

EE5175: Image Signal Processing

Lab-5

Space-variant blurring

1. **Space-variant Blurring** Now assume the blur to be space-variant, i.e. the standard deviation varies for each pixel. Consider the distribution of σ to be

$$\sigma(m, n) = A \exp \frac{-\left((m - \frac{N}{2})^2 + (n - \frac{N}{2})^2\right)}{B}, \quad 0 \leq m, n \leq N - 1$$

with

$$\sigma\left(\frac{N}{2}, \frac{N}{2}\right) = 2.0 \text{ and } \sigma(0, 0) = 0.01,$$

where $N \times N$ is size of the image and pixel indices are in the range $[0, N - 1] \times [0, N - 1]$. Find A and B , and create the matrix σ . Perform Gaussian blurring on `Globe.png` using the values of $\sigma(m, n)$.

2. Blur `Nautilus.png` using

- (a) space-invariant blur code of part 1 with $\sigma = 1.0$, and
- (b) space-variant blur code of part 2 with $\sigma(m, n) = 1.0$ for $0 \leq m, n \leq N - 1$.

Verify that the blurred images of the above two steps are same.

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