Figure Captions

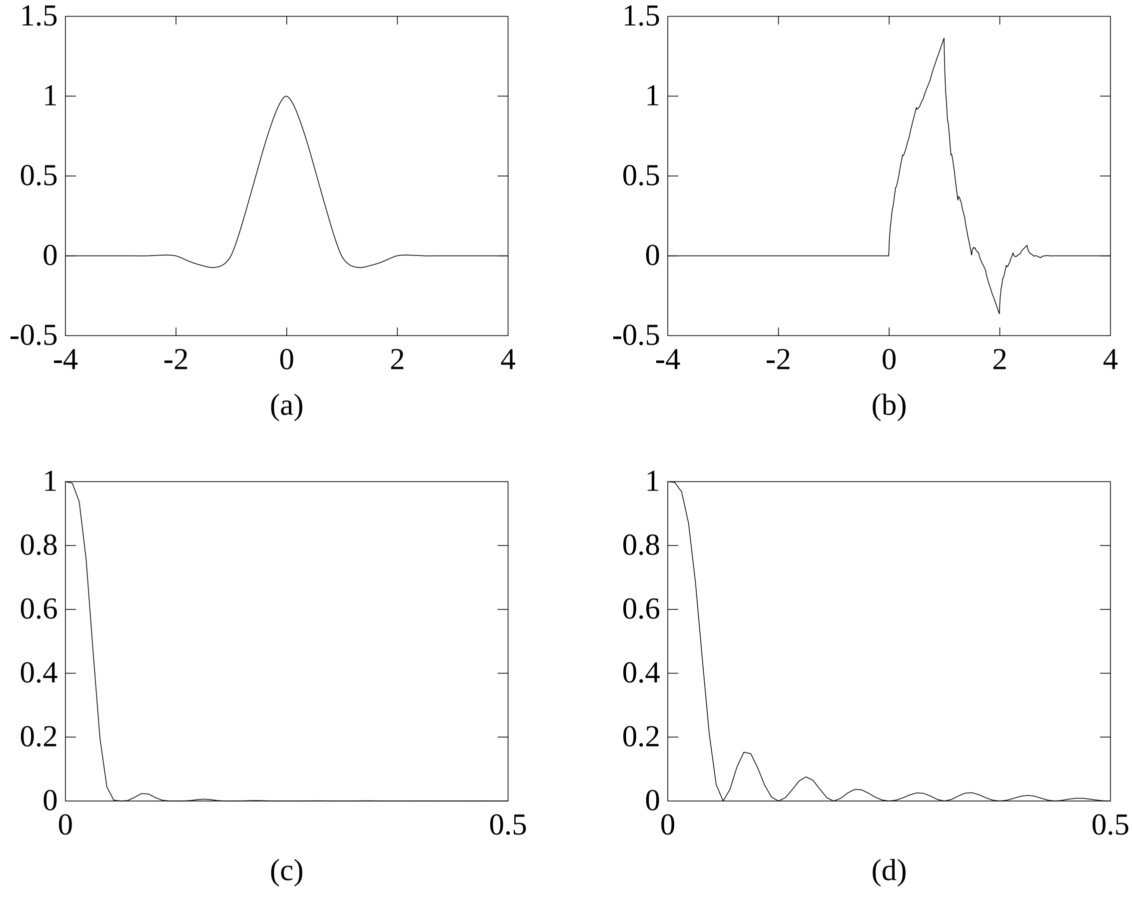
Figure 1. Plots of the auto-correlation function $\Phi(x)$ and Daubechies's scaling function $\varphi(x)$ with $L = 2M = 4$. (a) $\Phi(x)$. (b) $\varphi(x)$. (c) Magnitude of the Fourier transform of $\Phi(x)$. (d) Magnitude of the Fourier transform of $\varphi(x)$.

Figure 2. Plots of the auto-correlation function $\Psi(x)$ and Daubechies's wavelet $\psi(x)$ with $L = 2M = 4$. (a) $\Psi(x)$. (b) $\psi(x)$. (c) Magnitude of the Fourier transform of $\Psi(x)$. (d) Magnitude of the Fourier transform of $\psi(x)$.

