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FPGA Implementation of Medical Image Fusion

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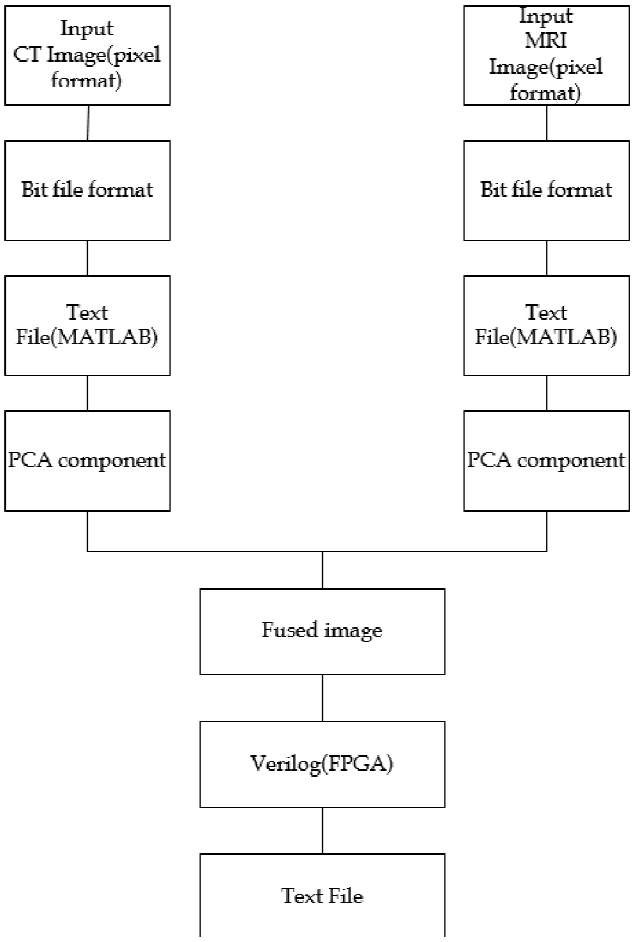
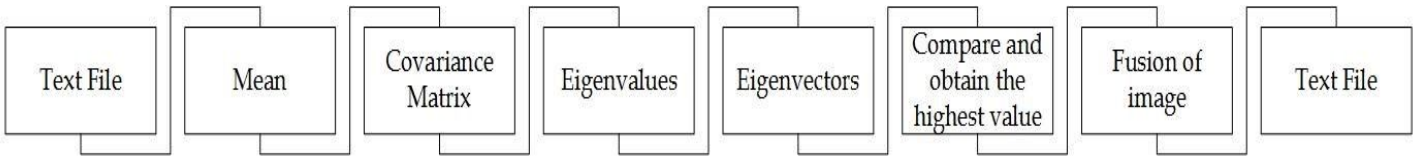
I. OBJECTIVE

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 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

Output

Figure 1: Input image (CT)

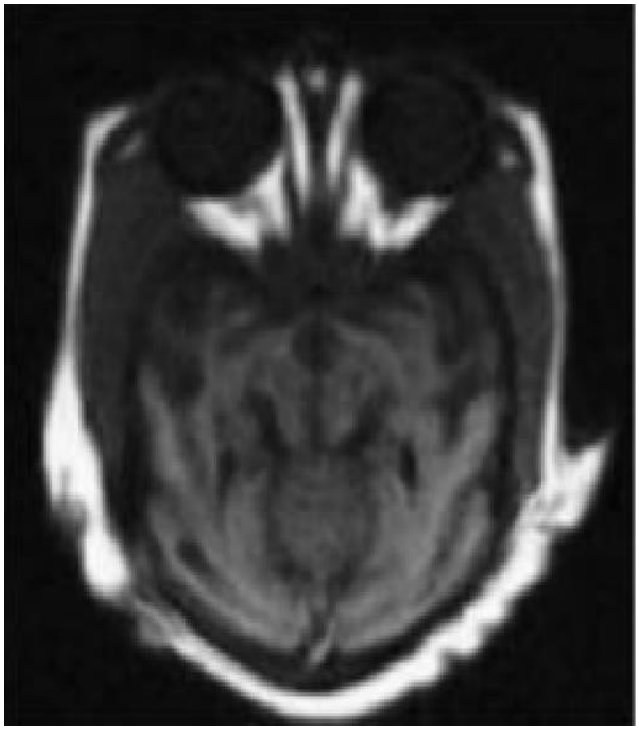

Figure 2: Input image (MRI)

