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Evaluation of Different Image Enhancement Methods - A Study

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***Abstract*- There are many definitions available for the term image enhancement, one of them is "Image enhancement is basically improving the interpretability or perception of information in images for human viewers and providing `better' input for other automated image processing techniques". On other words the objective of image enhancement is to modify its features according to the requirements of processing space. While considering the above mentioned things it is clear that enhancement techniques are very relevant to the field where the processed image to be used, because of this several techniques are available for enhancement of image depending upon the use (like human perceptions, medical imagery or very complex radar systems). Another problem with enhancement techniques is that most of the method requires a properly de-noised image otherwise the noise generated artifacts could also get enhanced. Hence, de-noising is often a necessary and the first step to be taken before the image data is analyzed. It is necessary to apply an efficient de-noising technique to compensate for such data corruption.**

***Keywords* – NPR, Wavelet, ANN.**

I. INTRODUCTION

As discussed above the noise modeling in images is greatly varies depending upon capturing instruments, data transmission media, image quantization and discrete sources of radiation. It is difficult to design a single mathematical model for all types of noise instead a soft computing based black box model could be a much better solution for noise model. This paper also considers information based processing depth for each part of image which not only reduces the processing time but also protects the information loss.

Modern digital technology has made it possible to manipulate multi-dimensional signals with systems that range from simple digital circuits to advanced parallel computers. The goal of this manipulation can be divided into three categories: Image Processing image in →image out Image Analysis image in → measurements out. Image Understanding image in → high-level description out.

II. IMAGE ENHANCEMENT

The aim of image enhancement is to improve the interpretability or perception of information in images for human viewers, or to provide `better' input for other automated image processing techniques.

Image enhancement techniques can be divided into two broad categories: Spatial domain methods, which operate directly on pixels, and Frequency domain methods, which operate on the Fourier transform of an image.Unfortunately, there is no general theory for determining what `good' image enhancement is when it comes to human perception. If it looks good, it is good! However, when image enhancement techniques are used as pre-processing tools for other image processing techniques, then quantitative measures can determine which techniques are most appropriate. The value of a pixel with coordinates (x,y) in the enhanced image $\hat{F}$ is the result of performing some operation on the pixels in the neighborhood of (x,y) in the input image, F. Neighborhoods can be any shape, but usually they are rectangular. The simplest form of operation is when the operator T only acts on a 1X1 pixel neighborhood in the input image, that is F(x,y) only depends on the value of F at (x,y). This is a grey scale transformation or mapping. The simplest case is thresholding where the intensity profile is replaced by a step function, active at a chosen threshold value. In this case any pixel with a grey level below the threshold in the input image gets mapped to 0 in the output image. Other pixels are mapped to 255.Other grey scale transformations are outlined .[7]

III. NEURAL NETWORK

An artificial neural network (ANN), usually called neural network (NN), may be a mathematical model or machine model that's impressed by the structure and/or useful aspects of biological neural networks. A neural network consists of associate interconnected cluster of artificial neurons, and it processes data employing a connectionist approach to computation. In most cases associate ANN is associate adaptative system that changes its structure supported external or internal data that flows through the network throughout the training part. fashionable neural networks square measure non-linear applied math information modeling tools. they're typically wont to model complicated relationships between inputs and outputs or to seek out patterns in information. machine neurobiologists have made terribly elaborate laptop models of neurons so as to run elaborate simulations of explicit circuits within the brain.

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As laptop Scientists, we tend to square measure additional inquisitive about the overall properties of neural networks, freelance of however they're really "implemented" within the brain. this suggests that we will use abundant easier, abstract "neurons", that (hopefully) capture the essence of neural computation albeit they miss abundant of the small print of however biological neurons work. individuals have enforced model neurons in hardware as electronic circuits, typically integrated on VLSI chips. bear in mind although that computers run abundant quicker than brains - we will thus run fairly giant networks of straightforward model neurons as software package simulations in affordable time. This has obvious blessings over having to use special "neural" component.

Our basic machine part (model neuron) is commonly known as a node or unit. It receives input from another units, or maybe from associate external supply. every input has associate associated weight w, which may be changed therefore on model junction learning. in essence, back prop provides some way to coach networks with any variety of hidden units organized in any variety of layers. (There square measure clear sensible limits, that we'll discuss later.) In fact, the network doesn't got to be organized in layers - any pattern of property that allows a partial ordering of the nodes from input to output is allowed. In different words, there should be some way to order the units such all connections go from "earlier" (closer to the input) to "later" ones (closer to the output). this can be similar to stating that their association pattern should not contain any cycles. Networks that respect this constraint square measure known as feed forward networks; their association pattern forms a directed acyclic graph or dag.

IV. Image-Based Stylization And Abstraction Systems

Previous work varies in the use of scene geometry, video-based vs. static input, and the focus on perceptual task performance and evaluation. Among the earliest work on image-based NPR was that of Saito and Takahashi [1990] who performed image processing operations on data buffers derived from geometric properties of 3D scenes. Our own work differs in that we operate on raw images, without requiring underlying geometry. To derive limited geometric information from images, Raskar et al. [2004] computed ordinal depth from pictures taken with purpose-built multi-flash hardware. This allowed them to separate texture edges from depth edges and performs effective texture removal and other stylization effects.

Our own framework does not model global effects such as repeated texture, but also requires no specialized hardware and does not face the technical difficulties of multi-flash for video. Several video stylization systems have been proposed, mainly to help artists with labor-intensive procedures [Wang et al. 2004; Collomosse et al. 2005].

V. Many People Proposed Algorithms To Reduce Time

On the basis of reduced search, which reduces the compatible block search using some type of grouping but this can reduce only a part of time which is involved in searching of blocks but the time to calculate error matrix does not change. So the way is to neglect the error matrix which saves time but causes degradation in image quality because in reduced level domain image, it is not always possible to find exact matching block matching blocks. Hence at that case it will produce an image of quality inferior than normal methods.

comparison of different method based on parameters

paramer	2014	2012	2008	2006	2005
BER	16.5	14.5	18.01	11.02	10.25
Complexity	more	less	more	average	less
performance	average	good	better	decresed	reduced
PSNR	32.02	29.26	30.58	25.00	23.24

VI. Conclusion

The Neural Network formula works on detection and enhancing the necessary info of a picture whereas suppressing the noise generated false info contents this technique has advantage that it doesn't dissolve the impulsive noise however eliminate it. this is often notably helpful wherever the first image having risk of being distorted by noise.Optionally, straightforward user masking will be incorporated into the formula to by selection management the abstraction speed and to shield explicit regions. Experimental results show that our technique effectively produces extremely abstract however feature-preserving illustrations from pictures.

The Neural Network formula is repetitive and progressive, and thus the extent of abstraction is intuitively controlled. Optionally, straightforward user masking will be incorporated into the formula to by selection management the abstraction speed and to shield explicit regions. once finding out several of strategies we have a tendency to conclude that results of image sweetening mistreatment neural networks were quite quick & amp promising.

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