Figure 3. The Lagrange iterative interpolation of the unit impulse sequence with the associated quadrature mirror filter of length $L = 4$, i.e., $a_1 = 9/8$ and $a_3 = -1/8$. Black nodes at $x = 0$ indicate 1 and white nodes at $x = \pm 1$ have value 0. Shaded nodes have values other than 0 or 1. Note that the values of nodes existing at the j-th scale do not change at the $(j-1)$-th scale and higher. The result of repeating this procedure converges to $\Phi(x)$ as $j \to -\infty$.

Figure 4. The expansion of the signal in the auto-correlation shell using the auto-correlation functions of Daubechies's wavelet with $L = 2M = 4$. The top row is the original signal. Note that the locations of edges in the original signal correspond to the zero-crossings in this representation.

Figure 5. The average coefficients on different scales (The top row is the original signal).



1.5
1
0.5
0
-0.5
-4
-2
0
2
4
(a)
1.5
1
0.5
0
-0.5
-4
-2
0
2
4
(b)
1
0.8
0.6
0.4
0.2
0
0
0.5
(c)
1
0.8
0.6
0.4
0.2
0
0
0.5
(d)

Figure 1:

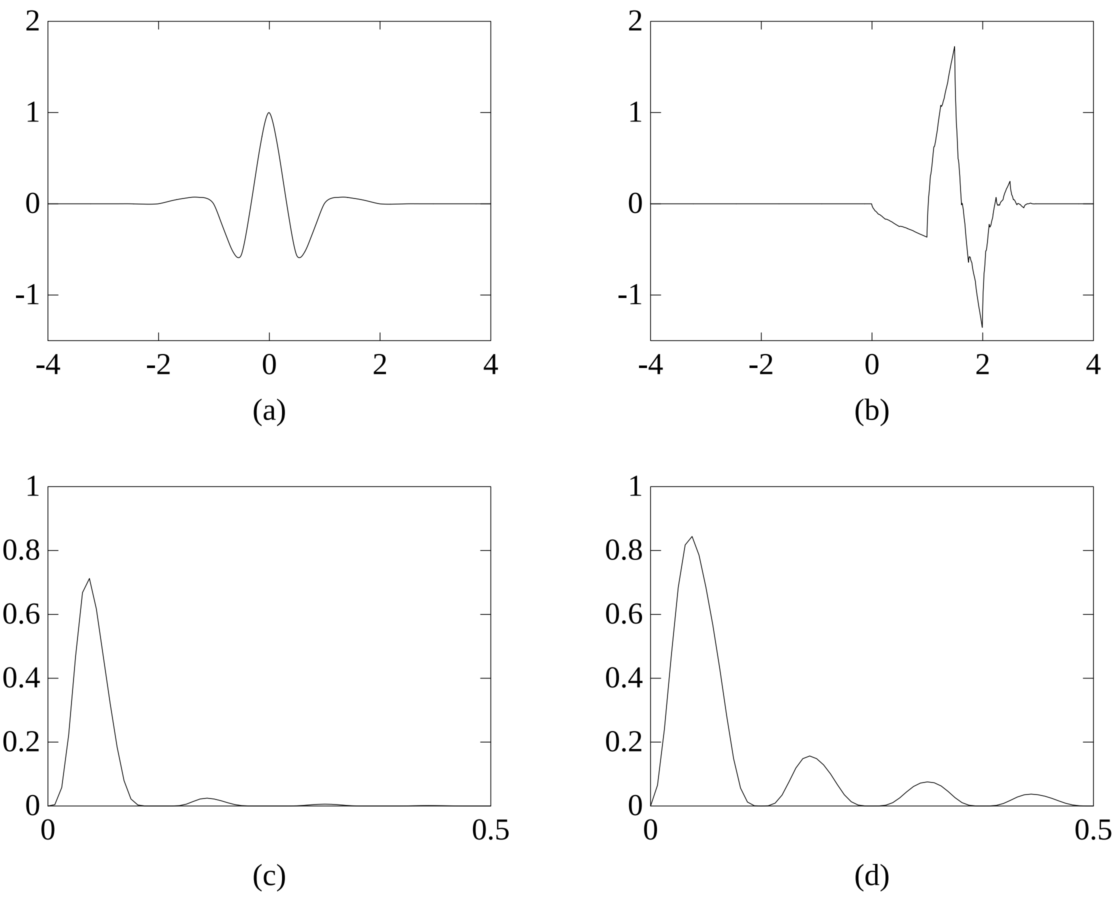


Figure 2:

