3

1 Ground Truth Images

Figure 1 displays the ground truth images.

(a) Barbara (b) Goldhill

Figure 1: Ground Truth Image

2 Noisy Images

Figure 2 displays the noisy images with noise $\sim \mathcal{N}(0, 4)$ with calculated RMSE.

(a) RMSE = 0.014633 (b) RMSE = 0.013943

Figure 2: Noisy Image

3 Reconstructed images using ISTA

As a general observation, noisy and noiseless RMSE in any reconstruction are very close, suggesting that given noise doesn't make a significant difference.

3.1 All measurements

3, 4 shows the reconstruction images with all measurements for noisy as well as noiseless images with calculated RMSE. All RMSE values are less than 0.003.

(a) Noisy, 0.0026952 (b) Noiseless, 0.0026166 (c) Noisy, 0.0027094 (d) Noiseless, 0.002681

Figure 3: DCT Basis

(a) Noisy, 0.0028379 (b) Noiseless, 0.0028216 (c) Noisy, 0.0028422 (d) Noiseless, 0.0028246

Figure 4: Haar Wavelet Basis

3.2 Compressive measurements

5, 6 shows the reconstruction images with compressive measurements for noisy as well as noiseless images using patching with calculated RMSE. This time, all RMSE values are close to 0.54 as they are less bright which could be improved by choosing a suitable value of λ. Also, the images show weird artifacts around the border which could possibly be improved by padding the image.

(a) Noisy, 0.54113 (b) Noiseless, 0.54114 (c) Noisy, 0.5414 (d) Noiseless, 0.5414

Figure 5: DCT Basis

(a) Noisy, 0.54183 (b) Noiseless, 0.54184 (c) Noisy, 0.54209 (d) Noiseless, 0.54209

Figure 6: Haar Wavelet Basis