ICTS Seminar

Title   :   Studies on Kernel Based Edge Detection and Hyper Parameter Selection in Image Restoration and Diffuse Optical Image Reconstruction

Speaker   :   Yamuna Swamy, Indian Institute of Science, Bangalore

Date   :   Monday, July 24, 2017

Time   :   2:15 PM

Venue   :   Amal Raychaudhuri Meeting Room, ICTS Campus, Bangalore

Abstract :   Computational imaging has been playing an important role in understanding and analyzing the captured images. Both image segmentation and restoration has been integral parts of computational imaging. The studies performed in this work has been focused toward developing novel algorithms for image segmentation and restoration. The formulation of the developed Helmholtz of Gaussian (HoG) kernel is similar to Laplacian of Gaussian (LoG). It was also shown both theoretically and experimentally that LoG is a special case of HoG. This kernel when used as an edge detector exhibited superior performance compared to LoG, Canny and wavelet based edge detector for the standard test cases both in one- and two-dimensions.

A novel method that relies on minimal residual method for finding the regularization parameter automatically was proposed here and was compared with the Generalized Cross Validation (GCV) method. It was shown that the proposed method performance was superior to the GCV method in providing high quality restored images in cases where the noise levels are high. Study related to usage of Morozov Discrepancy Principle (MDP) in Diffuse Optical Imaging was also presented here to show that hyperparameter selection could be performed effectively.