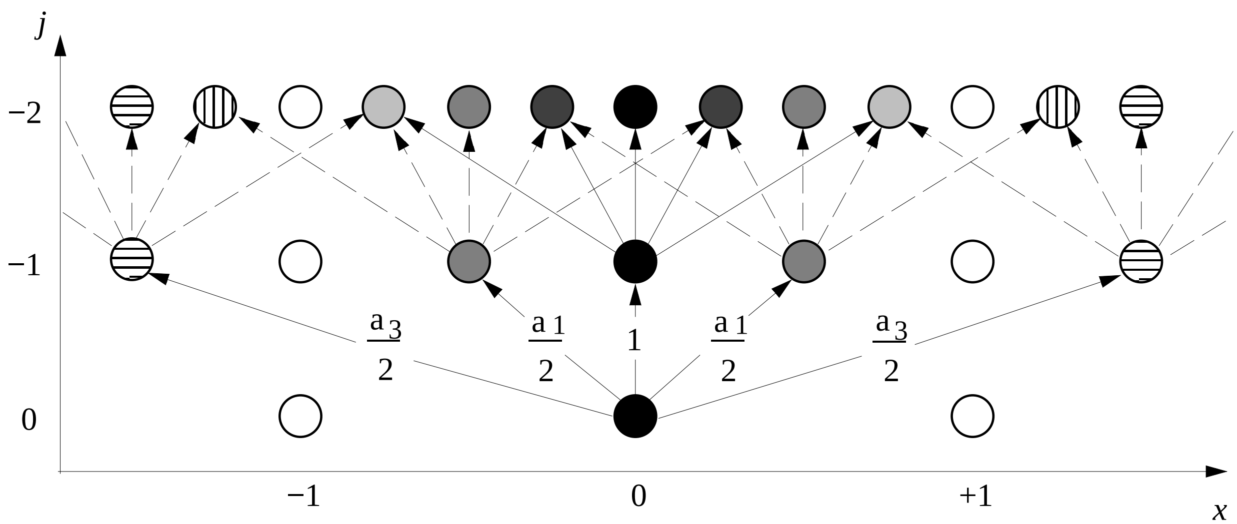


Figure 3:

