

MATH 416, extra project 1

Implement the 4th level discrete Haar transform on the sequence  $s = \{\sin(2\pi n/512) : n = 0, \dots, 511\}$ . In the resulting sequence, threshold (i.e., set to 0) all the coefficients below  $\epsilon = 0.001$ . Apply the 4th level inverse discrete Haar transform to the thresholded sequence, call it  $s'$ .

Plot the difference between this new sequence  $s'$  and the sequence  $s$ .

Repeat for  $\epsilon = 0.01$  and  $\epsilon = 0.1$ , each time computing the compression rate (i.e., the ratio of non-zero coefficients in the original Haar sequence and the number of non-zero coefficients in the thresholded sequence), and the approximation error in terms of the  $\|s - s'\|_2$ .