Polina Golland

Contact:
MIT AI CSAIL
32 Vassar Street 32-D470
Cambridge, MA 02139

tel: 617-253-8005
fax: 617-258-6287
e-mail: polina@csail.mit.edu

Education

2001 Ph.D. in Electrical Engineering and Computer Science. Massachusetts Institute of Technology, Cambridge, MA. Thesis: *Statistical Shape Analysis of Anatomical Structures.* Advisor: W. E. L. Grimson.

1995 M.Sc. in Computer Science. Technion, Israel. Thesis*: Use of Color for Motion Estimation.* Advisor: A. M. Bruckstein.

1993 B.A. in Computer Science (Summa Cum Laude). Technion, Israel.

Professional Experience

Massachusetts Institute of Technology *Cambridge, MA*

2003- Assistant Professor, Electrical Engineering and Computer Science Department, MIT.

2001-3 Postdoctoral Research Associate at the Artificial Intelligence Laboratory, MIT. Developing statistical analysis techniques for image understanding.

2001-3 Industrial Liaison Officer at the Artificial Intelligence Laboratory, MIT. Responsible for providing the companies with information on the current research and fostering connections between the industrial partners and and the faculty.

1995-01 Research Assistant in the Artificial Intelligence Laboratory. Developed novel algorithms for shape modeling and representation, statistical shape analysis and image acquisition. Built a novel visualization system for digital anatomy atlases. Close to 200 research labs and universities are registered users of the software; the system is being used as a teaching tool in anatomy classes and for visualization of medical images in research studies.

Independent Software Consulting *Cambridge, MA*

1999- Software consultant in image visualization and analysis. Projects include a visualization system for aerial video combined with maps and GPS data, visualization systems for 3D medical imaging, software for orthopedic implant matching and others.

Microsoft *Redmond, WA*

1996 Research intern in the Vision Research Group. Developed a novel algorithm for scene reconstruction from multiple images with simultaneous recovery of depth, color and opacity of the objects.

Kulicke & Soffa *Haifa, Israel*

1994-5 Software consultant in the Vision Group. Developed a computer vision module for chip manufacturing machine Die Bonder to assist precise positioning and inspection of chip components.

Intel *Haifa, Israel*

1991-3 Software Engineer, Logic Design Group, Intel Haifa Design Center. Participated in the development and maintenance of a software package for schematic verification.

Teaching

Massachusetts Institute of Technology *Cambridge, MA*

2004 Probabilistic Systems Analysis and Applied Probability.

1996 Teaching Assistant for Probabilistic System Analysis course. Taught weekly recitation and tutorials, participated in course preparation and grading. Lecturer: Prof. A.W. Drake.

Technion *Haifa, Israel*

1994-5 Lecturer in the extension school. Designed and gave lectures for the course on object oriented programming and C++ programming language.

1993-5 Teaching Assistant for courses in Data Structures, Digital Systems, Image Processing and Computer Vision. Developed recitation notes, taught weekly recitations and participated in homework and exam design.

1991-2 Teacher in a high school program. Designed and taught weekly classes in mathematics to help students to keep up with classes in local high schools.

Awards and Fellowships

Honorable Mention for the Best Poster Award for paper "Statistical Shape Analysis Using Fixed Topology Skeletons: Corpus Callosum Study", *IPMI'99: The 16th International Conference on Information Processing and Medical Imaging*, Visegrad, Hungary, 1999.

Honorable Mention for Marr Prize for paper "Stereo Matching with Transparency and Matting", *ICCV'98: Sixth International Conf. On Computer Vision*, Bombay, India, 1998.

Stanley Foundation Fellowship, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, 1998.

Intel Graduate Fellowship, Technion, Haifa, Israel, 1994-1995.

President's Fellowship and Honor List, Technion, Haifa, Israel, 1990-1991.

Grants

A Athinoula A. Martinos Center for Biomedical Imaging, Mass General Hospital, Harvard Medical School Collaboration Start up Grant. PI: W.E.L. Grimson. 12/15/01-12/15/02
Statistical study of cortical thickness in healthy aging and Alzheimer's disease.
The goal of the grant is to develop an algorithm for automatic detection and characterization of the pattern of change in brain morphology or function that lead to successful discrimination between populations.
Role: Co-Investigator

NIH/NIMH K02 MH 01110. PI: M.E. Shenton. 1999-2004
Clinical Symptoms and Brain Abnormalities in Schizophrenia.

Role: Collaborator

NIH/NIMH 2R01 MH50740-06. PI: M.E. Shenton. 1994 - 2004
Computerized Image Analyses of MR Scans in Schizophrenia.
The goals of this grant are to define and to localize further brain abnormalities s in patients afflicted with schizophrenia.
Role: Co-Investigator

Invited talks

Statistical Analysis of Anatomical Shape and Function. Siemens Corporate Research Labs. Princeton, NJ. May 2003.

