

Applied Algebra, Homework 6

Due Monday, March 9

Consider the signal $y = [2 \ 2 \ 4 \ 6 \ 8 \ 8 \ 12 \ 10]^t$.

1. Use the Haar wavelet transform to obtain 2 vectors of length 4, representing the "trend" and the "detail" for the signal
2. Use these vectors to write y in terms of the basis consisting of vectors t_0, t_1, t_2, t_3 and d_0, d_1, d_2, d_3 , where $t_i = e_{2i} + e_{2i+1}$ and $d_i = e_{2i} - e_{2i+1}$
3. Repeat the process on the trend to obtain a new pair of vectors of length 2, representing the "trend of the trend" and "detail of the trend"
4. Use these together with the previous information to write y in terms of the basis consisting of the vectors t'_0, t'_1, d'_0, d'_1 and d_0, d_1, d_2, d_3 , where $t'_0 = e_0 + e_1 + e_2 + e_3$, $t'_1 = e_4 + e_5 + e_6 + e_7$, $d'_0 = e_0 + e_1 - e_2 - e_3$, $d'_1 = e_4 + e_5 - e_6 - e_7$, and where the d_i 's are as before.
5. Repeat this process a final time to write y in terms of the basis consisting of the vectors:

$$e_0 + e_1 + e_2 + \cdots + e_7,$$

$$e_0 + e_1 + e_2 + e_3 - e_4 - e_5 - e_6 - e_7,$$

d'_0 and d'_1 from part 4 above

d_0, d_1, d_2, d_3 from part 3 above