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ORIGINAL RESEARCH PAPER

Engineering

IMAGE CORRECTION USING VHDL AND WARP

KEY WORDS: Contentanalysis, Image Processing, Representing digital images, Image Enhancement, *WARP.*

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ABSTRACT

In this paper, Digital image processing refers processing of two dimensional picture by a digital computer. Digital image is composed of a finite number of elements are called picture elements or pixels. These image are generally degraded by noise. Noise occurs during image capture, transmission or processing. Some of these noises are salt and pepper noise, gaussian noise and uniform noise. These noises can be removed by two kinds of filters either linear or nonlinear filters. The nonlinear filters which we use for filtering operation are median, midpoint and trimmed. The aim of the paper is to remove the pepper noise by using median filter and also there is possibility to change image matrix value in to connected graph and find the dominating set and dominting number for the image matrix value for better result with help of dominating technique in graph theory. The equivalent two dimensional matrix representation having picture for the image is generated using MATLAB-programming and the program for median filter process are simulated using VHDL.

INTRODUCTION

Digital image processing refers to processing of two dimensional picture by a digital computer. An image is a two dimensional function f (x,y), Where X and Y are spatial co-ordinates and the intensity or gray level of the image at that point. Digital image is composed of a finite number of elements are called picture elements, image elements, pels and pixels. The image may be in the form of slide, photograph or chart.Digital image processing operation can be broadly grouped into five fundamental classes.

- Image enhancement
- Image restoration
- Image analysis
- Image compression
- Image synthesis

IMAGE ENHANCEMENT

Image enhancement operation improves the quality of an image. They can be used to improve an images contrast and brightness characteristics (except color), reduce its noise content or sharpen its details.

Image enhancement technique may be grouped as either subjective enhancement or objective enhancement.Subject enhancement technique may be repeatedly applied in various forms until the observer feels that the image yields the detail necessary for particular application.

NOISE

The principal sources of noise in digital images arise during image acquisition or transmission.

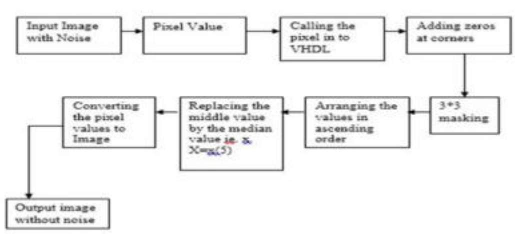
Consider a noisy image F(x,y) formed by the addition of noise f_x (x,y) to an original image f_y (x,y).By Mathematically in two dimensional random variable we write if x and y are independent then we write

$$F(x,y) = f_x(x,y) * f_y(x,y)$$

SPATIAL FILTERING

Spatial filtering work with the values of the image pixels in the neighborhood and the corresponding and the corresponding values of a subimage that has the same dimensions as the neighborhood.The subimage is called, filter, mask, template, Window or kernel. The value in the filter subimage are referred to as coefficients.

BLOCK DIAGRAM



SOFTWARE DESCRIPTION

MATLAB

MATLAB is a high performance language for technical computing. It integrates computation, visualization, and programming in an easy -to- use environment problems and solutions are expressed in familiar mathematical notation typical uses include math and computation.

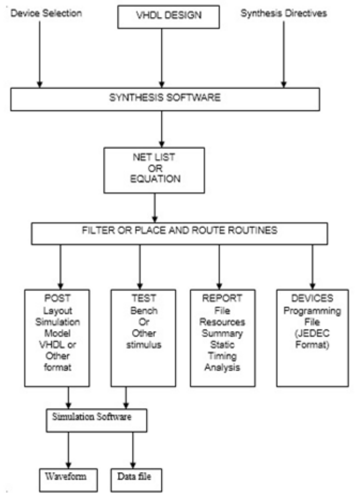
VHDL DESIGN

VHDL is an acronym for VHSIC hardware description language (VHSIC – Very High Speed Integrated Circuits) VHDL is a hardware description language that can be used to model a digital system ranging from algorithmic level to the gate level.

FLOW DIAGRAM

The flow diagram shows the inputs and outputs for each tools used in the design process.

The inputs to the synthesis s/w and the VHDL design source code, synthesis directives and device selection.



WARP

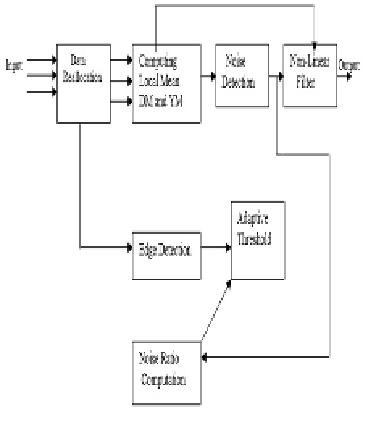
warp is from cypress technology. WARP consist of galaxy which is a source coded editor and active HDL simulation . galaxy is used to write the program . after saving the file we select the device. There are two types of device.

