Sliding DCT

Mathematical Models and Methods for Image Processing

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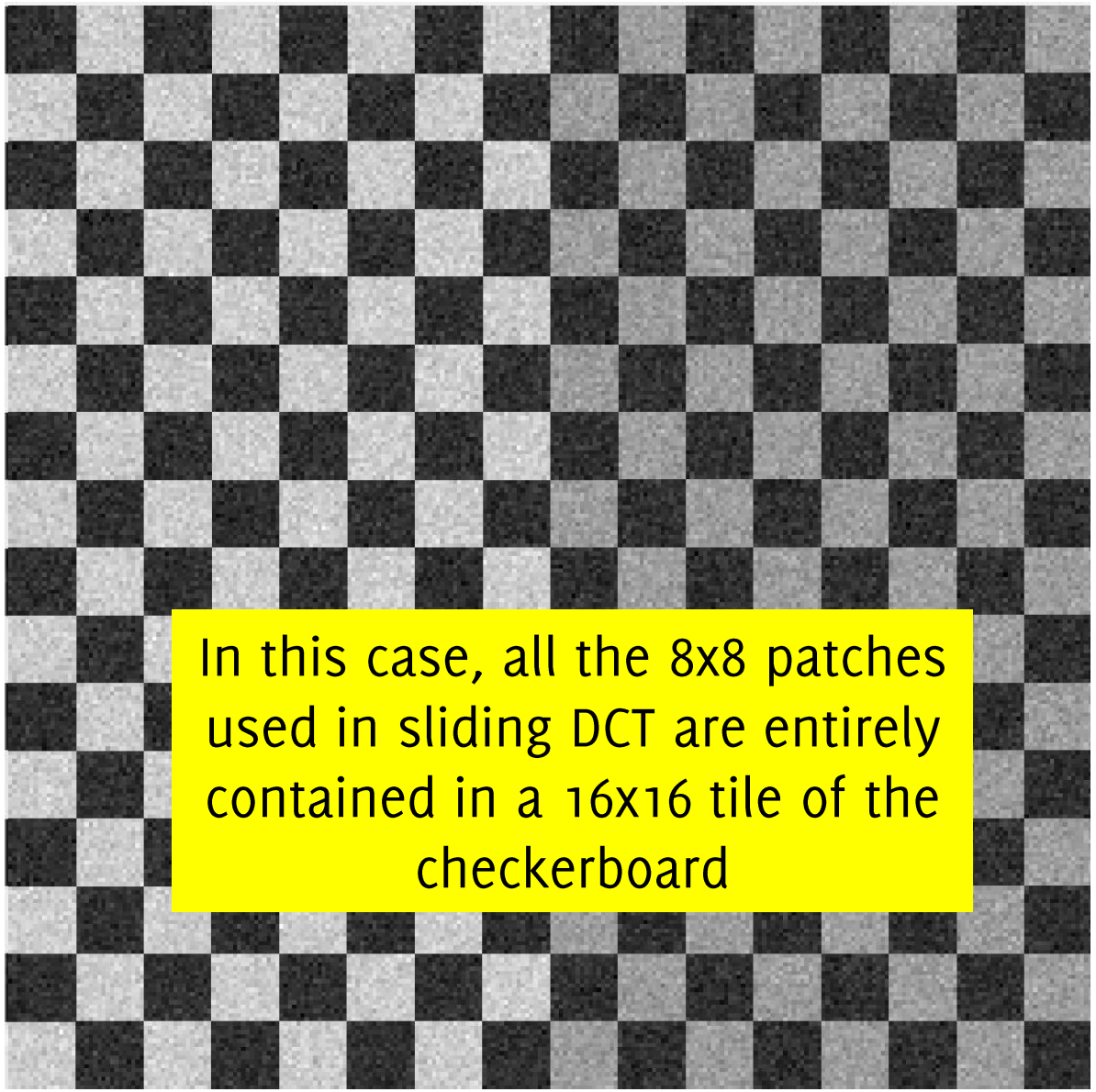
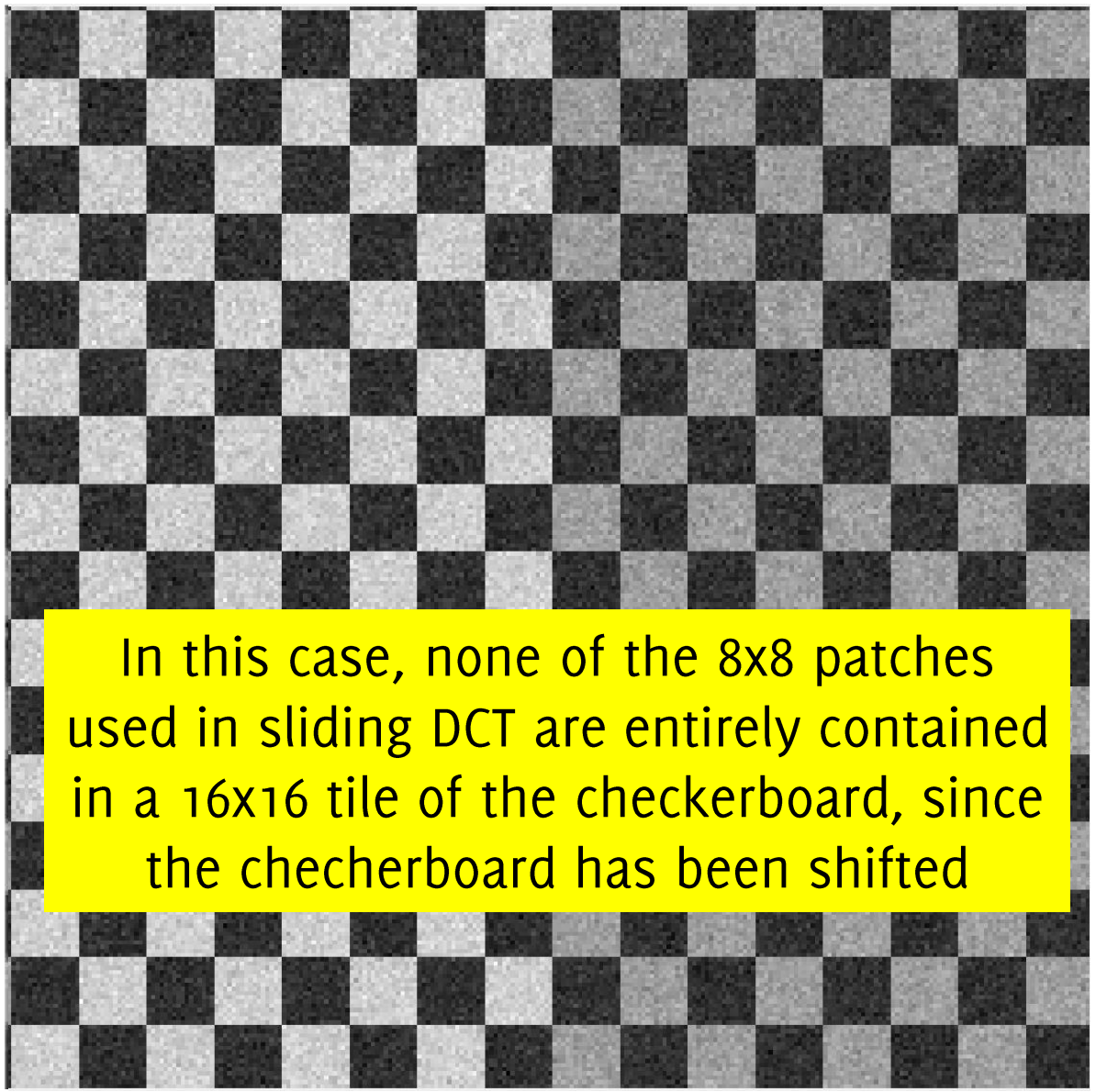
Sliding DCT