Statistical Shape Analysis. A Tutorial on Shape and Deformable Models in Biomedical Imaging, held in conjunction with MICCAI'2002: Fifth International Conference on Medical Image Computing And Computer Assisted Intervention. Tokyo, Japan. September 2002.

Deformation Analysis for Shape Based Classification. MIA'2002: Mathematics and Image Analysis. Paris, France. September 2002.

Statistical Analysis of fMRI data. Prof. Malach group. Department of Neurobiology, Weizmann Institute of Science. Rehovot, Israel. March 2002.

Statistical Shape Analysis of Anatomical Structures. Brain Mapping Seminar, UCLA Brain Mapping Center. Los Angeles, CA. February 2001.

Statistical Shape Analysis of Anatomical Structures. The Stochastic Systems Group Seminar, Laboratory for Information and Decision Systems, MIT. Cambridge, MA. October 2001.

Statistical Shape Analysis of Anatomical Structures. Department of Psychiatry, Dartmouth Medical School. Hanover, NH, April 2001.

Stereo Matching with Transparency and Matting. Computer vision Seminar, Computer Science Department, Technion. Haifa, Israel. April 1998.

Digital Anatomy Atlases. Computer vision Seminar, Computer Science Department, Technion. Haifa, Israel. April 1998.

AnatomyBrowser: Digital Anatomy Atlas. Lucent Bell Labs. Murray Hills, NJ. March 1998.

Paper reviews

I have reviewed papers for the following journals and conferences:
Medical Image Analysis: IEEE Transactions on Medical Imaging (TMI), Medical Image Analysis (MedIA), Journal of Biomedical Informatics, International Conference on Information Processing in Medical Imaging (IPMI), Medical Image Computing and Computer-Assisted Intervention (MICCAI).
Computer Vision: IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), GMIP: Graphical Models & Image Processing, Computer Vision and Image Understanding (CVIU), International Conference on Computer Vision (ICCV), IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR), International Conference on Pattern Recognition (ICPR).
Machine Learning: Neural Information Processing Systems (NIPS), Information Sciences.

Patents

Methods and systems for construction of ultrasound images. US Patent 6695778. Filed July 3, 2002, Issued February 24, 2004.

Method for performing stereo matching to recover depths, colors and opacities of surface elements. US Patent 5917937. Filed April 15, 1997, Issued June 29, 1999.

Publications

Journal articles

P. Golland, W.E.L. Grimson, M.E. Shenton, R. Kikinis. Detection and Analysis of Statistical Differences in Anatomical Shape. *Medical Image Analysis* (in review), 2002.

M. Frumin, P. Golland, R. Kikinis, Y. Hirayasu, D.F. Salisbury, J. Hennen, C.C. Dickey, M. Anderson, I.A. Fischer, D. Yurgelun-Todd, F.A. Jolesz, W.E.L. Grimson, R.W. McCarley, M.E. Shenton. Shape Differences in the Corpus Callosum in First Psychotic Episode Schizophrenia and First Psychotic Episode Affective Disorder. *American Journal of Psychiatry, 159:866-868, 2002.*

P. Golland, R. Kikinis, M. Halle, C. Umans, W.E.L. Grimson, M.E. Shenton, J.A. Richolt. AnatomyBrowser: A Novel Approach to Visualization and Integration of Medical Information. Journal of Computer Assisted Surgery, 4:129-143, 1999.

R. Szeliski and P. Golland. Stereo Matching with Transparency and Matting. International Journal of Computer Vision, 32(1):45-61, 1999.

J.E. Anderson, C. Umans, M. Halle, P. Golland, M. Jakab, R.W. McCarley, F.A. Jolesz, M.E. Shenton, R. Kikinis. Anatomy Browser: Java-based Interactive Teaching Tool for Learning Human Neuroanatomy. Electronic Journal of Radiological Society of North America, http://ej.rsna.org/ej2/0050-97.fin/index.html, volume 2, 1998.

P. Golland and A.M. Bruckstein. Motion from Color. CVIU: Computer Vision and Image Understanding, 68(3):346-362, 1997.

P. Golland and A.M. Bruckstein. Why RGB? Or How to Design Color Displays for Martians. GMIP: Graphical Models and Image Processing, 58(5):405-412, 1996.

Book chapters

G.S. Young, S.G. Silverman, J. Kettenbach, N. Hata, P. Golland, F.A.Jolesz, K.R. Loughlin, R. Kikinis. Three-dimensional Computed Tomography for Planning Urologic Surgery. *The Urologic Clinics of North America,* 25(1):103-111, 1998.

