

# Digital Image Processing Project

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Tentative project title: Use of wavelets in image processing on a group of similar images

The paper I found relates to texture detection and image segmentation based on wavelet-domain information. The paper *Image processing with complex wavelets* also talks about the limitations of using wavelets transform, including shift dependence, as opposed to the property of Fourier transform. "Real DWTs are unlikely to give consistent results when used to detect key features in images". The paper then presents the advantages of complex wavelets and how it could solve 2 main problems of DWT. The other paper *Multiscale Image Segmentation Using Wavelet-Domain Hidden Markov Models* has introduced a way to use training data to solve this problem, among other uses. In lots of applications, the number of images is abundant, so I would like to explore if this can be used to a significant advantage in terms of processing in wavelet domain. The first paper envisions a range of applications of the processing technique including motion estimation, denoising, texture analysis and synthesis, and object segmentation, but it only gives a single denoising example. I would like to try out segmentation in different context and assess its usefulness.

I also will have an internship with Google Maps this summer, so I will try to explore if this topic has relevance in terms of analysing and processing large amount of similar street views and satellite views.

Reference paper:

Kingsbury, Nick. "Image processing with complex wavelets." *Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences* 357, no. 1760 (1999): 2543-2560.

Hyeokho Choi; Baraniuk, R.G., "Multiscale image segmentation using wavelet-domain hidden Markov models," *Image Processing, IEEE Transactions on* , vol.10, no.9, pp.1309,1321, Sep 2001

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