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Frontiers of Scientific Computing Lecture Series

A Two-stage Image Segmentation Method Based on the Mumford-Shah Model with Thresholding**Raymond H. Chan, Chinese University of Hong Kong**Digital Media Center 1034
November 02, 2015 - 10:30 am**Abstract:**

The Mumford-Shah model is one of the most important image segmentation models, and has been studied extensively in the last twenty years. In this talk, we will first survey the past development of the method. Then we introduce our two-stage segmentation method based on the Mumford-Shah model. The first stage of our method is to find a smooth solution g to a convex variant of the Mumford-Shah model. Once g is obtained, then in the second stage, the segmentation is done by thresholding g into different phases. The thresholds can be given by the users or can be obtained automatically using any clustering methods. Because of the convexity of the model, g can be solved efficiently by standard techniques. We prove that our method is convergent and the solution g is always unique. Experimental results show that our two-stage method performs better than many standard two-phase or multi-phase segmentation methods for very general images, including anti-mass, tubular, MRI, noisy, and blurry images; and for very general noise models such as Gaussian, Poisson and multiplicative Gamma noise. We will also mention the generalization to color images.

Speaker's Bio:

Raymond Chan is the Chairman and Choh-Ming Li Chair Professor of the Mathematics Department at the Chinese University of Hong Kong. He won a Leslie Fox in 1989; a Feng Kang Prize in 1997; a Morningside Award in 1998; and 2011 Higher Education Outstanding Scientific Research Output Awards (First Prize) from the Ministry of Education in China. He was elected a Fellow of SIAM in 2013 and a SIAM Council Member for 2015-17.

Chan works in the area of numerical linear algebra and image processing. He has published 120 journal papers and has been in the ISI Science Citation List of Top 250 Highly-Cited Mathematicians in the world since 2004. Chan has served on the editorial boards of many journals, including: Asian Journal of Mathematics (co-Chief Editor), Journal of Mathematical Imaging and Vision, Journal of Scientific Computing, Numerical Linear Algebra with Applications, SIAM Journal on Imaging Sciences, and SIAM Journal on Scientific Computing. He also presented over 140 invited conference talks in more than 20 countries and reviewed papers for more than 100 different journals.

This lecture has refreshments @ 10:00 am**This lecture has a reception @ 10:00 am**