



THE CENTRE FOR PATTERN ANALYSIS AND MACHINE INTELLIGENCE IN ASSOCIATION WITH
IEEE SIGNAL PROCESSING AND COMPUTATIONAL INTELLIGENCE CHAPTERS OF KW SECTION

PRESENTS:

DISCRIMINATIVE SPARSITY FOR IMAGE CLASSIFICATION

Speaker: Professor Vishal Monga, Assistant Professor, Electrical Engineering, Pennsylvania State University

Date: Thursday March 13, 2014

Time: 3:00 pm

Place: University of Waterloo, William G. Davis Computer Research Centre, DC-1304

**Refreshments will be provided*

Abstract:

Significant advances in compressive sensing and sparse signal encoding have provided a rich set of mathematical tools for signal analysis and representation. In addition to novel formulations for enabling sparse solutions to under-determined systems, exciting progress has taken place in efficiently solving these problems from an optimization theoretic viewpoint. The focus of the wide body of literature in compressive sensing/sparse signal representations has however been on the problem of signal recovery from a small number of measurements (equivalently a sparse coefficient vector). This talk will discuss the design of sparse signal representations explicitly for the purposes of signal classification. The talk will build upon two significant recent advances. First, the work by Wright et al. which advocates the use of a dictionary (or basis) matrix comprising of class-specific training sub-dictionaries. In this framework, a test signal is modeled as a sparse linear combination of training vectors in the dictionary, sparsity being enforced by the assertion that only coefficients corresponding to one class (from which the test signal is drawn) ought to be active. The second set of ideas we leverage are recent key contributions in model-based compressive sensing where prior information or constraints on sparse coefficients are used to enhance signal recovery. These ideas will be combined towards the exposition of current trends: namely the development of class-specific priors or constraints to capture structure on sparse coefficients that helps explicitly distinguish between signal classes. Motivating applications will be interspersed throughout the talk and comprise medical image classification for diagnostics and well-known visual object and face recognition.

Biography:

Vishal Monga is currently an Assistant Professor of Electrical Engineering at the main campus of Pennsylvania State University in University Park, PA. Prior to joining Penn State, he was an imaging scientist with Xerox Research Labs from 2005-2009. His undergraduate work was completed at the Indian Institute of Technology (IIT), Guwahati and he received his PhD in Electrical Engineering from the University of Texas, Austin.

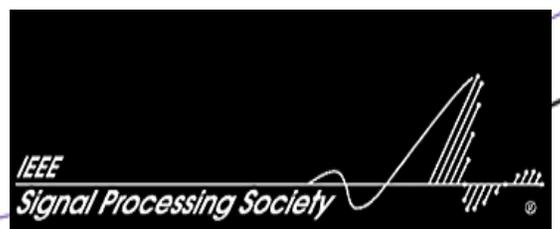
Prof. Monga's research interests are broadly in statistical signal and image processing. He established the Information Processing and Algorithms Laboratory (iPAL) at Penn State. Current research themes in his lab include computational imaging, multimedia security and mining, and sparse representations for robust image classification and recognition.

He currently serves as an Associate Editor for the *IEEE Transactions on Image Processing* and the *SPIE Journal of Electronic Imaging* and has been a past guest AE for the *IEEE Transactions on Signal Processing*. While with Xerox Research in Rochester, he was selected as the 2007 Rochester Engineering Society (RES) Young Engineer of the Year. His work in image processing has received two IEEE SPS paper awards, and he is currently a recipient of the Monkowski Early Career award from the college of engineering at Penn State. Prof. Monga is a Senior Member of the IEEE.

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