

## EECS Seminar Series



### Dr. Donald Geman

*Professor, Department of Applied Mathematics and Statistics, Center for Imaging Science*  
“Stationary Features and Cat Detection”

Monday, March 30, 2009 • 2:00 p.m. • HEC (Harris Center) 101

Semantic scene interpretation is one of the most challenging problems in computer vision. Most algorithms for detecting and describing instances from object categories consist of looping over a partition of a “pose space” with dedicated binary classifiers. This strategy is inefficient for a complex pose: fragmenting the training data severely reduces accuracy, and the computational cost is prohibitive due to visiting a massive pose partition. To overcome data-fragmentation I will discuss a novel framework centered on pose-indexed features, which allows for efficient, one-shot learning of pose-specific classifiers. Such features assign a response to a pair consisting of an image and a pose, and are designed so that the probability distribution of the response is invariant if an object is actually present. To avoid expensive scene processing, the classifiers are arranged in a hierarchy based on nested partitions of the pose, which allows for efficient search. The hierarchy is then “folded” for training: all the classifiers at each level are derived from one base predictor learned from all the data. The hierarchy is “unfolded” for testing. I will illustrate these ideas by detecting and localizing cats in highly cluttered greyscale scenes. This is joint work with Francois Fleuret.

#### **DR. DONALD GEMAN**

Donald Geman received his B.A. in Literature from the University of Illinois and his Ph.D. in Mathematics from Northwestern University. He was Distinguished Professor at the University of Massachusetts until 2001, when he joined the Department of Applied Mathematics and Statistics at The Johns Hopkins University, where he is a member of the Center for Imaging Science and the Institute for Computational Medicine. He works at the intersection of applied mathematics and computer science, specializing in statistical learning, computer vision and computational biology. Current research projects include mental image retrieval, semantic scene interpretation, molecular cancer diagnosis and modeling protein-protein interaction networks.