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Image Denoising Based On Variable Exponent Using Adaptive Perona Malik Model

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ABSTRACT: *Image denoising is a common procedure in Digital image processing aiming at the removal of noise, which may corrupt an image during its transmission, while retaining its quality. This paper introduces a class of adaptive Perona–Malik (PM) diffusion, which combines the PM equation with the heat equation. The PM equation provides a potential algorithm for image segmentation, noise removal, edge detection, and image enhancement. However, the defect of traditional PM model is tending to cause the staircase effect and create new features in the processed image. Utilizing the edge indicator as a variable exponent, we can adaptively control the diffusion mode, which alternates between PM diffusion and Gaussian smoothing in accordance with the image feature. Computer experiments indicate that the present algorithm is very efficient for edge detection and noise removal.*

KEYWORDS: *PM, APM, Noise Removal, Edge Indicator*

I. INTRODUCTION

An image is often corrupted by noise during its acquisition or transmission. Image denoising is used to remove the additive noise while retaining as much as possible the important image features circuitry enables to implement energy-efficient circuits. The basic idea behind the PM algorithm is to evolve an original image , which was defined in a domain , under an edge-controlled diffusion operator. In this project we are using different algorithms and adaptive Perona-Malik Model for image coefficient to perform image denoising. This project deals with the different Algorithms based on the statistical modeling of wavelet coefficient. And our aim is to calculate the different MAE and PSNR ratio to find out the most suited for image denoising.

II. LITERATURE REVIEW

In this paper , based on the variable exponent, we have proposed an adaptive PM model for image denoising. In our method, we have used the edge indicators as the variable exponent to control the diffusion mode. In different region, the new method act as different diffusion modes. Compared with the compared to the TV method, the new method will avoid staircase effect. Our Experimental results have demonstrated that the quality of restored image by our method is quite well.

III. AIM

The main aim of the project is to calculate the different MSE and PSNR ratio to find out the most suited for image denoising**.**

IV. OBJECTIVE

This method is adopted for enhancing the resolution, restoration of image pixels and for improving the quality of ultrasound images and magnetic resonant images

V. MODULES

Gaussian Noise, Noise Estimation, PM Denoising ,
Adaptive PM Denoising , Quality metrics Analysis

The selected input image is subjected to Gaussian noise . The noise level consists of either 0.01,0.1 or 0.5. The noisy image of any one of the above level is generated.

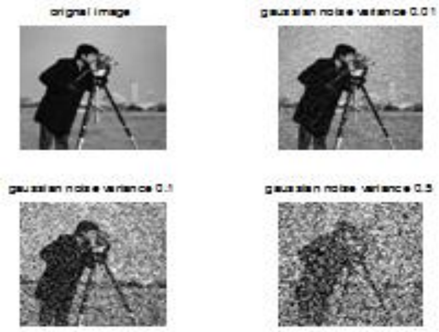

Figure 1. Images with Noise

Figure 2. Images for Different Filter

VI. EXISTING SYSTEM

TV method:

The number of iterations that is necessary to satisfy the. stopping rule increases rapidly when increases TV-based diffusion reconstructs sharp edges, but the stair - casing effect is obvious.PM method The appropriate parameter K is indispensable to get the best result.PM-based diffusion also reconstructs sharp edges, but it creates isolated black and white speckles in the restored image.

Proposed System

The proposed model reconstructs sharpen edges as effectively as PM-based diffusion and meanwhile recovers smooth regions as effectively as pure isotropic diffusion (in particular, without stair casing).
We have used the edge indicator as the variable exponent to control the diffusion mode.
The edge indicator segments one image into two sub-regions
In spite of the degeneration of the image, the edges are still clear compared with other regions.
Sub-region almost contains all edges of this image, and sub-region is the inside region in the image. Because of the convolution, this segmentation is not sensitive to the influence of noise.

Noise Estimation

The parameters such as

MSE- Mean Square Error

PSNR- Peak Signal to Noise Ratio are estimated.

Where, t1 = sum((clean-denoised)2)

N = prod(size(clean))

Table 1. Calculation of MSE and PSNR

Images	MSE	PSNR
Noisy image	0.0094	68.4207
Medium filter image	0.0040	72.1565
Perona malik image	0.0034	72.8038

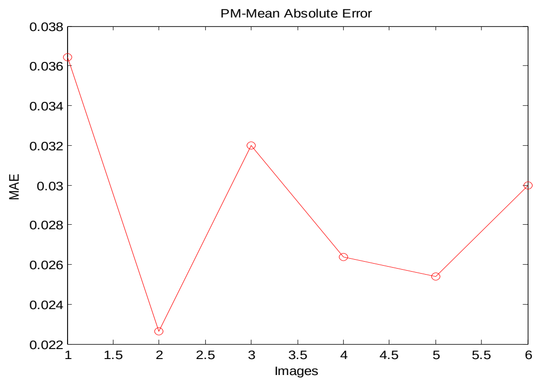

Figure 3. Simulation 1(a) Schematic of PM- MAE

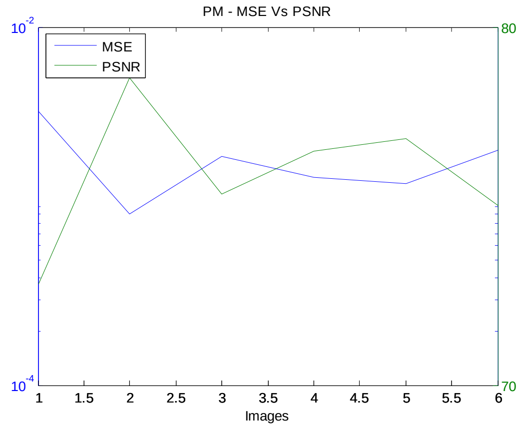

Figure 4. Simulation 1(b) Schematic of MSE Vs PSNR

VII. CONCLUSION

We have proposed an adaptive PM model for image denoising.

In our method, we have used the edge indicator as the variable exponent to control the diffusion mode.

In different regions, the new method acts as different diffusion modes.

Compared with the PM method, the new method will not create new features, compared to the TV method, the new method will avoid staircase effect.

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