Sliding DCT

Mathematical Models and Methods for Image Processing

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https://boracchi.faculty.polimi.it/teaching/MMMIP.htm

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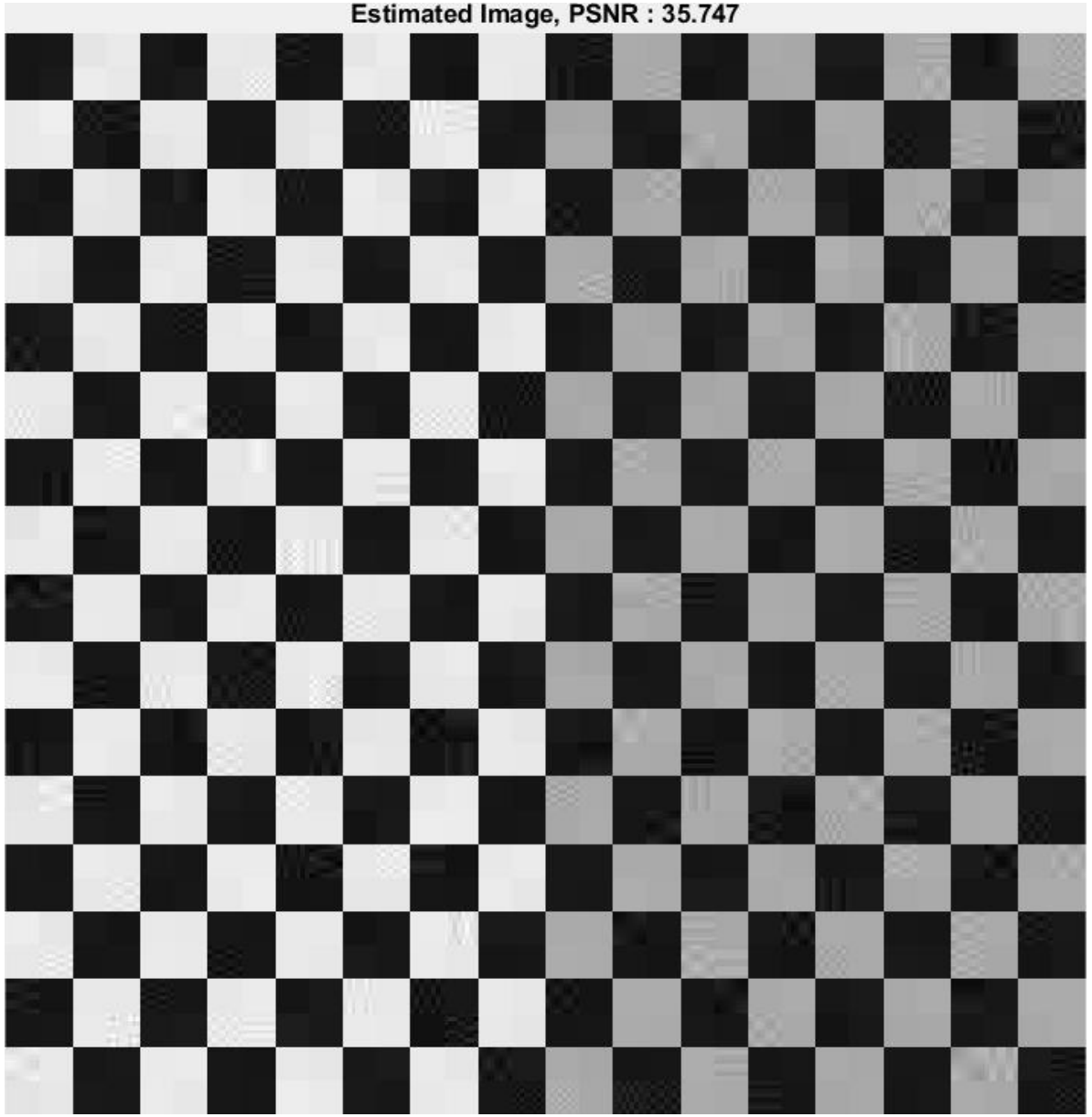
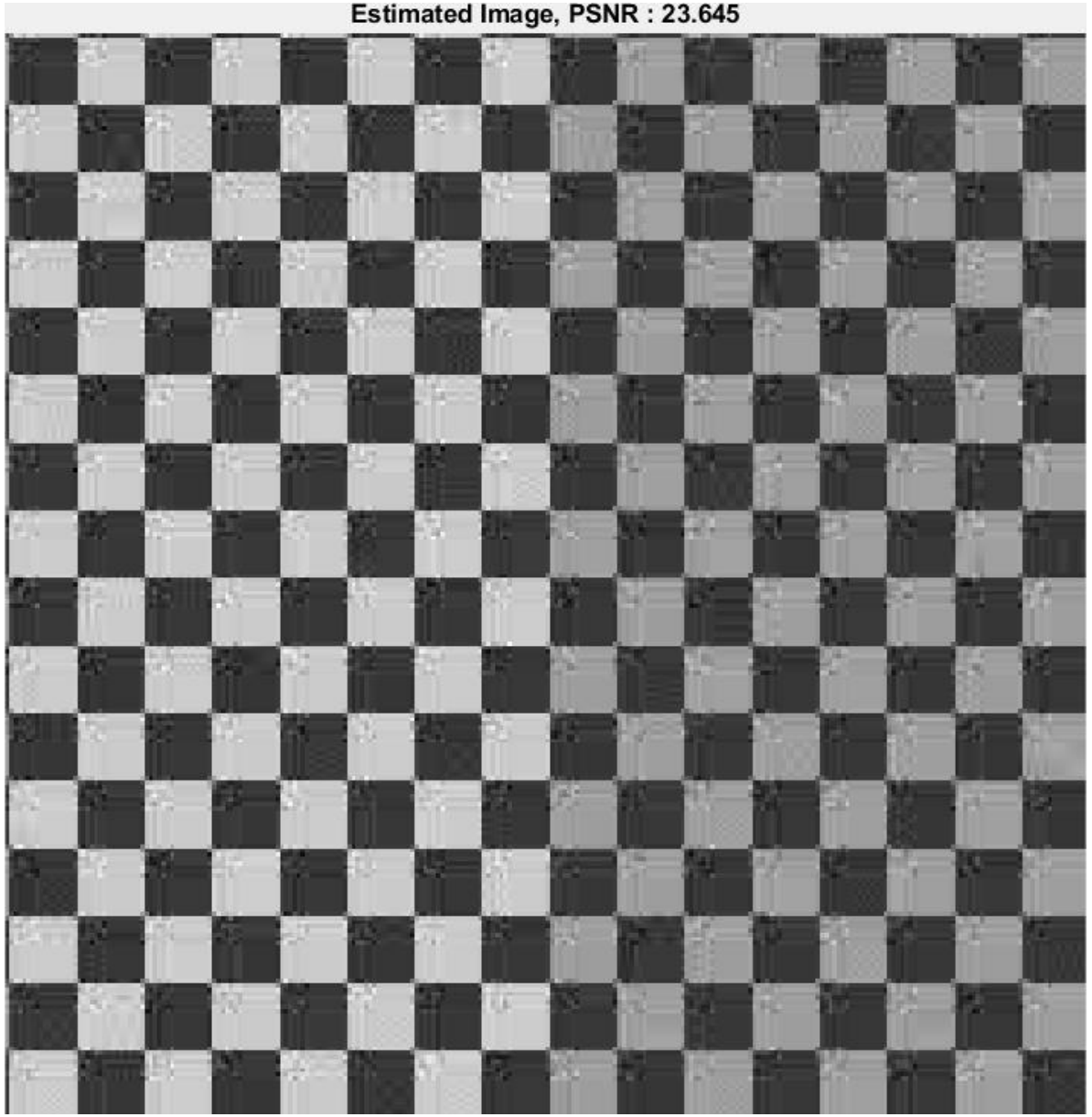
No shift



