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Lappeenranta University of Technology
LUT Mathematics and Physics

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BM40A1200 Digital Imaging and Image Pre-Processing

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Exercise 9: Images and distorting them on purpose

1. Image noise (1 point): Corrupt image I with different types of noise (e.g., Gaussian, multiplicative...) using different parameters. Visualise the results.

   Additional resources: `imnoise`.

2. Common colour space transformations (1 point): Try the different colour space transformations available in MATLAB. Visualise the colour channels before and after the transformations.

   Additional resources: `rgb2gray, rgb2hsv, hsv2rgb`.

3. Noise on image channels (1 point): Corrupt each channel of the image I individually with Gaussian noise. Transform image I to HSV colour space and repeat. Visualise the results.

   Additional resources: `imnoise, rgb2hsv, hsv2rgb`.

4. Uneven illumination (1 point): Let us study non-ideal illumination.

   (a) Corrupt image I with a multiplicative linear illumination field f,

   $$\tilde{I} = If. \tag{1}$$

   Visualise the results (show both the corrupted image and the illumination field).

   (b) Corrupt image I with a multiplicative radial illumination field f, defined as

   $$f = e^{-(\rho r)^2} \tag{2}$$

   where ρ is a scaling parameter and r is the distance from image center. Visualise the results (show both the corrupted image and the illumination field).

   Additional resources: `meshgrid`.

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