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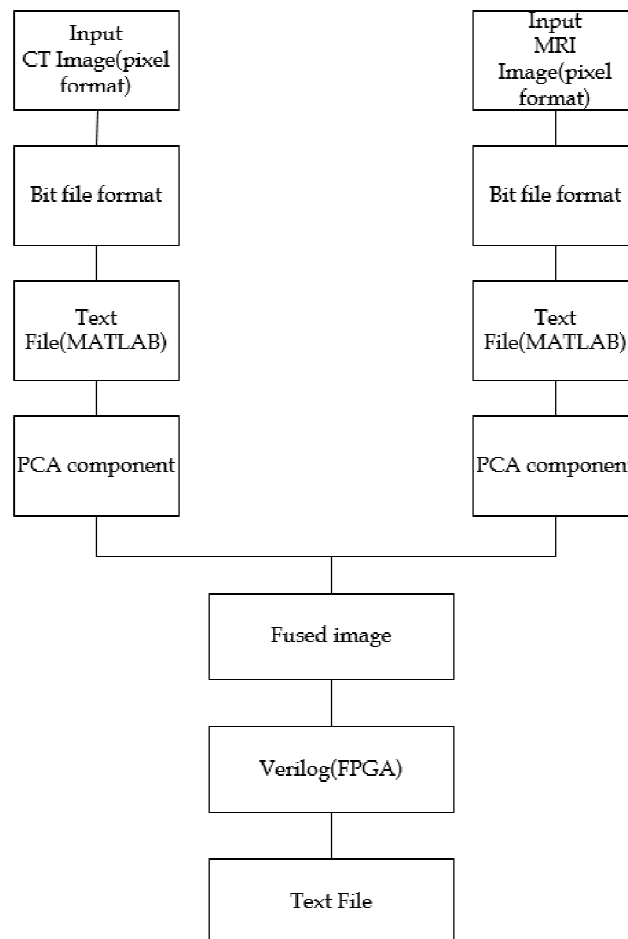
FPGA Implementation of Medical Image Fusion

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

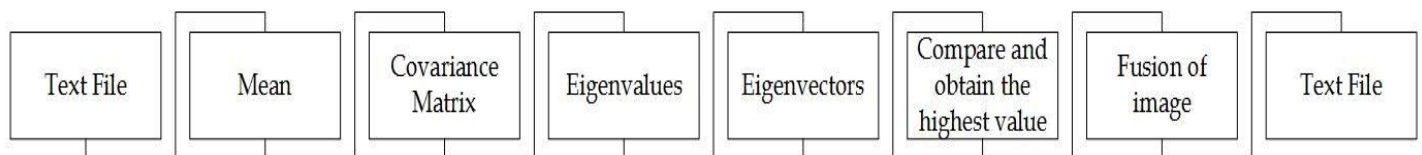
I. OBJECTIVE

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

II. BLOCK DIAGRAM



III. IMPLEMENTATION OF PCA ALGORITHM IN FPGA



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 descending 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

IX. APPLICATION

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

Output

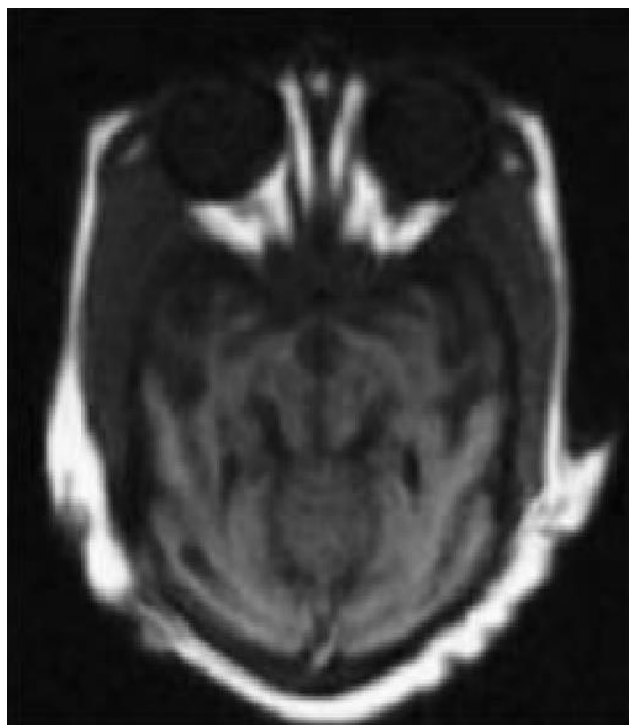


Figure 1: Input image (CT) Figure 2: Input image (MRI)

Figure 3: Output image (CT+MRI)

Output

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	1,005,461 ps	
[1,0:10]	[14460.0600	[14460.060000,14448.040000,14436.020000,14424.000000,14411.980000,14399.960000,14387.940000,14375.920000,14363.900000,14351.880000]	14448.030000	14436.020000	14424.000000	14411.980000	14399.990000	14387.980000	14375.970000
[2,0:10]	[14448.0300	[14448.030000,14436.020000,14424.000000,14412.000000,14400.000000,14388.000000,14376.000000,14364.000000,14352.000000,14340.000000]	14436.000000	14424.000000	14412.000000	14400.000000	14388.000000	14376.000000	14364.000000
[3,0:10]	[14436.0000	[14436.000000,14424.000000,14412.000000,14400.000000,14388.000000,14376.000000,14364.020000,14352.030000,14340.040000,14328.050000]	14423.9700	14411.980000	14399.990000	14388.000000	14376.010000	14364.020000	14352.030000
[4,0:10]	[14423.9700	[14423.970000,14411.980000,14399.990000,14388.000000,14376.010000,14364.020000,14352.030000,14340.040000,14328.050000,14316.060000]	14411.9400	14411.940000	14399.960000	14387.980000	14376.000000	14364.020000	14352.040000
[5,0:10]	[14411.9400	[14411.940000,14399.960000,14387.980000,14376.000000,14364.020000,14352.040000,14340.060000,14328.080000,14316.100000,14304.120000]	14399.9100	14399.910000	14387.940000	14375.960000	14364.000000	14352.030000	14340.060000
[6,0:10]	[14399.9100	[14399.910000,14387.940000,14375.960000,14364.000000,14352.030000,14340.060000,14328.090000,14316.120000,14304.140000,14292.160000]	14387.8800	14387.880000	14375.920000	14363.960000	14352.000000	14340.040000	14328.080000
[7,0:10]	[14387.8800	[14387.880000,14375.920000,14363.960000,14352.000000,14340.040000,14328.080000,14316.120000,14304.160000,14292.200000,14280.240000]	14375.8500	14375.850000	14363.900000	14351.950000	14340.000000	14328.050000	14316.100000
[8,0:10]	[14375.8500	[14375.850000,14363.900000,14351.950000,14340.000000,14328.050000,14316.100000,14304.150000,14292.200000,14280.240000,14268.280000]	14363.8200	14363.820000	14351.880000	14339.940000	14328.000000	14316.060000	14304.120000
[9,0:10]	[14363.8200	[14363.820000,14351.880000,14339.940000,14328.000000,14316.060000,14304.120000,14292.180000,14280.240000,14268.280000,14256.320000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	[0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000]	
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totala[31:0]	0000000000								
totalb[31:0]	0000000000								
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meanb	1204.000000								



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45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



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