SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Faculty of Engineering
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Area: Signal Processing and New Media

 Host: Dr Zhao Qi

TOPICS	:	**Reconstructive Sparse Code Transfer for Contour Detection and Semantic Labeling**
SPEAKER	:	**Dr Michael Maire** **Toyota Technological Institute at Chicago**
DATE	:	**3 November 2014, Monday**
TIME	:	**2:00 pm to 3:00 pm**
VENUE	:	**E4-04-06, Engineering Blk E4, Faculty of Engineering, NUS**

ABSTRACT

I will describe recent work on framing the task of predicting a semantic labeling as a sparse reconstruction procedure. This procedure applies a target-specific learned transfer function to a generic deep sparse code representation of an image. This strategy partitions training into two distinct stages. First, in an unsupervised manner, we learn a set of dictionaries optimized for sparse coding of image patches. These generic dictionaries minimize error with respect to representing image appearance and are independent of any particular target task. We train a multilayer representation via recursive sparse dictionary learning on pooled codes output by earlier layers. Second, we encode all training images with the Genetic dictionaries and learn a transfer function that optimizes reconstruction of patches extracted from annotated ground-truth given the sparse codes of their corresponding image patches. At test time, we encode a novel image using the generic dictionaries and then reconstruct using the transfer function. The output reconstruction is a semantic labeling of the test image.Applying this strategy to the task of contour detection, we demonstrate performance competitive with state-of-the-art systems. Unlike almost all prior work, our approach obviates the need for any form of hand-designed features or filters. Our model is entirely learned from image and ground-truth patches, with only patch sizes, dictionary sizes and sparsity levels, and depth of the network as chosen parameters. To illustrate the general applicability of our approach, we also show initial results on the task of Semantic part labelling of human faces.

The effectiveness of our data-driven approach opens new avenues for research on deep sparse representations. Our classifiers utilize this representation in a novel manner. Rather than acting on nodes in the deepest layer, they attach to nodes along a slice through multiple layers of the network in order to make predictions about local patches. Our flexible combination of a generatively learned sparse representation with
discriminatively trained transfer classifiers extends the notion of sparse reconstruction to encompass arbitrary semantic labelling tasks.

Joint work with Stella Yu and Pietro Perona. Paper to appear in ACCV 2014.

BIOGRAPHY

Michael Maire is a research assistant professor at the Toyota Technological Institute at Chicago. He received the BS degree with honors from the California Institute of Technology in 2003, and the PhD degree in computer science from the University of California, Berkeley, in 2009. From 2009 to 2014, prior to joining TTIC, he was a postdoctoral scholar in the Department of Electrical Engineering at Caltech. His research is centered around the development of algorithms for understanding visual scenes, with emphasis on the problems of object detection and segmentation.