CPLD: Complex programmable logic device
SPLD: Programmable logic device.

After the device has been selected the compilation is done after the compilation is done successfully simulation is done.
Active-HDL Overview

Active-HDL is an integrated environment designed for development of VHDL, Verilog, EDIF and mixed VHDL Verilog-EDIF designs. It comprises three different design entry tools, VHDL'93 compiler, Verilog compiler, single simulation kernel, several debugging tools, graphical and text simulation output viewers, and auxiliary utilities designed for easy management of resource files, designs, and libraries.

System architecture of the proposed noise-reduction processor



Description

The proposed algorithm is split into two parts forimpulsenoise removal, i.e., noise detection(ND) and adaptive filter. Take f_{ij} as the currently processed pixel, the pixel of the previous scanning line f_{i-j+m} (=-1,0,1) and the pixel of the current scanning line $f_{i,j-1}$ that have been filtered. Next, the mean of the done-filtered pixels around the currently processed pixel f_{ij} is computed by

$$DM_{ij} = \frac{f_{i-1,j-1} + f_{i-1,j} + f_{i-1,j+1} + f_{i,j-2}}{4}$$

whereDM$_{ij}$ denotes the local mean of the demo pixels for the current pixel. Aside from DMij another parameter is needed to represent the mean of pixels that have not yet been processed, which can be expressed by

$$YM_{ij} = \frac{f_{i,j+1} + f_{i-1,j-1} + f_{i-1,j} + f_{i+1,j+1}}{4}$$

where $f_{i,j+1}$ and $f_{i+1,j+m}$ represents a not-yet processed pixel in the current scanning line and the following one, respectively. DM_{ij} and YM_{ij} values offer a local mean feature for the processed pixel if the processed pixel is unaffected by impulse noise, its gray value is close to DM_{ij} or YM_{ij}. Thus, ND can be expressed by

$$\begin{cases} \text{if } \left| f_{ij} - \frac{(DM_{ij} + YM_{ij})}{2} \right| \geq Th, & f_{ij} \text{ is corrupted pixel} \\ \text{otherwise}, & f_{ij} \text{ is a noise-free pixel} \end{cases}$$

Where Th is the noise threshold. Since the currently processed pixel may be a part of an object's edge, averaging DM_{ij} and YM_{ij} can eliminate errors. From the above equation, one can decide whether the currently processed data is a corrupted pixel. If it is, then a nonlinear filtering procedure is used to remove noise, which is given by

$$f_{ij}=DM_{ij}, \quad \text{as } f_{ij} \text{ is a corrupted pixel}$$

$$f_{ij}=f_{ij} \quad \text{as } f_{ij} \text{ is a noise-free pixel}$$

where noisy pixels are replaced using the average of previously filtered pixels and noise-free pixels are kept.

This filtering method possibly blurs image edges unless the noise-reduction ability near edges is reduced. In doing adoption of edge detection (ED) in threshold adaptation improves on filtering quality. For an efficient filter to work one has to first see whether a processed pixel belongs to an edge of a noisy pixel in no smooth regions. If the decision direct, either the image edge becomes blurred on the noise to be removed. Moreover, filtered errors will be proved the pixel processed next due to the recursive nature of the algorithm. To improve filtering performance, the edge parameter has to repeated accurately. However, edge computations for noisy are extremely complex since some edges have already destroyed. The results will be erratic, as the edge parameter

$$ED = \sum_{M=4} \left| \hat{f}_{i-1,j-m} - \hat{f}_{i,j-m} \right|$$

Here pixels $\hat{f}_{i-1,j-m}$ and $\hat{f}_{i,j-m}$ have been filtered. Huge edges computed, such as the vertical (45^0 or 135^0) edges, would increase the number of line-buffer by two, but performance gained is only approximately 0.5 dB. For real-time chip implementation, we not only consider filtering performance, but also computational complexity and line buffer requirements. With a performance and complexity tradeoff, only horizontal edges are thus computed in the system.

Based on the ED value, the noise threshold Th can be dynamically adjusted to reduce edge distortions. When the ED is high, the threshold is increased accordingly. Furthermore, the amount of noise is an important factor in determining the appropriate adaptive function. The filtering power should be enhanced in a high noise condition; hence, the threshold is turned lowered. The noise ratio (NR) can be approximately computed by using a noise counter (NC). The NC increases by one if a noisy pixel is found. At the end of one frame, the NC records the number of noisy pixels to determine the NR. With ED and NC parameters, the adaptive function F for the noise threshold can be given by

$Th=F(ED, NC)=k1+K2*ED-k3*NC_{t-1}$

Where k1~k3 are constant. For real-time video processing, NC_{t-1} is the NC result that is estimated from the previous frame for computing the noise threshold of the current processed pixel.

