^{N}|X_{JK}-X'_{JK}|}{\sum_{j=1}^{M}\sum_{K=1}^{N}X_{JK}-X'_{JK}|}$$

TABLE I: Comparison of Earlier Contrast Enhancement Techniques With Proposed Work Using Different Parameters For Medical Image

Parameters/Techniques used	HE	AHE	CLAHE Uniform
PSNR	10.082	19.309	18.2115
MSE	6380.872	762.3931	981.5914
NAE	1.0861	0.25538	0.30868

TABLE III

Parameters/Techniques used	CLAHE exponential	CLAHE Rayleigh	HSF
PSNR	19.1798	18.4863	22.4204
MSE	785.411	921.4142	372.425
NAE	0.27152	0.3684	0.26301

TABLE IIIII

Parameters/Techniques used	Proposed HSF
PSNR	26.7565
MSE	137.2241
NAE	0.084989

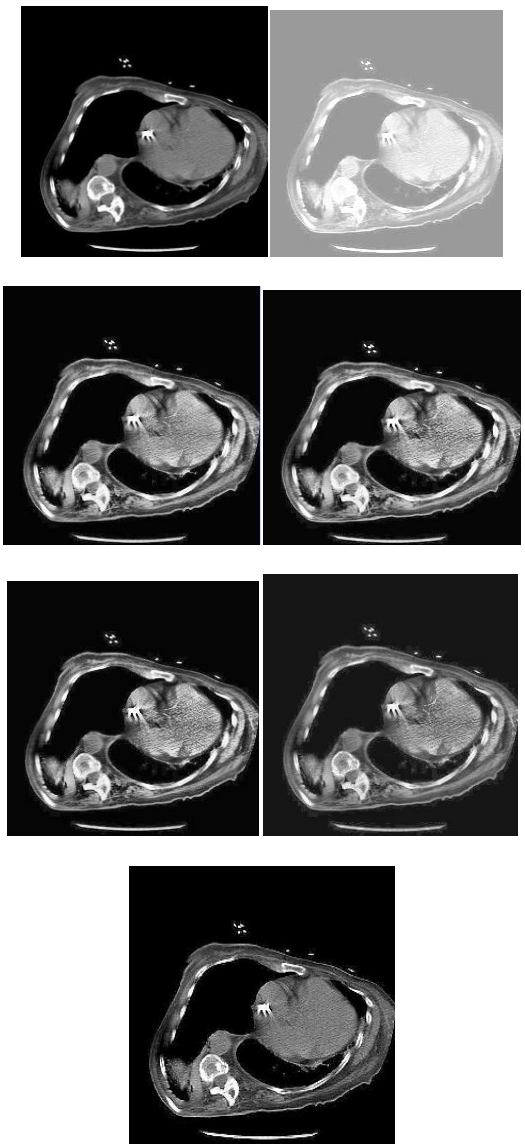

Fig. 1 The result of medical image with different enhancement techniques(HE,AHE,CLAHE,CLAHE Exponential, CLAHE Rayleigh, HSF, Proposed HSF) respectively.

The main advantage of histogram equalization technique is that pictures with very poor dynamic range can be enhanced. But the main disadvantage of this method is that visual artifacts get introduced.

The AHE process will improve the local contrast of an image. The process steps on AHE are consists of define local neighbourhood of image pixel in specific section, calculation and equalization histogram neighbourhood and mapping of pixel value on the center of neighbourhood based on equalized local histogram. To avoid discontinue value between the specific region, bilinear interpolation is applied to estimate pixel value on the region. It is therefore suitable for improving the local contrast of an image and bringing out more detail. We have presented the comparison of all techniques which reveals that our proposed method has not only good contrast but also have good visual perception.

IV. CONCLUSION AND FUTURE WORK

Contrary to the image that it is better to increase the role of medical imaging contrast of the image .In the image of the scene is viewed from different techniques to improve the quality. Thus, to make an image lighter or darker, or to increase or decrease the contrast of the resulting image to a specific application or set of objectives and better improve the image on the original image is greater visibility. Hypothesis filter with its own technology. in the future we create and will compare the results with more performance matrices and different modalities of images.

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