Image denoising using local pixel clustering

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With rapid growth of imaging applications in many disciplines, preservation of the details of image objects while removing noise becomes an important research area. Images often contain noise due to imperfections of the image acquisition techniques. Noise in images should be removed so that the details of the image objects e.g., blood vessels or tumors in human brain are clearly seen, and the subsequent image analyses are reliable. Most image denoising techniques in the literature are based on certain assumptions about the image intensity function which are often not reasonable in case the image resolution is low. If there are lots of complicated edge structures, then these denoising methods blur those structures. I will present an image denoising method which is based on local pixel clustering framework. The challenging task of preserving image details including complicated edge structures is accomplished by performing local clustering and adaptive smoothing. Numerical studies show that it works well in many applications. I will not assume any background knowledge on imaging from the audience. I will provide a brief introduction to gray scale images and the audience should be able to follow the big picture with little or no advanced background in statistics.

Time: Thursday, 03/03/2016, 3:00-3:50pm
Location: ILC302
Refreshments: at 2:40pm in MB226