To evaluate filtering performance, the median filter and the proposed algorithms were compared. In the proposed method, parameters k1~k3 have to the selected for the PSNR performance varies as each parameter changes. We find that k1=30, K2=0.25, and $k3=1/2^{12}$ can achieve better filtering result in the experiments. The same parameters are used for filtering all images. From practical simulations, our processing time was closed to the peak-valley approach, but was only approximately 1/2 and 1/540 of the median filter and the long-range correlation approach, respectively. Noise-reduction ability with the proposed adaptive filter could achieve much better quality than the median filter and peak-valley methods and was closed to the result of the long-range correlation approach. Thus, the filtering quality of the proposed method out performance state-of-the-art techniques with the same complexity. In general, filtering efficiency (FE) for noise removal not only considers image quality, but also computational complexity. FE can be defined by

$$FE=\frac{\text{Image Quality (PSNR)}}{\text{Computational complexity}}$$

Where the computational complexity is evaluated by the CPU processing time. FE parameters were 40, 94, 0.3, and 146 while using the median-filter peak-valley long-range correlation and the proposed algorithm in the case of NR = 50% for the "Mobile" sequence. Although long-range correlation method can achieve good filtering results its computational complexity is prohibitively high. Hence, its FE drops.

IMPLEMENTATION

Implementation is the final step of a system design. It means converting a new design into operation. This involves installing hardware terminals and training the operating staff. In this phase, user training is critical for minimizing resistance to change and giving the new system a chance to prove its worth.

FILTERING APPLICATION

APPLIED FOR THE IMAGE CORRECTION.

Normal pixel value of the noise image is given below

PIXEL VALUE BEFOR FILTERING

153	166	153	166	159	155	159	159	161	156	151	154	160
	148	155	156	154	149	151	150	155	157	151	149	152
	154	167	161	165	157	154	149	153	152	157	152	155
	148	154	162	155	157	154	164	144	156	155	164	154
	160	164	157	159	169	161	168	161	159	159	161	160
156	160	156	160	156	155	156	159	158	155	154	152	157
	151	156	157	154	151	153	152	154	155	151	150	153
	154	162	158	161	158	154	152	154	155	159	155	156
	152	155	160	157	157	155	160	153	158	159	162	157
	160	162	159	160	165	161	165	161	160	159	161	161
	159	159	159	159	159	162	163	163	161	162	161	165
	166	162	164	164	160	163	164	162	161	161	163	164
	161	159	160	159	163	160	166	164	162	158	157	158
	160	158	161	160	157	161	157	162	161	160	159	158
	157	161	165	159	155	164	162	161	165	158	157	162
	160	164	161	163	159	163	164	162	162	164	164	163
	163	164	162	159	164	162	159	157	161	161	162	158
	146	127	122	116	113	110	110	107	107	105	110	133
	126	95	95	82	69	70	64	66	80	113	110	86
	117	98	88	96	108	101	114	105	95	114	130	148
	140	133	140	134	140	144	142	141	136	135	137	132
	131	124	130	117	135	135	129	123	120	132	135	141
	137	148	150	140	135	110	130	141	126	117	114	119
	120	101	147	125	110	133	114	130	110	126	124	116
	133	111	119	119	100	117	132	147	118	126	117	125
	107	129	142	133	143	81	106	137	145	114	98	127
159	154	159	154	153	155	153	159	155	154	157	150	153
	154	157	158	154	153	155	154	157	153	151	151	154
	154	157	155	157	159	154	155	155	158	158	158	159
	156	156	158	156	157	156	156	159	160	163	160	160
	160	160	161	161	161	161	162	161	161	159	161	162
	160	161	160	160	163	161	164	163	159	162	165	163
	165	163	167	160	163	161	163	162	160	163	166	166
	162	162	162	162	163	163	165	162	161	157	160	159
	161	160	161	156	158	158	160	160	158	155	159	159
	157	159	161	160	161	161	158	162	162	162	161	161
	162	164	159	165	160	161	164	165	164	165	166	160
	161	161	162	162	162	164	160	161	161	164	165	160

The above image is represent to the pixcel value of noice image.That image is convert in the matrix format using dominating set methods and we have finish the entire process than we get the final value of the normal pixcel with out noise.

The img 1.1 is represent to the normal pixcel value of the noiceless image.The key role of the matrix value is get from the substract value of noice pixcel value to noiseless pixcel value.

