

Dictionary Learning and Astronomical Image Restoration

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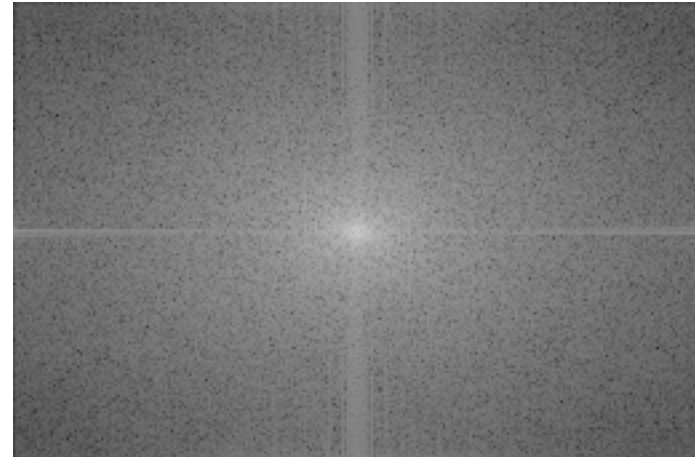


Signal representation

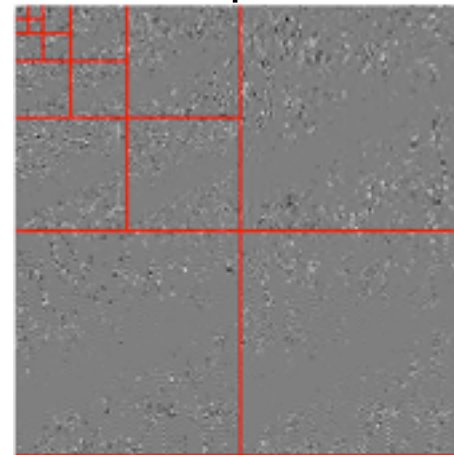
Pixel representation



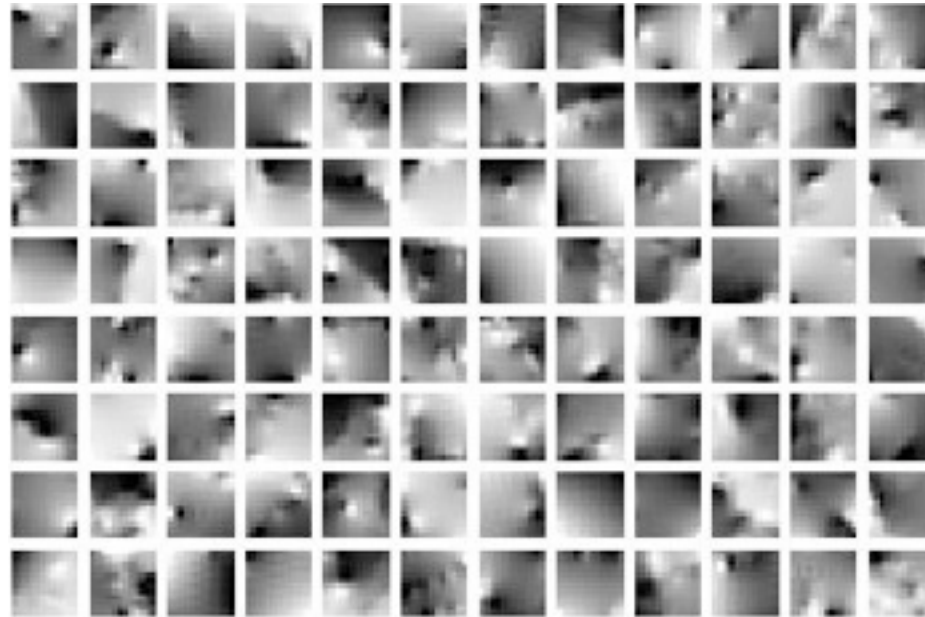
Harmonic representation



