

# CS 415 Machine Problem #1

## 1 Image filtering

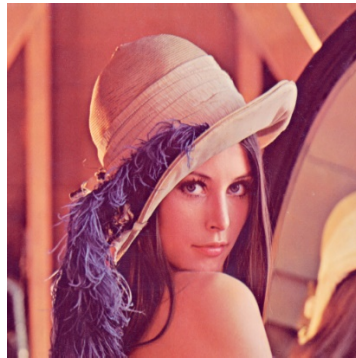
The purpose of this MP is to let you master the image filtering operations discussed in class. They are fundamental to many digital image processing and computer vision techniques. The due date of this assignment is 09/09/2019 (Wed).

You are required to implement the convolution and correlation operators and the median filter. Example function prototypes are below:

```
img_out = convolution(img_in, kernel)
img_out = correlation(img_in, kernel)
img_out = median_filter(img_in, kernel_size)
```

where `img_in` and `img_out` are respectively the input and output images, `kernel` is the convolution or correlation kernel, `kernel_size` is the size of the median filter. The resolution of the output image should be the same as that of the input one.

Two testing images (`lena.png` and `art.png`) are given<sup>1</sup>. Please (1) use convolution to apply mean, Gaussian, and sharpening filters to `lena.png` and (2) apply mean (via both convolution and correlation) and median filters to `art.png`. You should try different kernel sizes (except for the sharpening filter).



(a) `lena.png`



(b) `art.png`

## 2 What to turn in

Each individual student should turn in their own solution. What you need to turn in includes:

- your code in Python (recommended) or MATLAB;
- a short report.

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<sup>1</sup> You can download these images from our course website.