Shift [1 row, 1 col]



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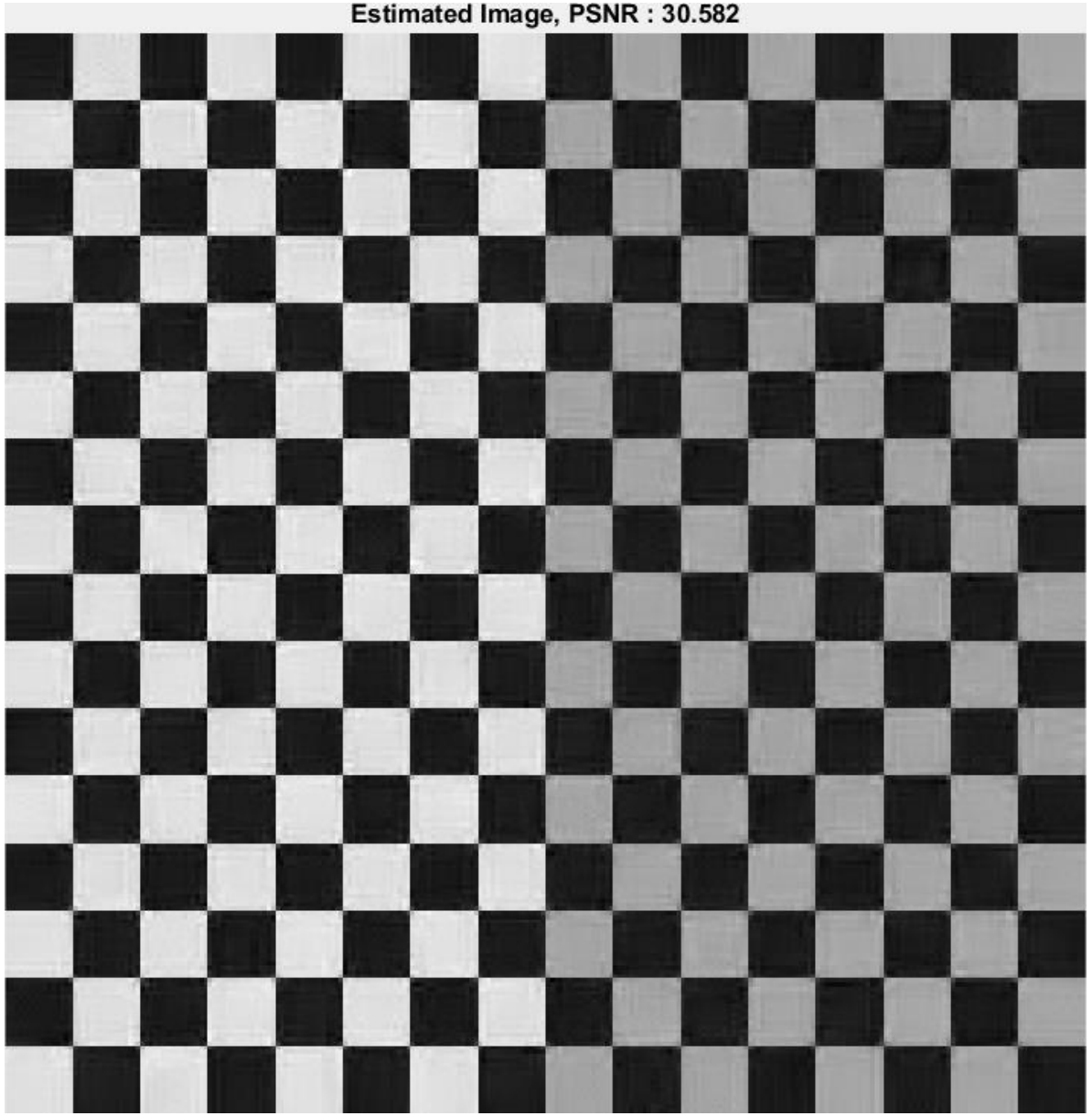
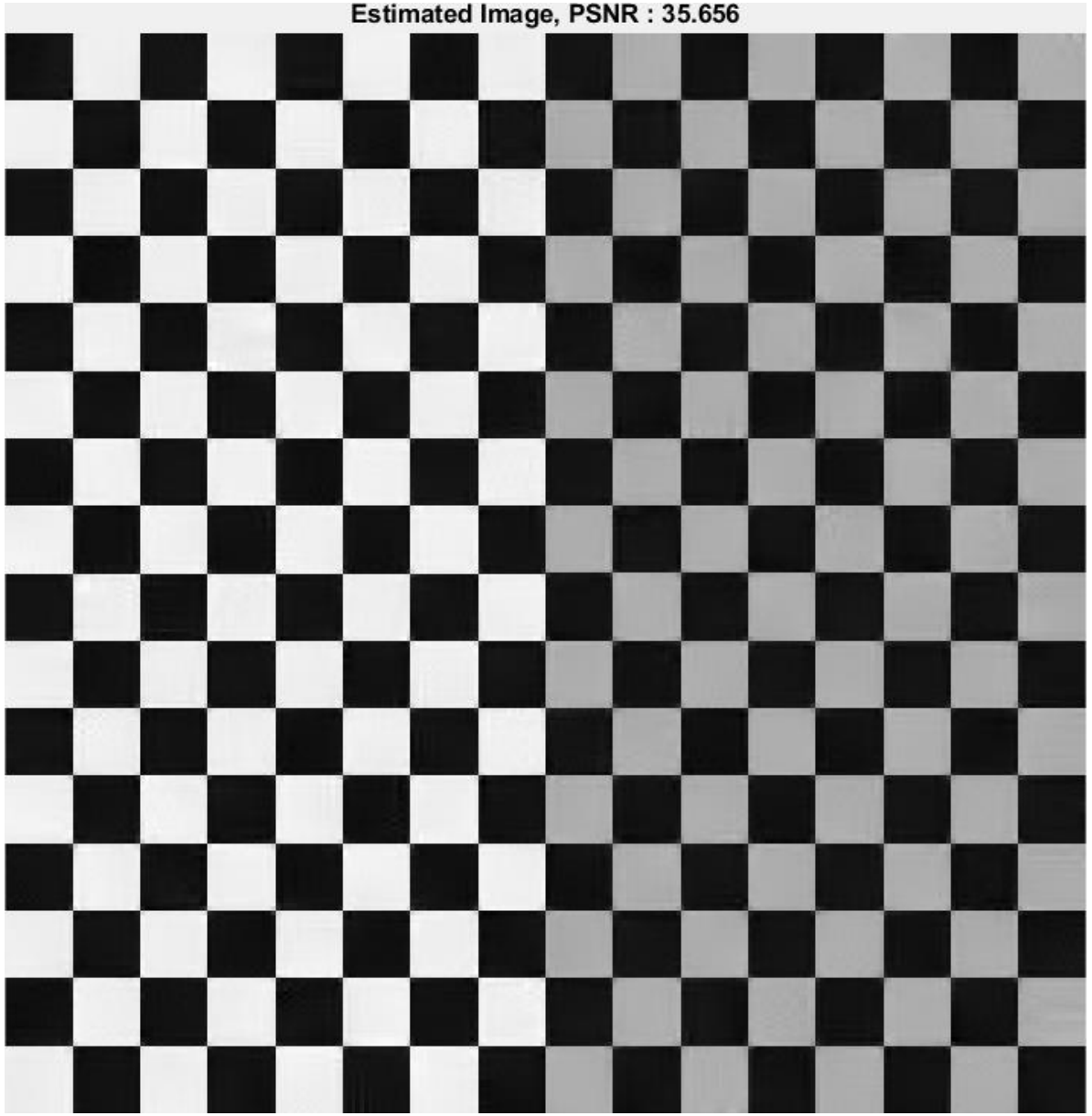
Uniform Weights



Sparsity-aware



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Assignment

Implement the sliding-DCT denoising using both forms of aggregation and test both on natural images

Finally, test how much the choice of the threshold τ influences the denoising performance. Observe the resulting image when:

- $\tau \ll 3\sigma$
- $\tau \gg 3\sigma$

This is very important to understand how important is the choice of the threshold


Original image
0
50
100
150
200
250
0
50
100
150
200
250


Noisy image, PSNR = 22.09
0
50
100
150
200
250
0
50
100
150
200
250


HT Estimate, PSNR = 29.15
0
50
100
150
200
250
0
50
100
150
200
250


Wiener Estimate, PSNR = 29.41
0
50
100
150
200
250
0
50
100
150
200
250

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Assignment

- Corrupt the image with white noise
- Compute a first estimate using DCT denoising with Hard Thresholding
- Use this estimate to perform denoising via Wiener Filtering

Assignment

Implement the noise estimation formula and use this in the denoising framework