Peer-reviewed conference papers

P. Golland and B. Fischl. Permutation Tests for Classification: Towards Statistical Significance in Image-Based Studies. *In Proc. IPMI'2003: The 18th International Conference on Information Processing and Medical Imaging*, LNCS 2732:330-341, 2003.

P. Golland, B. Fischl, M. Spiridon, N. Kanwisher, R.L. Buckner, M.E. Shenton, R. Kikinis, A. Dale, W.E.L. Grimson. Discriminative Analysis for Image-Based Studies. *In Proc. MICCAI'2002: Fifth International Conference on Medical Image Computing And Computer Assisted Intervention.* LNCS 2488:508-515, 2002.

S.J. Timoner, P. Golland, R. Kikinis, M.E. Shenton, W.E.L. Grimson, W.M. Wells. Performance issues

in shape classification. *In Proc. MICCAI'2002: Fifth International Conference on Medical Image Computing And Computer Assisted Intervention.* LNCS 2488:355-362, 2002.

P. Golland. Discriminative Direction for Kernel Classifiers. *In Advances in Neural Information Processing Systems 14*, Eds. T. G. Dietterich, S. Becker, and Z. Ghahramani, MIT Press, 2002.

P. Golland, W.E.L. Grimson, M.E. Shenton, R. Kikinis. Deformation Analysis for Shaped Based Classification. *In Proc. IPMI'2001: The 17th International Conference on Information Processing and Medical Imaging*, LNCS 2082:517-530, 2001.

P. Golland, W.E.L. Grimson, M.E. Shenton, R. Kikinis. Small Sample Size Learning for Shape Analysis of Anatomical Structures. *In Proc. MICCAI'2000: Third International Conference on Medical Robotics, Imaging And Computer Assisted Intervention*, LNCS 1935:72-82, 2000.

P. Golland and W.E.L. Grimson. Fixed Topology Skeletons. *In Proc. CVPR'2000: Computer Vision and Pattern Recognition*, 10-17, 2000.

P. Golland, W.E.L. Grimson and R. Kikinis. Statistical Shape Analysis Using Fixed Topology Skeletons: Corpus Callosum Study. *In Proc. IPMI'99: The 16th International Conference on Information Processing and Medical Imaging*, LNCS 1613:382-387, 1999.

P. Golland. R. Kikinis, C. Umans, M. Halle, M. Shenton, J. Richolt. AnatomyBrowser: A Framework for Integration of Medical Information. *In Proc. MICCAI'1998: First International Conference on Medical Image Computing and Computer-Assisted Intervention*, 720-731, 1998.

R. Szeliski and P. Golland. Stereo Matching with Transparency and Matting. *In Proc. ICCV'98: Sixth International Conference On Computer Vision,* 517-524, 1998.

Other selected publications (tech reports, abstracts, on-line pubs, etc.)

S. Mukherjee, P. Golland and D. Panchenko. Permutation Tests for Classification. MIT AI Lab Memo, AIM-2003-019, 2003.

P. Golland, R. Kikinis, M. Halle, C. Umans, W.E.L. Grimson, M.E. Shenton, J.A. Richolt. AnatomyBrowser: A Novel Approach to Visualization and Integration of Medical Information. *Yearbook of Medical Informatics 2001*, Eds. R. Haux and C. Kulikowski, 414-428, Schattauer, Germany, 2001.

P. Golland. Spatial Encoding In MRI And How To Make It Faster. Technical report. http://www.ai.mit.edu/people/polina/Papers/mri.pdf, 2000.

M. Frumin, P. Golland, R.W. McCarley, Y. Hirayasu, D.F. Salisbury, R. Kikinis, M.E. Shenton. Shape differences in the corpus callosum in first episode schizophrenia and affective disorder. 37th Annual Meeting of the American College of Neuropsychopharmacology, Puerto Rico, 1998.

P. Golland. Anatomy Browser. *On-line developer's directories maintained by Sun Microsystems* http://developer.earthweb.com/directories/pages/dir.java.educational.medical.3.html, 1998.

J. Richolt, P. Golland, C. S. Winalski, M. Anderson, A. Bhalero, S. Koskinen, S. Martin, R. Kikinis. The Digital Interactive Knee Atlas. *American Academy of Orthopedic Surgeons Annual Meeting*, Multimedia Education Demonstrations, New Orleans, LA, March 1998.

J. Richolt, C.S. Winalski, P. Golland, M. Halle, S. Nakajima, S. Martin, R. Kikinis. A Digital, Three Dimensional Knee Atlas for Teaching and Surgical Planning Using High Resolution MR Images. *The Conference of German Society of Orthopedics and Traumatologists*, Frankfurt, Germany, 1997.