Original Checkerboard



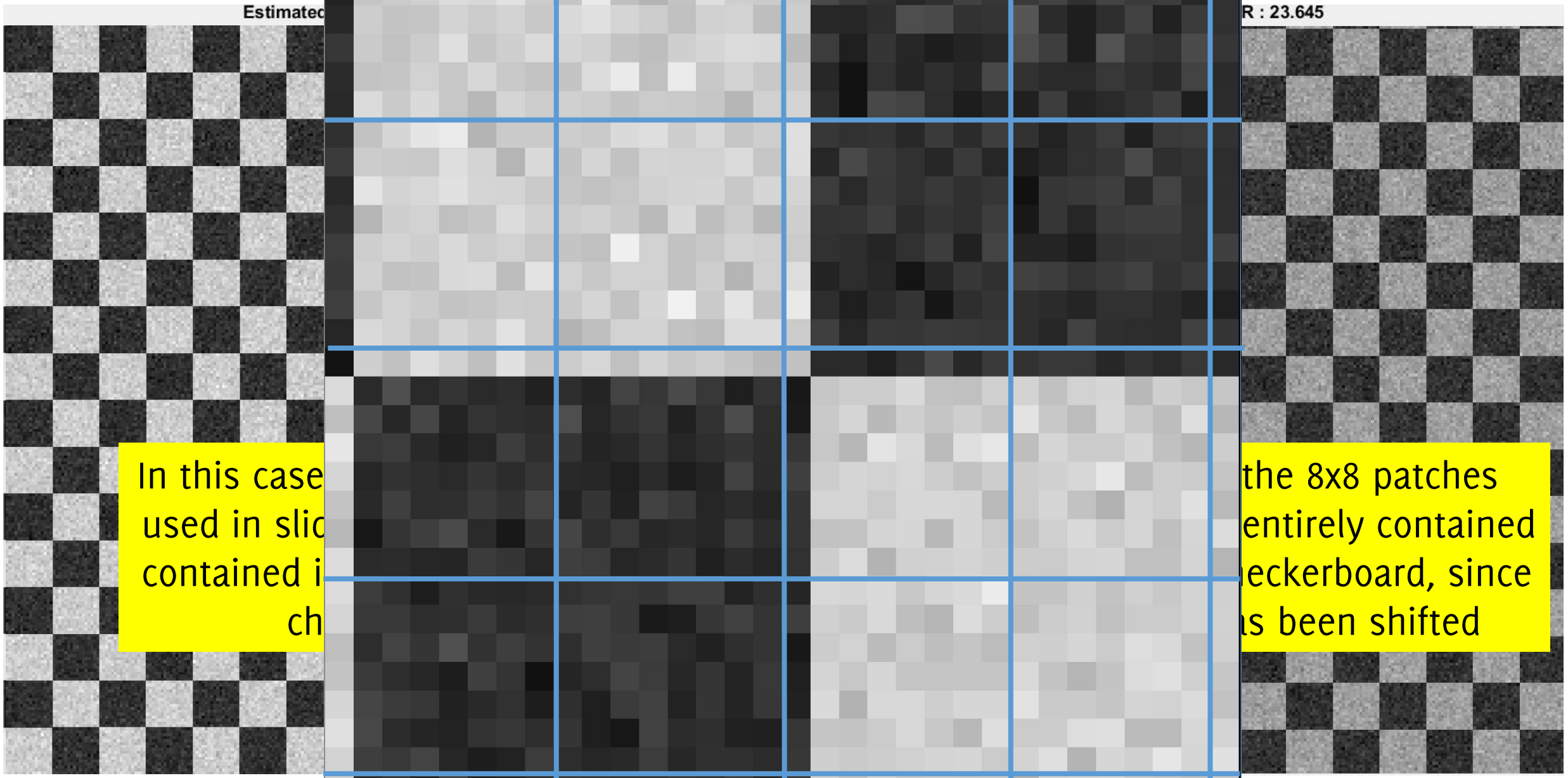
In this case, all the 8x8 patches used in sliding DCT are entirely contained in a 16x16 tile of the checkerboard

Shift [1 row, 1 col]



In this case, none of the 8x8 patches used in sliding DCT are entirely contained in a 16x16 tile of the checkerboard, since the checherboard has been shifted

