

EDUCATION

Ph.D., Applied Mathematics. Brown University, May 2009

Advisor: Stuart Geman

Thesis: *Statistical Inference and Probabilistic Modeling in Compositional Vision*

M.A., Economics. Brown University, May 2007

Sc.M., Applied Mathematics. Brown University, May 2006

B.A., Mathematics. Fudan University, Shanghai, China, June 2003

RESEARCH INTERESTS

Applied Probability and Statistics: Probabilistic Modeling in Computer Vision and Pattern Recognition, Statistical Inference in the Biosciences. Also: Image/Video Processing, Machine Learning, Medical Imaging, Probability Theory, Stochastic Processes

RESEARCH EXPERIENCE

Siemens Medical Solutions, Inc., Malvern, PA, May 2009 - Aug 2009

Intern, managed by Xiang (Sean) Zhou

- Designed probabilistic algorithms to target the center of patella from MRI images
- Developed a statistical framework to classify X-ray images
- Retrieved critical information from PET-CT images for lymphoma lesion detection

Google Inc., Mountain View, CA, June 2008 - October 2008

Vision Research Intern, managed by Jay Yagnik

Developed novel probabilistic models for classifying face images, for improving image quality in Picasa Web Albums. Extensive C++ programming and parallel computing

Brown University, Division of Applied Mathematics, RI, September 2005 – May 2009

Research Assistant, advised by Stuart Geman

Probability Theory and Statistical Inference:

- Developed a mathematical framework for constructing probabilistic hierarchical image models, and established two major supporting theorems
- An application of Large Deviation Theory: theoretical analysis of compositional versus optimal (Neyman-Pearson) ROC performance

Probabilistic Modeling and Practical Application:

- Designed and implemented generative probabilistic schemes for modeling object parts and natural scenes based on deformable templates
- Investigated applications to clustering and co-registering MRI images

PUBLICATIONS

- **Wei Zhang, Eran Borenstein and Stuart Geman.** (2009). "Maximum-Likelihood Templates" - In preparation
- **Wei Zhang and Stuart Geman.** (2009). "Hierarchy, Reusability, and the ROC Performance of Detection in Complex Scenes" - In preparation

PRESENTATIONS

- "Learning Image-Fragment Templates by Maximum Likelihood", SPIE /IS&T Electronic Imaging, San Jose, CA, Jan 26, 2008

CONFERENCES ATTENDED

- SPIE /IS&T Electronic Imaging, San Jose, CA, January 26 - 31, 2008
- Graduate Summer School: "Probabilistic Models of Cognition: The Mathematics of Mind", Los Angeles, CA, July 9 - 26, 2007
- IEEE Computer Vision and Pattern Recognition, New York, NY, June 17 - 22, 2006
- MSRI workshop: Visual Recognition, Berkeley, CA, March 22 - 25, 2005

TEACHING EXPERIENCE

Brown University, Division of Applied Mathematics:

- Co-Developed (with Stuart Geman) new graduate course "Recent Application of Probability and Statistics" on "learning theory" and its connections to the Gibbs distribution, statistical mechanics, information theory, large deviation theory, and nonparametric statistics. Assisted in developing course syllabus, designing projects and exams, grading, and holding office hours. Gave three lectures on nonparametric classifiers. Fall 2007
- Teaching Assistant for graduate course "Theory of Probability". Responsible for grading, holding office hours, and giving the instructor feedback regarding lecture clarity. 2005 - 2006
- Teaching Assistant for undergraduate-level course "Methods of Applied Mathematics". Responsible for grading, and holding recitation and office hours. 2004 - 2005

Brown University, Mathematical Resource Center:

- Mathematics Tutor for undergraduate students in a variety of courses ranging from introductory calculus classes to graduate-level digital signal. Fall 207

PROFESSIONAL DEVELOPMENT

- Brown University, Sheridan Center for Teaching and Learning in Higher Education, Spring 2006
Participated in seminars and department micro-teaching sessions
Awarded the Sheridan Center Teaching Certificate

TECHNICAL SKILLS

- Probability and Statistics
- Image/Video Processing
- Machine Learning (neural networks, regression, clustering, PCA, SVM, MRF, MCMC, SMC)
- Statistical Inference
- Image Analysis
- Stochastic Processes
- Medical Imaging

COMPUTER SKILLS

- Operating Systems: Linux/Unix, Windows
- Programming Languages: Matlab, C/C++
- Other Skills: LaTeX, HTML, word processing, spreadsheets, presentation software

AWARDS

- **Academic Fellowship**, Brown University, 2003-2004
- **Outstanding Graduate**, Fudan University, China, June 2003
- **Meritorious Winner**, Mathematical Contest in Modeling (MCM), USA, February 2002
Developed a series of mathematical models to investigate relationships between overbooking strategies and airline revenue in a three-member team
- **Second Prize**, Chinese Undergraduate Mathematical Contest in Modeling, September 2001
Reconstructed 3D structure of blood vessels from body slices in a three-member team

SERVICE

- **President** of Chinese Student and Scholar Association (CSSA), Brown University, 2004 - 2005
Liaison between Brown Student Activity Office (SAO) and Brown CSSA
Organized university Chinese cultural events and fundraising