Accomplishments

- **Information-Theoretic Imaging**
  - Theory and Applications

- **Direct comparison of approaches to ATR from SAR**
  - Recognizer performance as a function of model complexity

- **Dimensionality reduction for classification problems**
  - Analytical and experimental results

- **System design guidelines**
  - Recognizer performance as a function of hardware capability
  - Direct comparison of alternate hardware configurations

- **Spline models for target reflectance statistics**
  - Maximum likelihood estimation of spline coefficients
Performance-Complexity for ATR from SAR

Direct Comparison of ATR Algorithms

- Six approaches to ATR compared directly in a 10 class problem
- Conditionally Gaussian model with power compensation uniformly superior
Dimensionality Reduction for Classification

- Method to reduce storage/computation and improve performance
- Retain the $n$ most informative pixels relative to a null-hypothesis

$n$ Most Informative Pixels

Performance as a function of $n$
System Design Guidelines

- Given an algorithm and architecture, throughput depends on model complexity which sets performance limits
- Computational model for likelihood evaluation

1 Gb/s Interconnection Network

10 Gb/s Interconnection Network
Future Research

• Information-Theoretic performance-complexity studies
  - Probability of error vs. model complexity

• Quantify statistical model fit to actual data
  - Accumulate evidence over multiple targets and poses

• System design guidelines
  - Model complexity
  - Computational and communication models

• Hierarchical (embedded) target models
  - Derived using rate-distortion theory
  - Successively refinable