Figure 3: Output image (CT+MRI)

Output

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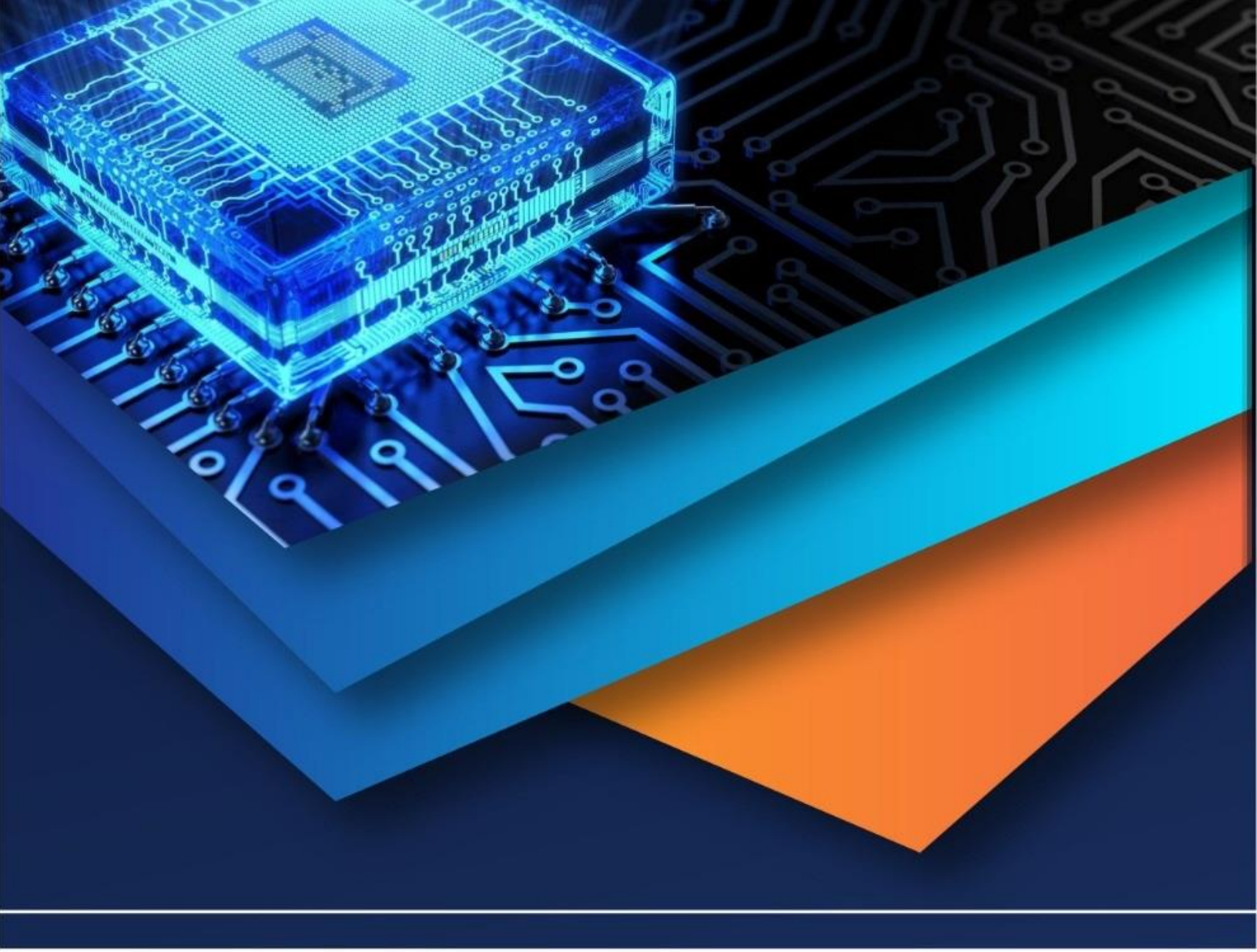

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