UNIVERSITY OF CENTRAL FLORIDA

CENTER FOR RESEARCH IN COMPUTER VISION

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Faculty Candidate

"Supervised and Weakly-supervised Structural Models for Large-Scale Visual Inferences: Representation, Computation, and Applications"
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ABSTRACT

The understanding and reasoning of the visual, acoustic, and text data can sometimes be viewed as a structural prediction problem for high-dimensional signals. In this talk, we will present a computational model with a feed-forward hierarchy for structural prediction (more specifically object detection, segmentation, and recognition in visual inference). This framework emphasizes the representation issue and focuses on two important aspects in vision and learning, contexts and bottom-up attention. The resulting algorithm, auto-context, is a general statistical paradigm effectively and efficiently integrating appearances, shapes, and contexts for visual inference; it has also been widely adopted in machine learning and medical imaging as a general solution for the structural labeling problem. We will also show a new learning framework to utilize bottom-up attention (saliency) to generate noisy input in which visual concepts are automatically exploited/discovered by top-down models through unsupervised- and weakly-supervised learning. In our recent results, around 10,000 mid-level visual concepts are automatically explored from half-million internet images. These efforts are along the line of building neuroscience-driven computational models to learn low-, mid-, and high-level information for visual inference. I will briefly discuss a new learning framework as a fix-point solution to the auto-context, which gives more understanding to the layered models. In addition, I will briefly show a range of work recently developed in my group in the aspects of big data: neuroimaging analysis, medical document analysis, human gesture understanding, and weakly-supervised learning for microscopic image segmentation/clustering.

BIOGRAPHY

Zhuowen Tu is an assistant professor in the lab of neuro imaging (LONI), Department of Neurology, with a joint appointment in the Department of Computer Science, UCLA. He is also affiliated with the Bioengineering IDP program and Bioinformatics IDP program at UCLA. He received his PhD from the Ohio State University and his M.E. from Tsinghua University. During 2011 and 2013, he took leave of absence to work for Microsoft Research Asia. He is a recipient of David Marr Prize and NSF CAREER award.