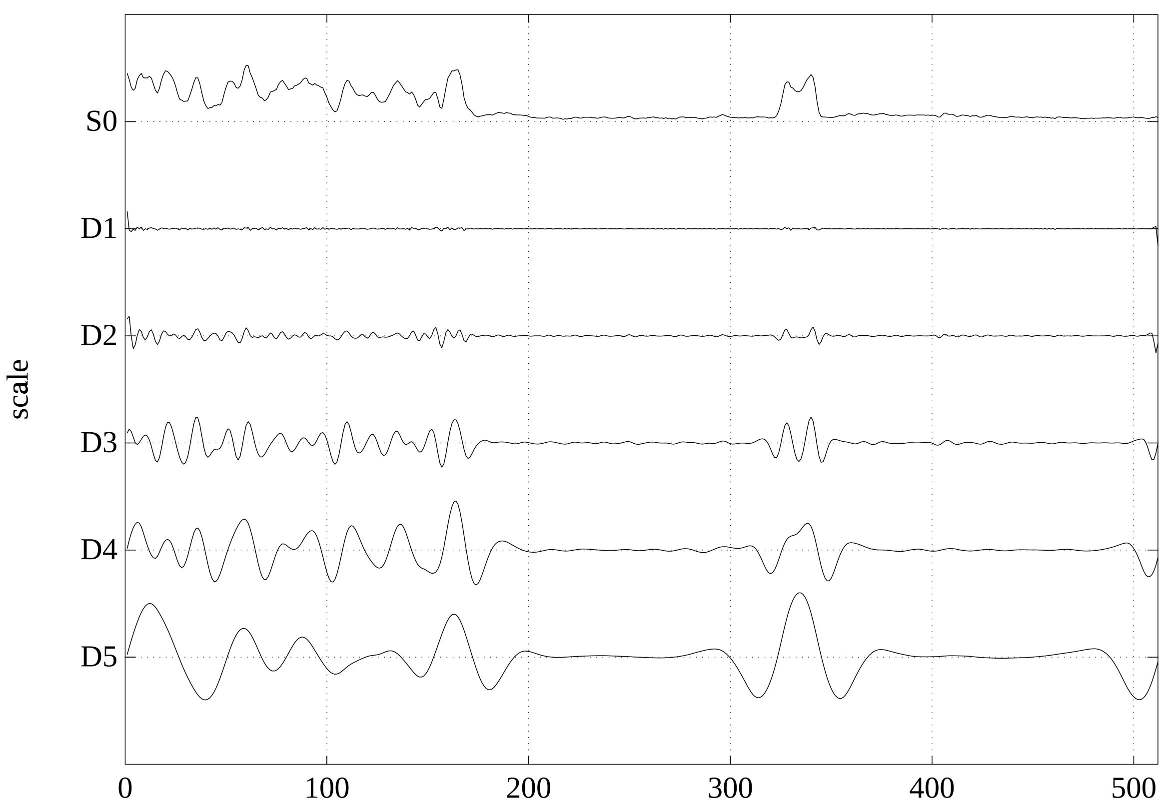


Figure 4:

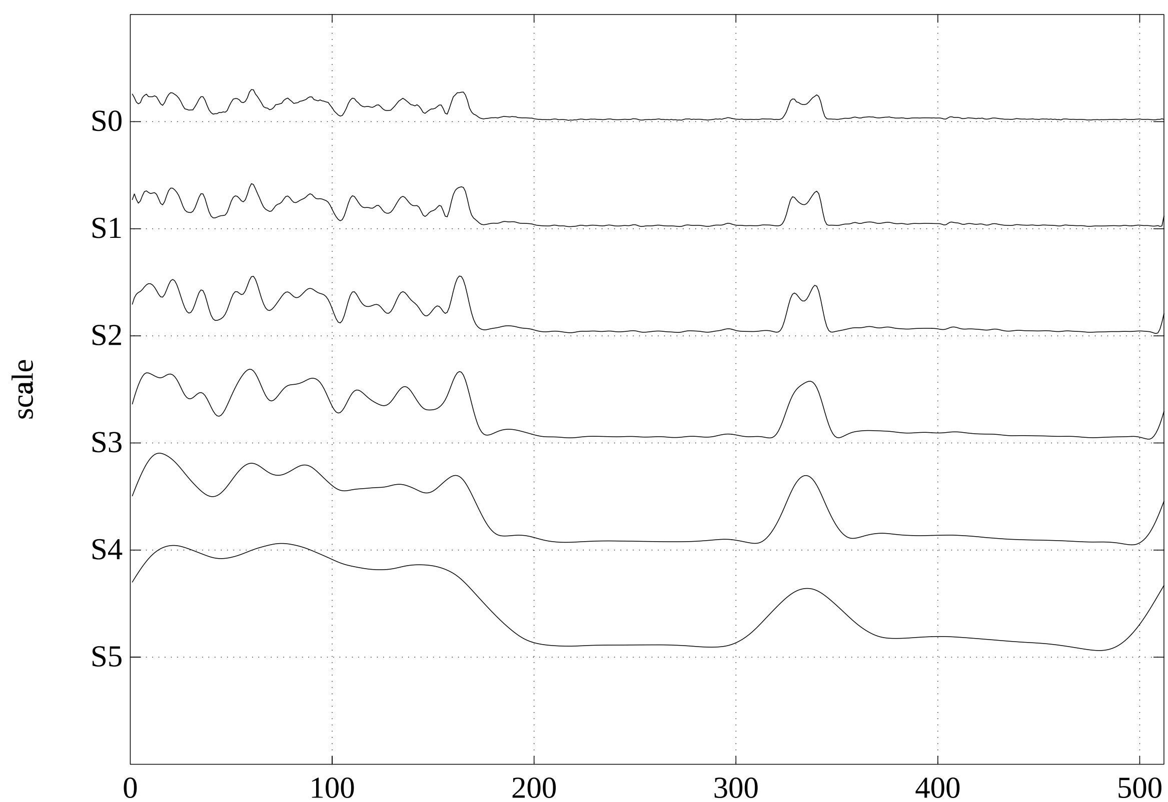


Figure 5: