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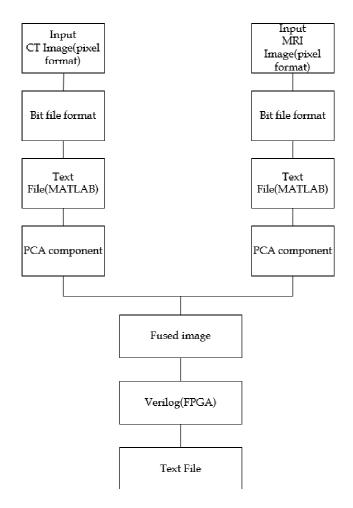
FPGA Implementation of Medical Image Fusion

P. Madhanraj¹, M. Jeshwanth Raj², Mrs Princy Magdaline P³

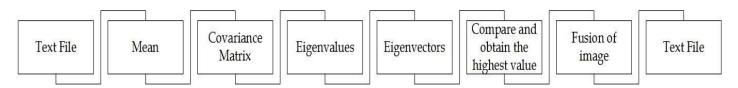
I. OBJECTIVE

- 1) To combine Computed Tomography(CT) and Magnetic Resonance Image(MRI)
- To obtain clear images
- 3) To maintain the accuracy PCA

II. BLOCK DIAGRAM



III. IMPLEMENTATION OF PCA ALGORITHM IN FPGA



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IV. COVARIANCE MATRIX

- 1) To measure the amount of dependency between two variables.
- 2) A positive covariance values are large.
- 3) A negative covariance large values associated with small values.
- 4) Depends on the scale of the variable.

V. PROPOSED SYSTEM

Steps Involved In Obtaining Components Of Pca Algorithm

- 1) Covariance Matrix
- 2) Eigenvalues and Eigenvectors
- 3) Sorting and comparing the highest value obtained which contains most of the information
- 4) The Value is multiplied with the original image and added
- 5) The fused image will be obtained

VI. IMPLEMENTATION FLOW

- 1) Image text file using Matlab
- A. VERILOG
- 1) Text File Hexadecimal values of image
- 2) Mean
- 3) hex values gives individual pixel intensity for entire image
- 4) Variance
- 5) to classify regions (i.e) variation between neighbouring pixels
- 6) Covariance
- 7) changes existing between neighbouring values
- 8) Output will be correlated values which reduce the dimensions of an image In the form of a matrix

VII. IMPLEMENTATION FLOW (CONTD)

- 1) Eigenvectors
- 2) Direction of the new space
- 3) Eigenvalue
- 4) Magnitude of the new space
- 5) Sorting the eigenvalues and eigen vectors in decending order
- 6) Eigenvector with highest eigenvalue is significant Contains the maximum information of the image
- 7) Image fusion
- 8) Highest value is multiplied with the original image
- 9) Original image is fused
- 10) Convert to text file
- 11) Values are converted to text
- 12) Output is verified in Matlab by converting the text file to an image

VIII. TOOLS REQUIRED

- A. Software
- 1) Matlab
- 2) Xilinx ISE (Verilog)
- B. Hardware
- 1) Spartan3 FPGA
- 2) PC



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IX. APPLICATION

- 1) Medical Diagnosis
- 2) Clinical Application
- 3) Research analyse in image processing

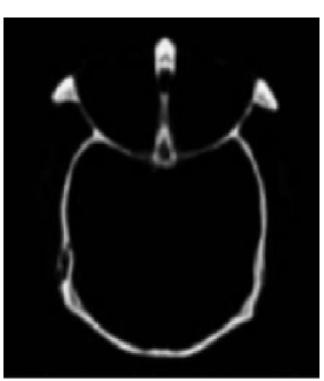


Figure 1: Input image Figure 2: Input image (CT) (MRI)



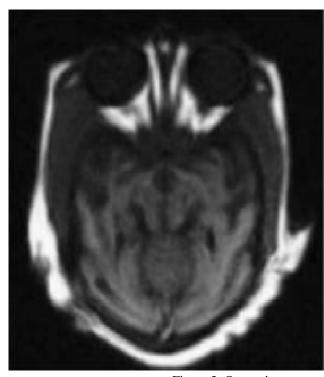


Figure 3: Output image (CT+MRI)

			1,005,456 ps					
Name	Value	1,005,455 ps	1,005,456 ps	1,005,457 ps	1,005,458 ps	1,005,459 ps	1,005,460 ps	1,00
5 [1,0:10]	[14460.0600	14460.060000,144	8.040000,14436.02	0000,14424.000000,	14411.980000,1439	9.960000,14387.940	000,14375.920000,1	4
5 [2,0:10]	[14448.0300	[14448.030000,1443	6.020000,1 44 24.01	0000,1 44 12.000000,	14399.990000,1438	7.980000,14375.970	000,14363.960000,1	4
5 [3,0:10]	[14436.0000	14436.000000,1442	4.000000,14412.00	0000,14400.000000,	14388.000000,14376	.000000,14364.000	000,14352.000000,1	4
4,0:10	[14423.9700	14423.970000,1441	1.980000,14399.99	0000,14388.000000,	14376.010000,14364	.020000,14352.030	000,14340.040000,1	4
5,0:10 [5,0:10]	[14411.9400	14411.940000,1439	9.960000,14387.98	0000,14376.000000,	14364.020000,1435	.040000,14340.060	000,14328.080000,1	4
5 [6,0:10]	[14399.9100	14399.910000,1438	7.940000,14375.97	0000,14364.000000,	14352.030000,14340	.060000,14328.090	000,14316.120000,1	4
5 [7,0:10]	[14387.8800	14387.880000,1437	5.920000,14363.96	0000,14352.000000,	14340.040000,14328	.080000,14316.120	000,14304.160000,1	4
5 [8,0:10]	[14375.8500	14375.850000,1436	3.900000,14351.95	0000,14340.000000,	14328.050000,14316	. 100000, 14304. 150	000,14292.200000,1	4
5 [9,0:10]	[14363.8200	14363.820000,1435	1.880000,14339.94	0000,14328.000000,	14316.060000,14304	. 120000, 14292. 180	000,14280.240000,1	4
5 [10,0:10]	[0.000000,0	[0.000000,0.0	00000,0.000000,0.0	000000,0.000000,0.0	00000,0.000000,0.0	00000,0.000000,0.0	00000,0.000000]	
▶ 🚮 i[31:0]	00000000000			000000000000000000000000000000000000000	000000000000000101			
▶ 🚮 j[31:0]	00000000000			000000000000000000000000000000000000000	0000000000000001010			
totala[31:0]	0000000000			000000000000000000000000000000000000000	11101011101000001	•		
▶ ■ totalb[31:0]	00000000000			000000000000000000000000000000000000000	11101011101000001			
16 meana	1204.000000			1204	000000			
lo meanb	1204.000000			1204	000000			

Output

X1: 1,005,456 ps



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