

Mathematics of Image Processing

Worksheet #7 - working with wavelets

Name: _____

Box #: _____

Use the low pass - high pass analysis and synthesis filter pairs the table below.

$$\begin{array}{ll} l_a & [1, 1] \\ h_a & [1, -1] \\ l_s & [0.5, 0.5] \\ h_s & [-0.5, 0.5] \end{array}$$

1. Let X be a signal on 128 points with at least four frequencies and random noise. Compute the 1-stage periodic wavelet transform using the command:

$$[CA, CD] = \text{dwt}(X, \mathbf{1a}, \mathbf{ha}, \text{'mode'}, \text{'per'})$$

Where $\mathbf{1a}$ and \mathbf{ha} are given above. Plot CA and CD together. What do you observe?

2. Compute the synthesis CA and CD

$$Y = \text{idwt}(CA, CD, \mathbf{1s}, \mathbf{hs}, \text{'mode'}, \text{'per'})$$

Compare X and Y . What do you observe.

6. Repeat the steps analogous to the above for a 2 stage decomposition.

7. Repeat all of the above for at least 2 more filter systems obtained from the `wfilters` command, one of which should be the Haar filter system.

```
[la,ha,ls,hs] = wfilters('db2')
```