Original Chec



In this case
used in slic
contained i
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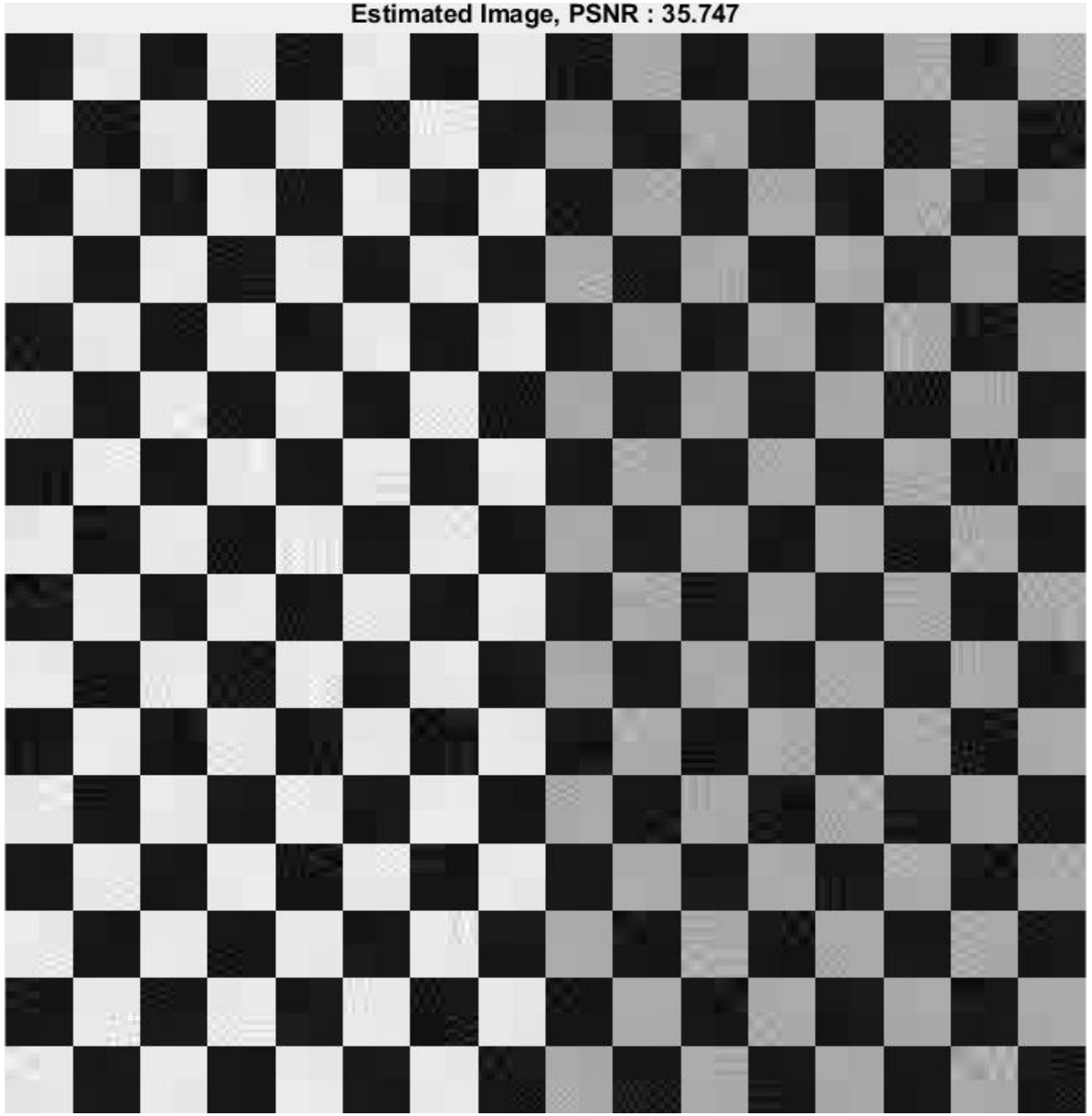
