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### Final Project Abstract/Proposal

I propose to a partial recreation of the results detailed in “Inverse polynomial reconstruction method in DCT domain”. The paper derives a method to denoise piecewise functions with an efficacy directly related to the number of DCT coefficients used from the series expansion. I propose a recreation of Figure 2(a-b) and Figure 4(a-b) from the paper showing example functions and the corresponding DCT coefficients (up to the number of elements of the constituent function). I will then recreate the 1D inverse polynomial reconstruction method (IPRM) that the paper derives. Applying the IPRM to signals  $f_1(x)$  and  $f_2(x)$  from Figure 2 and Figure 4, respectively, I will recreate Figure 3(a-b) and Figure 5(a-b).

I will forego the considerations for memory and computational efficiency initially. Unlike the paper, I will directly convert a series of images into a sorted tuple in ascending order of intensity. I will use the following built in MatLab R2020 images to test the algorithm: ‘cameraman.tif’, ‘cell.tif’, ‘mandi.tif’, ‘moon.tif’, and ‘pout.tif’. These images will be processed with and without the addition of gaussian noise at various SNR levels. I will also recreate an image with a smoothly ascending intensity value and perform the same testing as the previously stated. This will provide a control to show the case of an image without discontinuities.

Without great delay in the understanding and development of the aforementioned functions, I will set out to implement the more computationally efficient application of the derived algorithm through the use of the adaptation of the “Easy Path Wavelet Transform” approximation and sorting procedure described in the article. I will test the algorithm on the same images described above and compare the accuracy as well as the computation time. Finally, I will attempt to overlay noise that mimics the Gibbs phenomenon on 1D signals described in the paper and compare the algorithms efficacy to the success it had on Gaussian noise.

### Reference(s):

Dadkhahi et al.: Inverse polynomial reconstruction method in DCT domain. EURASIP Journal on Advances in Signal Processing 2012:133. doi:10.1186/1687-6180-2012-133.