

Joseph Schlecht — Curriculum Vitae

Department of Computer Science
University of Arizona
Tucson, AZ 85721-0077

Phone: 520-626-3285
schlecht@cs.arizona.edu
<http://vision.cs.arizona.edu/schlecht>

EDUCATION

Ph.D., Department of Computer Science Dec 2009
University of Arizona
Thesis: Learning 3D Models of Object Structure from Images.

Bachelor of Science, Department of Computer Science May 2003
North Dakota State University
McNair Scholar Undergraduate Research: Autonomous Mission Planning for Unmanned Air Vehicles.

RESEARCH

Research Assistant, Department of Computer Science Aug 2003 – Present
University of Arizona
Supervisor: Prof. Kobus Barnard

Currently researching automatic methods to learn three-dimensional models of object structure from single view images. Approach focuses on modeling object categories with connected geometric primitives and shape statistics. Represent arbitrary object pose through a constrained camera that minimizes ambiguity. Developed a generative statistical model for detected image features and created an inference algorithm to simultaneously learn the camera and object structure across a set of images. Results reveal method successfully learns structure useful for category-level recognition in views unseen during learning. Object model further encodes information for other vision tasks, such as autonomous scene interaction and learning function from form.

Collaborated with plant scientists to extend 3D object model and inference algorithm to biological structures imaged under a microscope. Created a grammar-based growth representation for *Alternaria*, a genus of fungus, and simultaneously fit instances of it and the imaging system to data. Inferred model enables scientists to automatically quantify, recognize, and classify biological structure in images from standard microscopes.

Research Assistant, Arizona Research Labs Jun 2005 – Present
University of Arizona
Supervisor: Nirav Merchant, Director of Biotechnology Computing

Developed an ensemble learning method for predicting male haplogroups given Y chromosome Short Tandem Repeat (STR) data. Method combines disparate machine learning algorithms with different types of error, including Support Vector Machines, Bayesian statistical models, and C4.5-based decision trees. Results of this work showed the predicted haplogroup accurately places an individual in a temporal and geographic hierarchy of human migration out of Africa. Implemented the algorithms in a high-throughput analysis system that predicts 85% of all collected STR samples.

Predictions have extremely high accuracy and confidence, eliminating most manual analysis by lab technicians. System is currently used as part of National Geographic's Genographic Project.

Undergraduate Research Assistant, Computer Science Nov 2001 – Jun 2003
North Dakota State University
Supervisor: Prof. Kendall Nygard

Explored autonomous mission planning for unmanned air vehicles (UAVs) as part of a McNair research scholarship. Collaborated with research group members to develop emergent behavior models for UAVs with inspiration from behavior-based robotics, multi-agent systems, and swarm intelligence. Designed and implemented an extensive software simulation framework for experimentation and performance evaluation.

TEACHING

Teaching Assistant, Department of Computer Science Fall 2006
University of Arizona
Computer Graphics, Graduate and Undergraduate
Instructor: Prof. Kobus Barnard

Regularly met with students during office hours for individual tutoring and guidance on course reading and programming assignments. Graded homework, quizzes, and exams on content including polygon scan-line algorithms, 3D graphics rendering pipeline, and ray tracing. Received high course feedback marks from students for consistency, helpfulness, and clarity in communication.

INDUSTRY

IBM Corporation, Disk Access Storage Device, Co-op May 2000 – Dec 2000
Rochester, MN
Supervisor: Russell Mettler

Worked as a member of the AS/400 SCSI hard disk integration team diagnosing and solving issues between SCSI hard disk microcode and hardware. Responsibilities included analyzing performance and reliability tests for new models of SCSI hard disks in the AS/400. Developed software to run automated regression tests on networked systems that controlled hundreds of hard disks. Results from these tests increased team efficiency by reducing the time to disk integration.

AWARDS AND DISTINCTIONS

- Awarded Galileo Circle Scholarship from University of Arizona College of Science, 2009.
- Awarded Biology, Mathematics and Physics Initiative (BMPI) Fellowship at the University of Arizona (BIO5), 2007-2008 and 2008-2009.
- Awarded Department of Computer Science Outstanding Graduate Research Award, 2008.
- Selected by the Department of Computer Science for the College of Science award in scholarship at the University of Arizona, 2008.

- Nominated for the University of Arizona's *Team Award for Excellence* as a member of the Arizona Research Labs Genographic Team, 2006.
- Awarded a Graduate College fellowship at the University of Arizona, 2003 – 2004.
- McNair Scholar at North Dakota State University, 2001 – 2003.
- Award for outstanding co-op at IBM, Rochester, 2000.
- Graduated from North Dakota State University with honors and a member of Phi Eta Kappa national honor society.

PUBLICATIONS

- Schlecht, J., Barnard, K., Learning Models of Object Structure, *Advances in Neural Information Processing Systems* (NIPS), To appear Dec, 2009.
- Schlecht, J., Kaplan, M., Barnard, K., Karafet, T., Hammer, M., Merchant, N., Machine Learning Approaches for Classifying Haplogroup from Y Chromosome STR Data, *PLoS Computational Biology*, doi:10.1371/journal.pcbi.1000093, June, 2008.
- Schlecht, J., Barnard, K., Spriggs, E., and Pryor, B., Inferring Grammar-based Structure Models from 3D Microscopy Data, In *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR), Oral presentation, June, 2007.
- Schlecht, J., Barnard, K., and Pryor, B., Statistical Inference of Biological Structure and Point Spread Functions in 3D Microscopy, In *Proceedings of the Third International Symposium on 3D Data Processing, Visualization and Transmission* (3DPVT), Oral presentation, June, 2006.
- Schlecht, J., Altenburg, K., Md Ahmed, B., and Nygard, K., Decentralized Search by Unmanned Air Vehicles Using Local Communication, In *Proceedings of the International Conference on Artificial Intelligence* (IC-AI), 757-762, Oral presentation, June, 2003.

INVITED TALKS

- Schlecht, J., Sampling Structure, Invited Talk, *Uncertainty Quantification Workshop*, University of Arizona, April 2008
- Schlecht, J., Statistical Inference of Structure in 3D Microscopy, Invited talk, *University of Arizona Bio-computing Seminar*, Jan 2006.
- Schlecht, J., Extracting Structure from 3D Images, Invited talk, *Symposium Internacional de Informática Aplicada*, Sinaloa, Mex, Nov 2005.
- Schlecht, J., Haplogroup Classification, Invited talk, *University of Arizona Bio-computing Seminar*, Sept 2005.