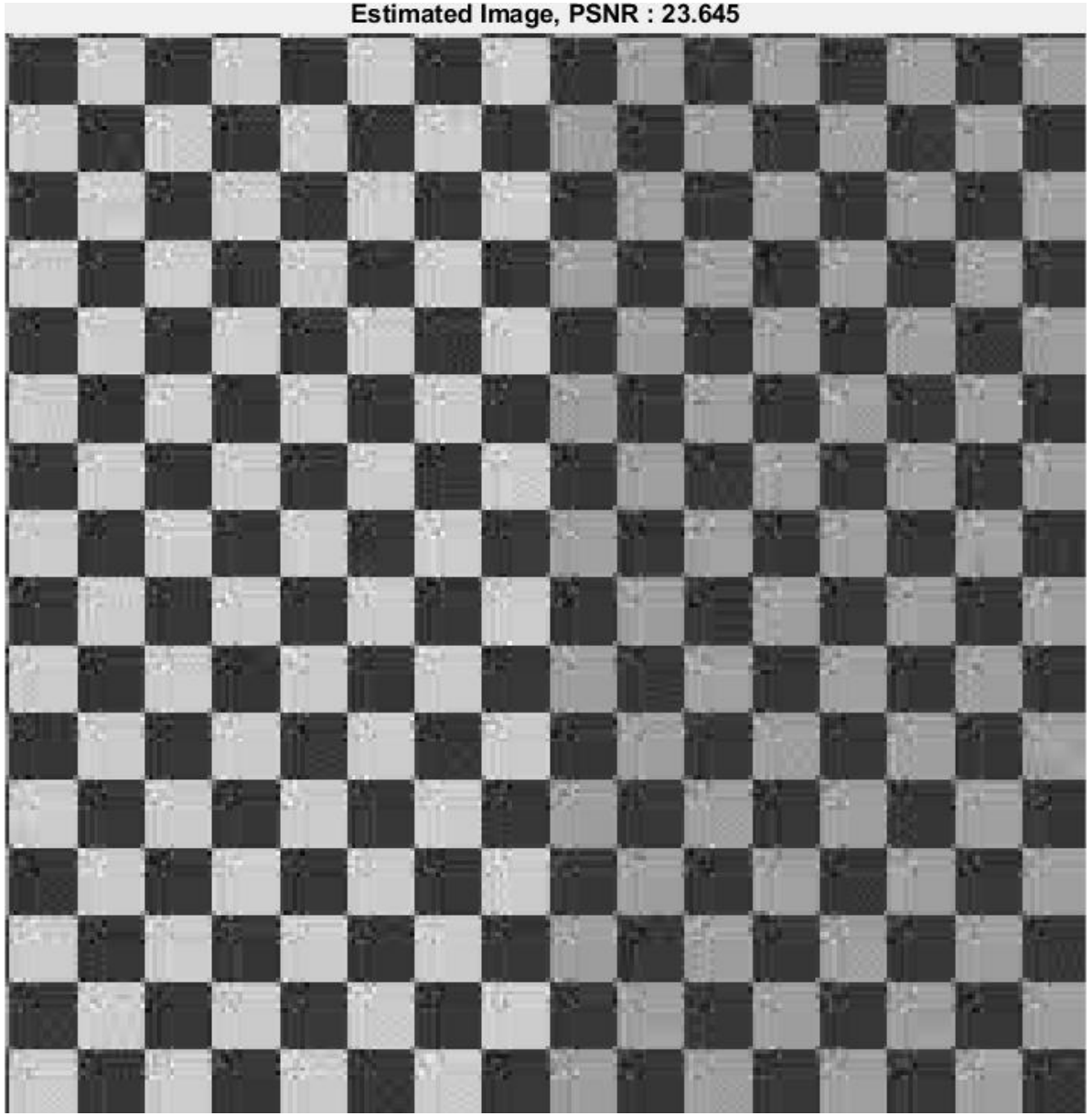
the 8x8 patches
entirely contained
eckerboard, since
s been shifted