Wavelets representation



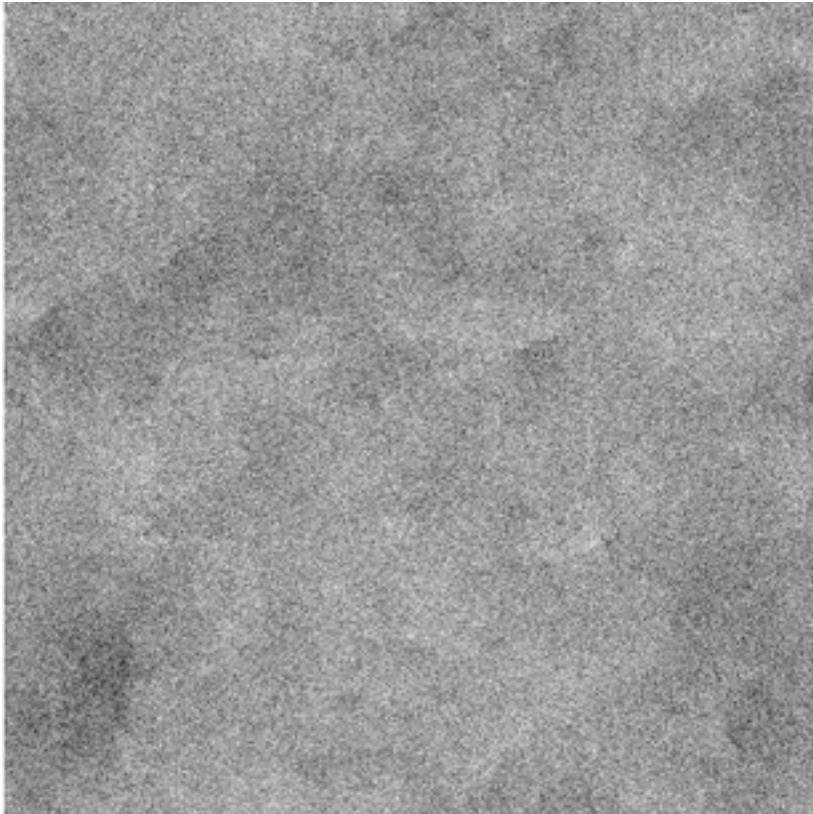
Sparse coding



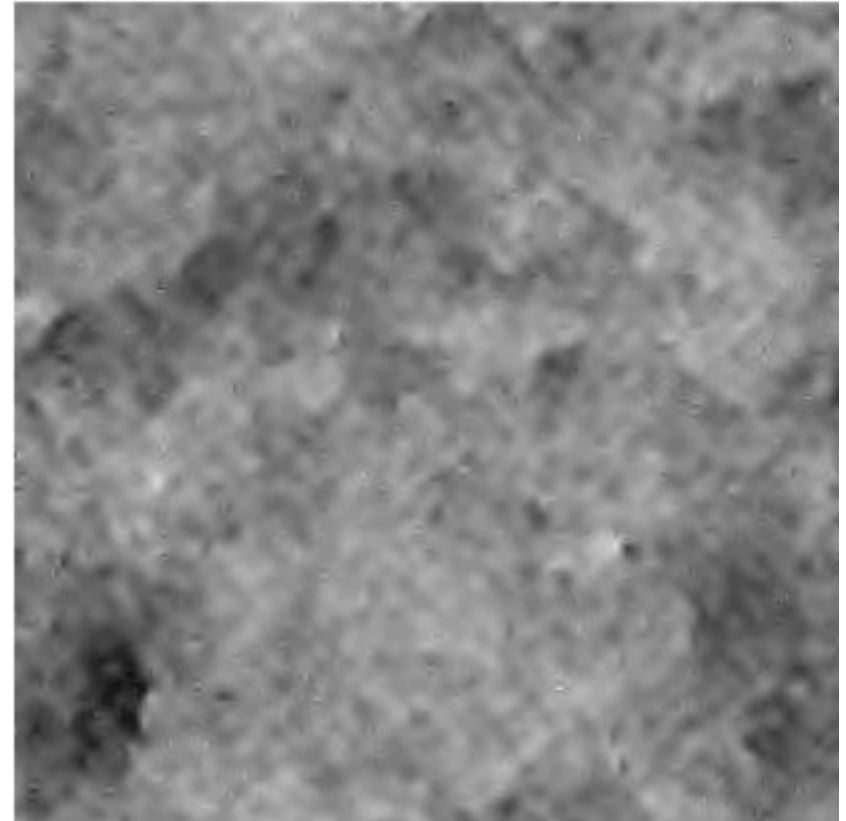
$$X_i = \min_x \frac{1}{2} \cdot \|Dx - P_i\|_2^2 + \lambda \cdot \sum_{k=1}^N |x_k|$$

$$D_\ell = \min_D \|DX - P\|_{Fro}$$

Astronomical images denoising



SNR = 5.4



SNR = 22.9