CMPG-767 Image processing and Analysis
Project 4

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1. Design a Matlab function utilizing rank order EV filtering (Mean). The function shall accept a noisy image (matrix) and return a filtered image (matrix).

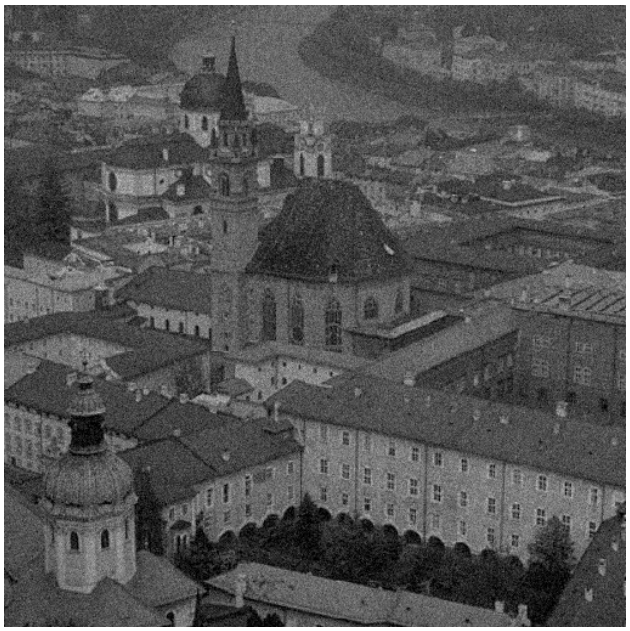
Take into account that a suboptimal value of the ε_V (EV) is σ (standard deviation) of a noisy image. Use your function from Project 1 to calculate σ .

2. Add additive Gaussian noise like you did in Project 2 using the functions, which you designed working on your Project 2 or use noisy images from the Project 2 if you stored them.

You may fix the filter window size 3x3 or design a function for the general case (arbitrary filter window size). In the latter case include a window size as an additional parameter in you function.
The second option (adaptation of the function to any window size) **will give you 25% extra credit score**.

ORIGINAL IMAGE

GAUSSIAN NOISE 0.5 σ



3. Filter your noisy images using the rank order EV filter. Use the function, which you designed.
Do not forget to take care of the boundary effect (use function mirrorImage.m or your own function if you designed it to extend an image before filtering).

5. Find RMSE/PSNR for the filtered images and compare the results to the ones, which you got using linear filters in the Project 2.

The following kernel was used for linear filtering:

$$\frac{1}{16}\begin{pmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{pmatrix}$$

EV FILTERED IMAGE

LINEAR FILTERED IMAGE

	Original and EV filtered image	Original and linear filtered image
RMSE	8.680178e+00	7.208211e+00
PSNR	2.936023e+01	3.097425e+01

6. Prepare a brief technical report containing your RMSE/PSNR values and your conclusion.

7. Turn in your source code, a report, and your images.