Original Checkerboard



Shift [1 row, 1 col]



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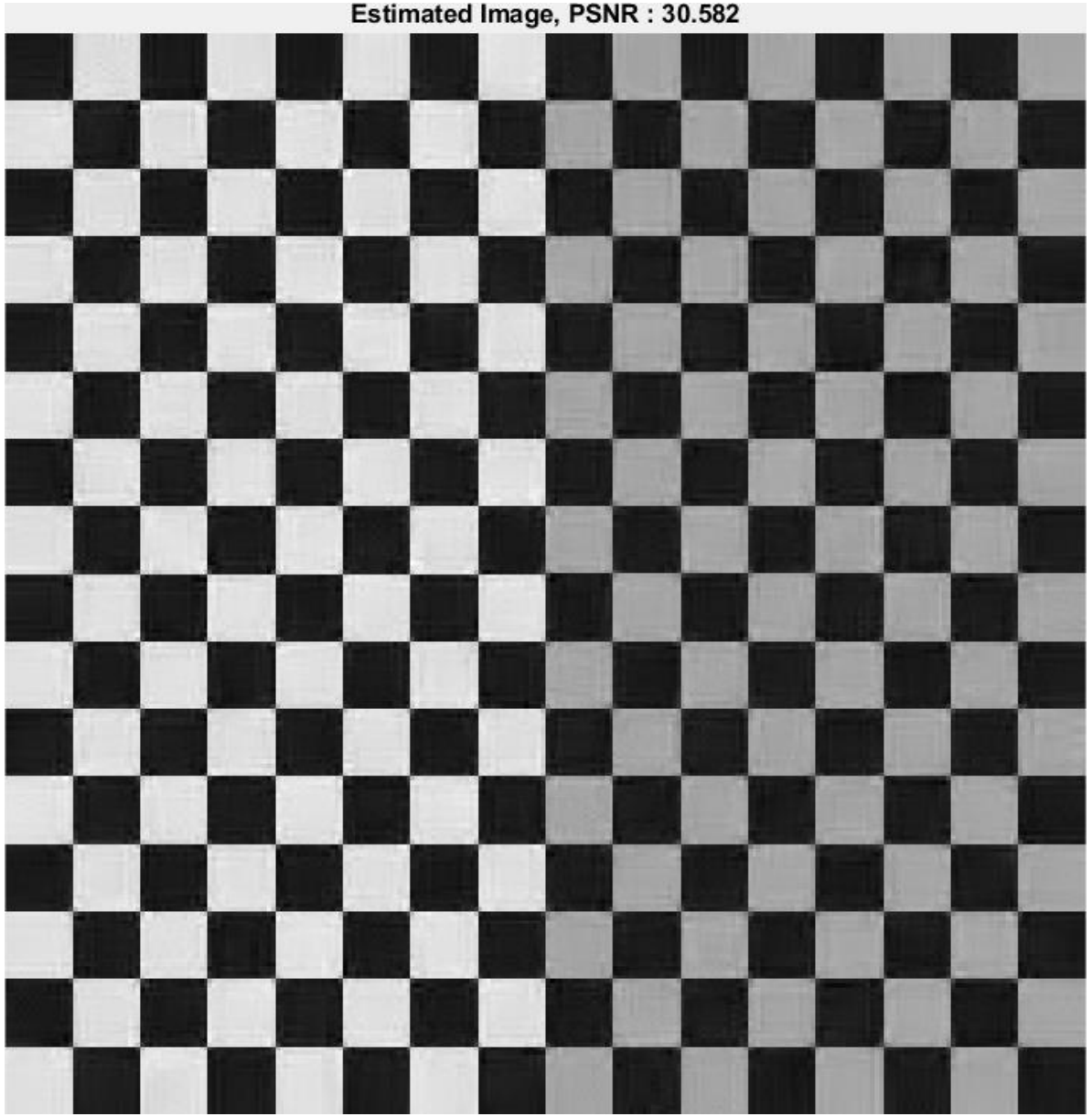
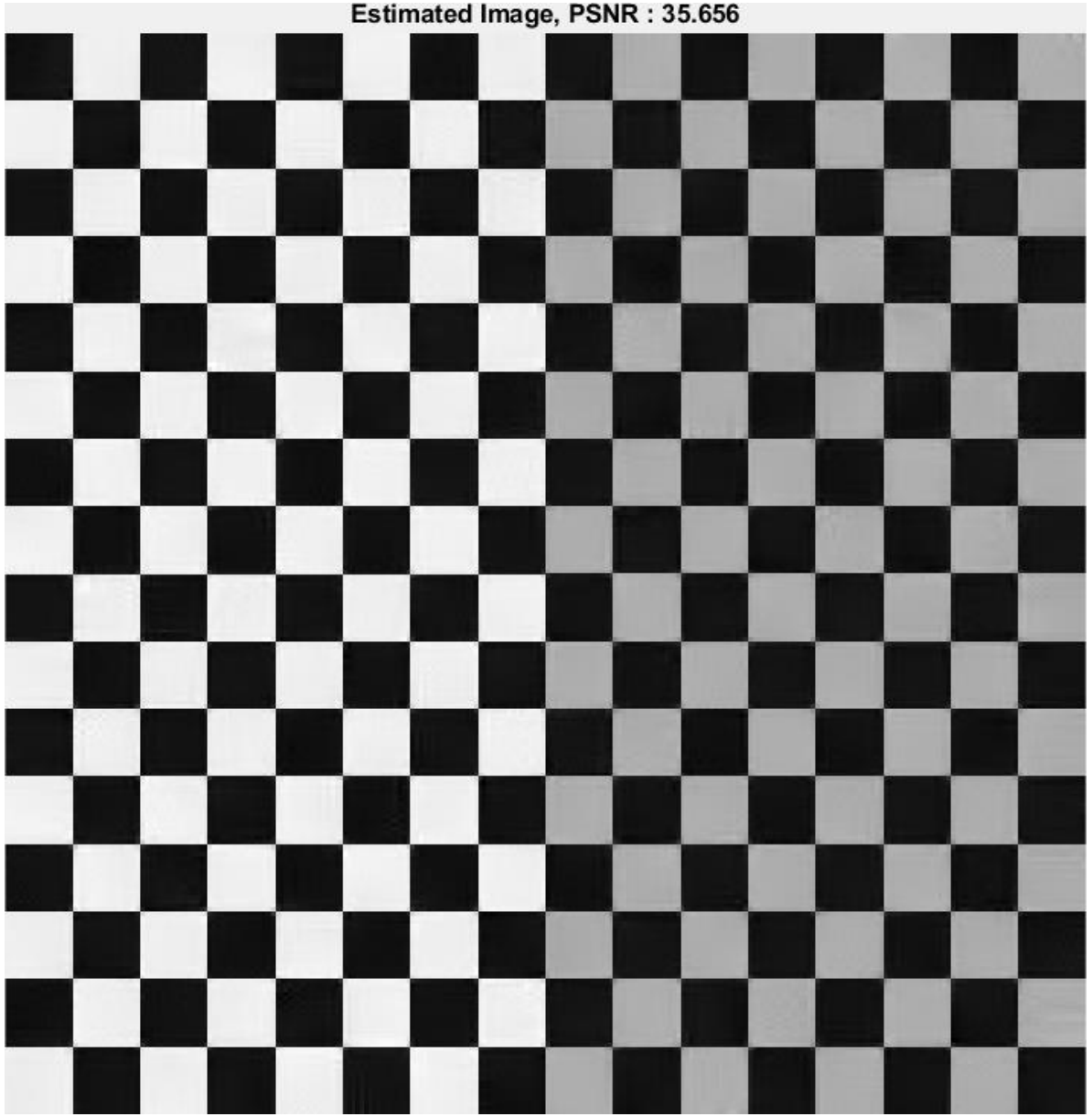
Uniform Weights



Sparsity-aware



Assignment

1. Implement the sliding-DCT denoising using
   - no aggregation (operate on non-overlapping tiles)
   - aggregation using uniform weights
   - aggregation using weights inversely proportional to patch sparsity in DCT domain.
2. Test the three algorithms on both chekerboard and cameraman image
3. 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


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