

Sparse Coding Minimizing ℓ_0 : Denoising

Mathematical Models and Methods for Image
Processing

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Assignment

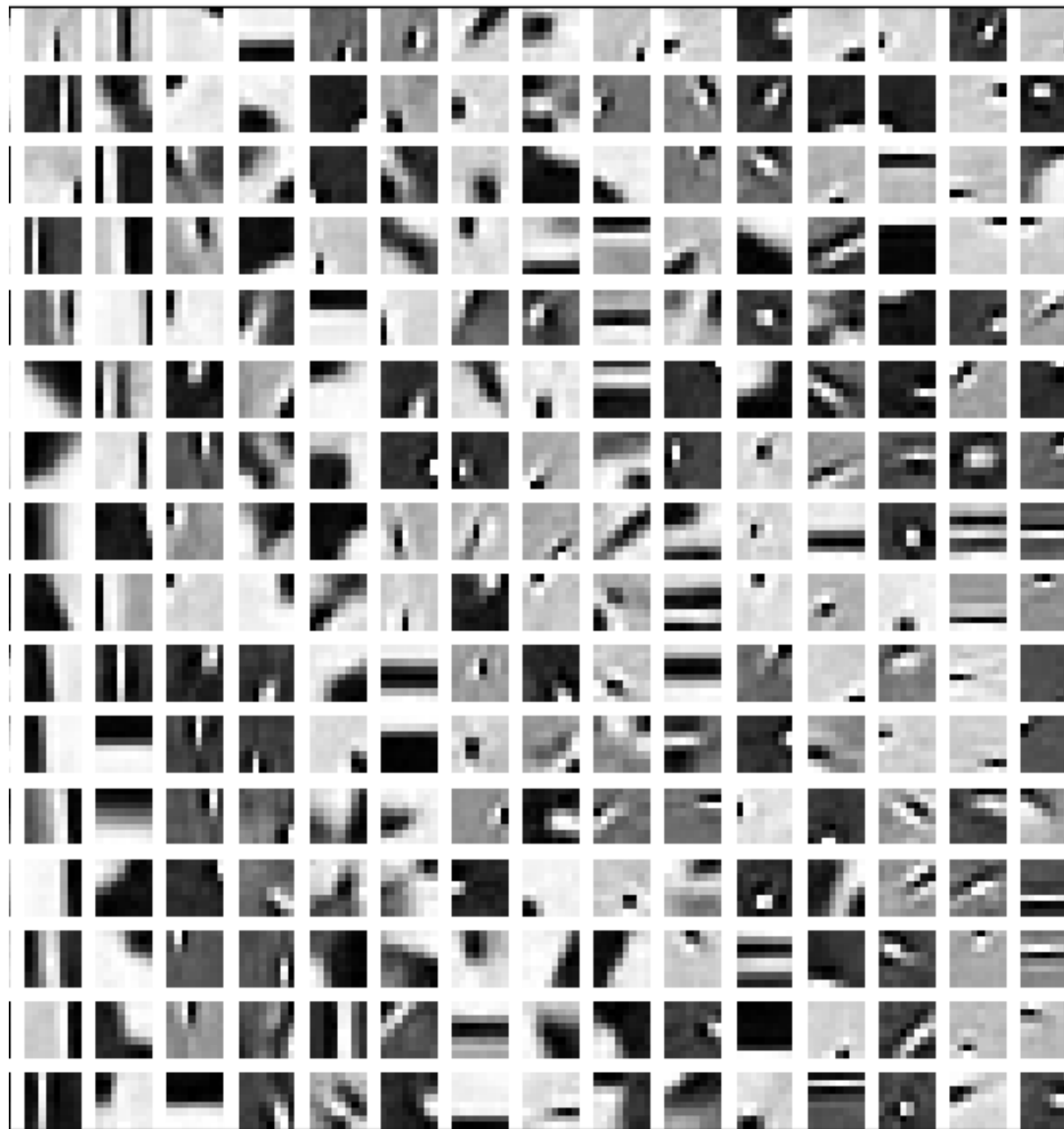
Denoising with Matching Pursuit

Denoising via Sparse Coding

Take the setup of Assignment 3 (denoising via DCT)

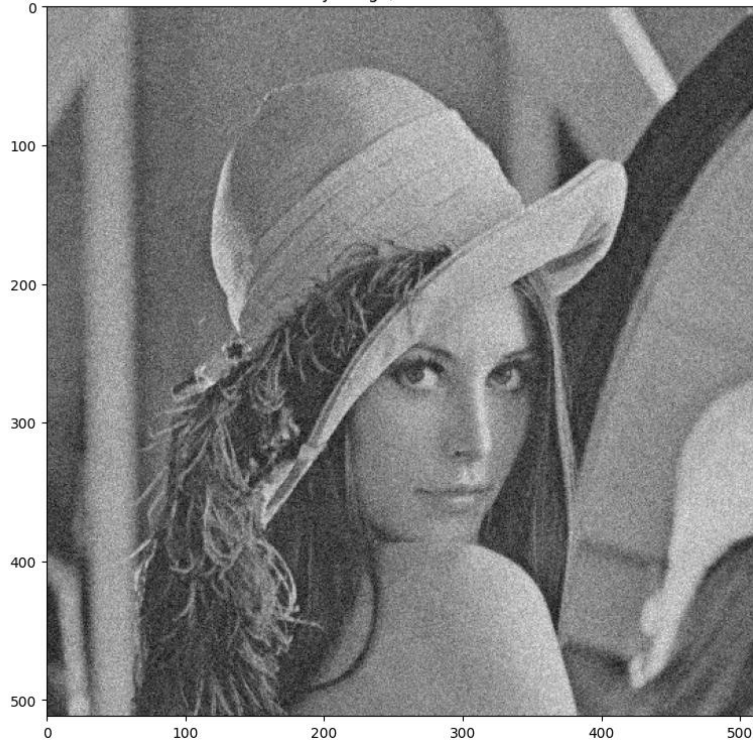
- Load the dictionary provided (learned from natural images)
- Replace the analysis and the thresholding with the sparse coding using a MP variant (start with OMP)
- Perform the synthesis and reconstruct the image
- Sparse Coding is much more demanding than analysis + thresholding. Take a step $\gamma > 1$ to reduce the computation
- Implement Tikhonov for images and perform denoising using Tikhonov
- Compare the results

The Dictionary



The estimated image

Noisy image, PSNR = 22.12



Estimated Image (OMP Denoising),
PSNR = 31.01



Estimated Image (Tikhonov),
PSNR = 25.80