PIXEL VALUE AFTER FILTERING

	0	156	154	154	154	153	155	155	155	154	152	152	151	153	154			
154	153	153	152	153	153	151	151	151	151	154	154	157	157	154	154			
154	154	155	155	156	155	155	155	156	157	156	156	155	156	158	159			
159	160	160	160	160	160	161	161	161	161	159	159	159	160	159	159			
159	159	159	161	162	161	161	161	162	163	163	163	162	160	160	161			
162	161	161	161	163	162	161	160	159	160	160	163	162	162	158	157			
157	158	158	160	156	157	157	157	159	158	158	158	158	157	157	157			
159	159	159	158	161	161	161	158	158	160	161	160	161	159	160	160			
162	162	162	163	163	161	161	161	161	162	162	160	159	159	161	161			
160	146	127	122	118	113	109	109	107	107	106	104	104	109	109	95			
85	69	68	66	66	66	66	80	89	89	89	94	94	94	101	103	104	95	95
95	116	133	133	133	133	134	134	140	140	136	135	131	131	131	131			
130	124	126	126	132	127	123	123	129	135	135	137	124	124	124	122			
120	120	126	123	114	114	109	108	108	119	119	119	110	114	110	124			
121	120	120	111	111	106	106	106	117	119	128	126	118	125	117	120			
120	129	128	106	106	106	116	116	114	114	114	116	121	0					
156	158	157	156	155	155	156	157	157	157	155	155	154	156	157	157			
156	154	153	154	154	154	153	151	154	154	155	157	158	158	155	155			
155	157	158	157	156	156	156	157	157	157	157	156	158	159	160	160			
160	160	160	161	161	161	162	161	161	161	160	161	161	161	160	160			
160	161	163	163	163	162	162	162	163	163	165	164	164	163	163	163			
163	162	163	164	164	162	162	162	162	162	163	162	162	161	160	158			
159	159	160	160	160	160	160	160	160	159	159	159	159	159	159	161			
161	160	160	161	162	162	162	161	161	162	161	163	161	162	162	163			
163	163	164	164	163	163	162	162	162	162	162	161	161	161	162	162			
160	146	127	122	118	110	109	108	108	107	106	104	110	133	126	95			
82	69	66	66	66	80	110	112	117	117	117	103	106	106	114	108	114		
114	119	136	136	135	135	134	140	141	142	141	136	135	135	132	135			
131	131	130	132	133	133	132	129	132	137	137	137	137	137	140	135			
132	129	129	128	126	123	120	119	119	120	125	125	122	120	120	120			
124	124	123	124	116	122	111	118	118	119	128	132	144	140	136	120			
123	129	133	133	119	119	119	122	119	116	116	116	124	126	121				
155	158	157	157	155	155	156	156	157	157	157	155	155	156	157	157			
157	154	154	155	155	155	154	154	154	155	155	157	157	157	156	155			
155	157	158	157	157	156	156	156	157	157	157	158	159	160	160	160			
160	160	161	161	162	162	161	161	161	161	161	162	161	161	161	161			
160	161	163	163	163	162	162	162	163	164	165	164	164	163	164	164			
163	163	163	165	165	165	163	162	163	162	163	162	161	161	160	159			
160	160	160	159	159	159	160	161	160	158	158	159	159	159	161	161			
161	161	161	161	162	162	162	162	162	162	162	163	162	162					

IMAGE AFTER FILTER APPLICATION

FUTURE DEVELOPMENT

In this paper we use only Bit map files*BMP images has been processed. But in future, other extension files including joint photographic expert's group (ipeg) images can also be processed. Colour images can also be processed.

CONCLUSION

The implementation of Median filter is reviewed in this project. The behavior and performance is analyzed using dominating methods. Based on the threshold value of the median filtering algorithm have been developed and summarized here. The optimization goal is to minimize the absolute error, resulting these filter will attenuate noise maximally while preserving certain desired.

By using this filtering technique the edges images can be preserved, while reducing the noise to its maximum capability.

References

[1] " KRASULA, L., KLÍMA, M., ROGARD, E., JEANBLANC, E. MATLAB-based applications for image processing and image quality assessment – Part I: Software description. Radioengineering, 2011, vol. 20, no. 4, p. 1009 – 1015.

[2] " BREMOND, R., TAREL, J.-P., DUMONT, E., HAUTIERE, N. Vision models for image quality assessment: One is not enough. Journal of Electronic Imaging, October – December 2010, vol. 19, no. 4, p. 043004-1 to 043004-14.

[3] " SHEIKH, H. R., BOVIK, A. C. Image information and visual quality. IEEE Transaction on Image Processing, February 2006, vol. 15, no. 2. [Online]. Available at: http://live.ece.utexas.edu/ research/Quality/index.html.