Image Processing Workshop, May 21st, 2004

Lecture Abstracts

The afternoon session will consist of three lectures:

Speaker: Dr. Ishwar K. Sethi
Lecture Title: "*Content-based Multimedia Information Retrieval*"
Time: 1:15PM – 2:15PM

Abstract
The content-based access to growing multimedia information has received considerable attention in recent years. In this talk, an overview of content-based approaches to access multimedia information will be provided. The shortcomings of the existing approaches will be discussed and a case will be made for integrating cues from different modalities in a multimedia environment. A recently developed approach for integrating multiple modalities, termed the cross-modal association, will be described. This approach works by identifying and measuring intrinsic associations between different modalities. Several possible cross-modal association schemes under the linear correlation model will be presented and compared for applications involving audiovisual analysis.

Speaker: Dr. Stephen Pizer
Lecture Title: "*Statistics of the Geometry of Object Populations*"
Time: 2:15PM – 3:15PM

Abstract
Probability distributions on geometric representations of objects or multi-object complexes are useful as priors in segmentation via posterior optimization of deformable models and for characterization of geometric differences between populations, e.g., of healthy and diseased anatomy, and for a variety of other objectives. These applications require localization, accurate estimation of probabilities from a few tens of sample cases, rich and intuitive characterization of geometric effects, and null probabilities for geometrically illegal objects. I will present an implemented mechanism for achieving these aims that is based on Markov random fields of geometric residues through multiple scale levels, considering objects as geometric transformations in symmetric spaces, finding means and principal geodesic components on these abstract curved spaces, and medial primitives. Probability distributions for a few anatomic objects and multi-object ensembles will be presented. While the mathematical level of this material is deep, the presentation's level will be accessible to users and developers of image analysis methods.

Speaker: Dr. Sven Dickinson
Lecture Title: "*Generic Object Recognition and the Need for Image Abstraction*"
Time: 3:30PM – 4:30PM

Abstract
One of the bottlenecks of current object recognition systems is their assumption of one-to-one feature correspondence. This assumption breaks down in the generic object recognition task where, for example, a collection of features at one scale (in one image) may correspond to a single feature at a coarser scale (in the second image). Under such conditions, one-to-one correspondence exists only between image abstractions, and the matching of such abstractions, in turn, requires an ability to match features many-to-many. In this talk, I will motivate the need for image abstraction, and show how it has been systematically avoided over the last 30 years. Next, I will review three independent generic object recognition problems, each formulated as a many-to-many graph matching problem. In the first problem, we explore the problem of learning a 2-D shape class prototype (represented as a graph) from a set of object exemplars (also represented as graphs) belonging to the class, in which there may be no one-to-one correspondence among extracted features. Next, we define a low-dimensional, spectral encoding of graph structure and use it to match entire sub-graphs whose size can be different. Finally, in very recent work, we embed graphs into geometric spaces, reducing the many-to-many graph matching problem to a weighted point matching problem, for which efficient many-to-many matching algorithms exist.