Project 2

Due date is Nov 11th.

Total Points: 100

For the second project you will be required to implement a filter that is not currently available in Numpy/Scipy/Scikit-Image. You will be allowed to use those libraries as necessary to implement the filter however.

15 pts	Describe the mathematics behind the filter. Not every equation is necessary, but most should be included, possibly organized in a way to make the code more readable.
13 pts	Describe the purpose of the filter, i.e. what it is used for and, if it makes sense, what is the output of the filter.
12 pts	Describe how it works (e.g. first-order edge detectors work because edges are large values in the derivative of the image, but with more detail)
30 pts	Implementing the filter as a self-contained function taking the image as the first argument and any additional parameters, preferably with reasonable default values.
15 pts	Demonstration of the filter on images of your choosing with different parameter values. If possible, include example of where the filter "fails".
15 pts	Demonstration of the filter on noisy images (salt and pepper and Gaussian noise), providing recommendations for preprocessing steps to deal with possible noise in images.

By Wednesday October 21 your group must send me the two choices for filters.

Some filters to consider:

- Log Gabor
- ~~Exact histogram equalization using the variational approach (Nikolova et al 2014)~~
- ~~Exact histogram equalization using the local means approach (Coltuc et al 2006)~~
- Kalman Filter (e.g. https://www.slideshare.net/raviteja1926/kalman-filter-applications-in-image-processing)
- Granulometric Filter (Prodanov et al 2006 – ask me for the PDF)
- Lipschitz Filter (Š Štencel and Jiří Janáček, 2006)
- K-Means Clustering
- Anisotropic Diffusion