

FACULTY OF ENGINEERING SCIENCE

Denoising and inpainting with wavelets

Wavelets with application in signal and Image processing

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1 Wavelet-based denoising

1.1 A univariate functions with noise

1.1.1 Question 2.1

Function being sampled, $N = 1000$, between $[-2, 2]$

$$f(x) = (2 + \cos(x))|x| \operatorname{sign}(x - 1)$$

Tested for wavelet transform of 4 levels deep, using the Daubechies 2

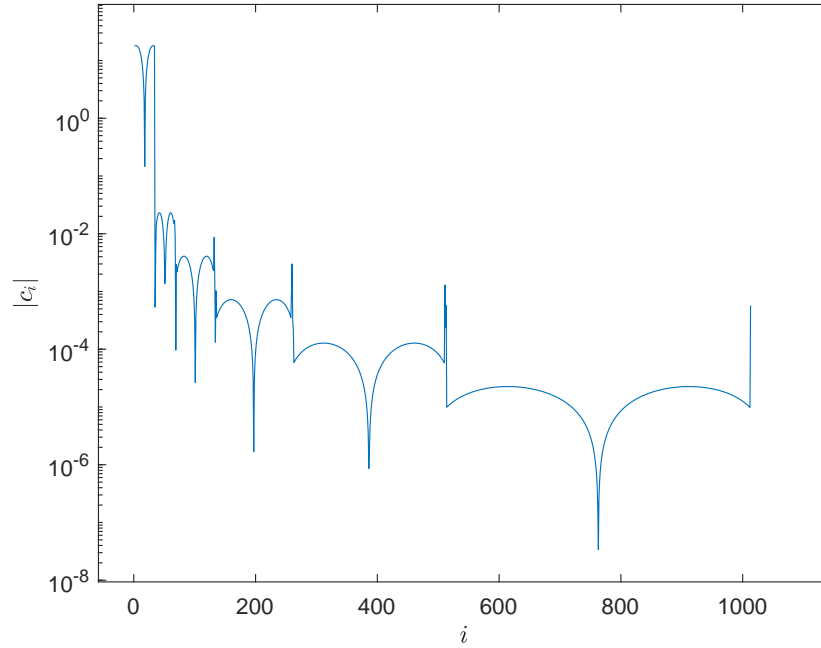


Figure 1: Coefficients of Wavelet transform (4 levels deep, using the Daubechies 2, $N = 1000$ sample points, between $[-2, 2]$

We can see in fig. 1, that the size of the coefficients decreases as i increases. The meaning of this is that the coefficients of small size are of less importance to the reconstruction of the signal, and can be more easily effected by added noise.

1.1.2 Task 2.2

1.1.3 Question 2.3

1.2 Images with noise

1.2.1 Task 2.4

1.2.2 Question 2.5

1.3 Using a redundant wavelet transform

1.3.1 Task 2.6

1.3.2 Question 2.7

1.3.3 Question 2.8

1.3.4 Task 2.9

2 Wavelet-based inpainting

2.1 An iterative algorithm

2.1.1 Task 3.1

2.1.2 Question 3.2

2.1.3 Question 3.3

2.1.4 Question 3.4