EE5175: Image Signal Processing

Wiener Filtering

For the given image `lena.png`, perform Wiener filtering based image restoration (by treating the term $\frac{S_{nn}}{S_{ff}}$ as a constant) for the following scenarios (σ_n - Gaussian noise standard deviation, σ_b - Gaussian blur standard deviation) :

- $\sigma_n = 1$, $\sigma_b = 1.5$
- $\sigma_n = 5$, $\sigma_b = 1.5$
- $\sigma_n = 15$, $\sigma_b = 1.5$

NOTE: In the Wiener filter expression $\frac{\mathbf{H}^*}{\mathbf{H}^*\mathbf{H} + \frac{S_{nn}}{S_{ff}}}$, treat the term $\frac{S_{nn}}{S_{ff}}$ as a constant (say, k, i.e., $\frac{\mathbf{H}^*}{\mathbf{H}^*\mathbf{H} + k}$) and vary it from 0.01 to 2.0 in steps of 0.001. For each case, pick the k that gives minimum RMS error between the original image and the estimated image.