



An N-Point Statistics Framework for Predicting Tissue Traits in Biomedical Images

David Breen and Mark Zarella

Drexel University
Drexel University College of Medicine
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Need & Relevance

- Imaging is now a central aspect of medicine
- Pathology provides critical diagnostic info to physicians via examination of tissue
 - Determines type and stage of disease
- Need rapid, automated, high-volume, objective, robust, repeatable analysis of medical images
 - Provided by computerized image analysis
- Support personalized medical care

Goals & Objectives

- Develop a general image informatics framework that captures the spatial distribution of cellular structures in biomedical images
- Derive low-dimensional feature vectors from extracted distribution data
- Apply machine learning algorithms to classify/identify the tissues/objects in the images
- Predict traits of the imaged tissue



Approach

- Structures in images are segmented using color and shape information
- N-point statistics used to quantify spatial information, which transform images into histograms
- Fitting functions to histograms produces coefficients that can be interpreted as a feature vector
- Support Vector Machines (SVMs) used to classify specimens



Uniqueness

- Classification/assessment of tissue has traditionally been done by pathologists
 - Process is subjective, variable and time-consuming
- Recently, genetic screening is used to classify tissue
 - Limited access and expensive
- Our approach leverages and extends existing pathology infrastructure
 - Little added cost, automated, objective and repeatable



Impact

- Framework can be applied to a variety of tissues
- Able to predict traits not perceivable by humans
- Can be done locally or remotely as a web-based service
 - Supports telemedicine
- Does not require shipping of specimens
- Provides rapid, cost-effective tissue assessment
- Supports improved, personalized health care