## LIST OF FIGURES

1.1 Placenta and fetus during pregnancy ........................................ 7
1.2 Human Placenta in Diabetes ....................................................... 11
1.3 An ultrasound image displaying a normal placenta (long and thin) on the left and abnormal (small and thick) placenta on the right ........................................................................ 13
1.4 An ultrasound image displaying abnormal placental texture ......... 14
2.1 Wavelet Pyramid of an Image $X(x, y)$ ........................................ 29
2.2 Nearest Neighbors of x and y in A and H respectively ............... 36
2.3 Ultrasound Systems – Sound Wave Focusing ............................ 57
2.4 Ultrasound System Block Diagram ........................................... 58
2.5 Schematic diagram of a typical clinical ultrasound beam .......... 59
3.1 Wavelet Decomposition of a 2D Image ...................................... 76
3.2 Multilevel Wavelet Decomposition of an Image ....................... 76
3.3 Level-1 Haar Wavelet Decomposition of an ultrasound placenta Image ......................................................................... 78
3.4 Multilevel Decomposition of Ultrasound Placenta using Haar Wavelet ........................................................................... 81
3.5 Haar Wavelet Decomposition of multi-view (longitudinal and transverse) ultrasound placenta Image ........................................ 83
3.6 Multi-view of Ultrasound Placenta complicated by GDM ........ 84
3.7 Images from left to right is the synthesized image of placenta obtained from Haar, Daubechies and Symlet Wavelet Decomposition (15 weeks gestational age) ........................................ 85
4.1 Wavelet Decomposition and Image Fusion using Fusion Rules ......................................................................................... 93
4.2  Matching the images obtained from multi-view ........................................ 94
4.3  Transverse scans of placenta (10 weeks Gestational Age)  
     image reconstructed using Wavelet Image Fusion .............................. 97
4.4  Image Fusion of Wavelet Decomposed Ultrasound Placenta 
     using Max Approximation and Mean Detail ...................................... 99
4.5  Image fused using the fusion rule (a)Max Max (b) Max Min 
     (c) Max Mean (d) Min Max (e) Min Min (f)Min Mean 
     (g) Mean Max (h) Mean Min (i) Mean Mean approximation  
     and detail of 15 weeks of Gestational Age ........................................ 101
4.6  Quality Measures for various fusion rules using entropy,  
     mean, Standard deviation, average difference, signal to noise 
     ratio, spatial frequency, PSNR, RMSE, NAE, NCC and SC.................. 112
5.1  Histogram Equalization and Feature extraction of Ultrasound 
     Placenta .................................................................................................. 119
5.2  Haar Wavelet Decomposition of Left Placenta with its  
     equivalent histogram ........................................................................... 120
5.3  Haar Wavelet Decomposition of Right Placenta with its 
     equivalent histogram ........................................................................... 120
5.4  Synthesized Image from image fusion of left and right 
     placenta with its histogram ................................................................... 121
5.5  Asymmetric gray level co-occurrence matrices. (a) is original 
     image, (b) is GLCM in 0° direction (c) is GLCM in 45° 
     direction .................................................................................................. 125
5.6  Symmetric gray level co-occurrence matrices. Left is the 
     original image, right is GLCM in 0° direction ...................................... 126
6.1  Synthesized Ultrasound Placenta .......................................................... 134
6.2  Masks used by Sobel Operator ................................................................ 135