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Assistant Director of Bioimaging
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- EDUCATION**
- **North Carolina State University**, Raleigh, North Carolina
Ph. D. in Electrical Engineering with a Mathematics minor, December 2002
Dissertation: “*Vector space methods in surface reconstruction from one or more images acquired from the same view with application to scanning electron microscopy images*”
M. S. in Electrical Engineering, December 1999
Thesis: “*Signal reconstruction using the cross-scale correlation properties of the wavelet decomposition*”
 - **Bilkent University**, Ankara, Turkey
B. S. in Electrical Engineering, June 1997
- TEACHING**
- **University of Pennsylvania**
Guest lecturer in Nuclear Medicine 210 Course on Medical Image Analysis, 2004 and 2005
 - **North Carolina State University**
Teaching assistant to Computer Vision and VLSI Circuit Design, Fall 2000
Guest lecturer in Computer Vision class on Shape from Shading, Fall 2001
Guest lecturer in Data Mining Reading Group and Pattern Recognition class on Support Vector Machines, Spring 2002
 - **Bilkent University**
Member of a voluntary instructor team in a teaching program for high-school students on computer literacy
- RESEARCH**
- **Biomedical Information Processing**
Medical image analysis,
Topology preservation in image warping,
Multi-contrast image analysis for early disease diagnosis,
Quantitative methods for flow multicolor flow cytometry

- **Machine Learning**
Statistical Learning Theory,
Structural Risk Minimization, V-C Theory, Support Vector Machines,
Estimation, classification and pattern recognition,
Automatic target recognition, detection, and tracking
- **Computer Vision**
Surface reconstruction, shape from shading, and photometric stereo,
Feature selection and extraction,
Multispectral and hyperspectral vision,
Remote sensing
- **Mathematical Methods**
Vector space representations,
Wavelet theory and multiresolution,
Extreme Value Theory, rare event analysis

HONORS

- **1992** Nationally ranked 40th in the College Entrance Examination among approximately 1,000,000 high-school graduates (Turkey)
- **1997** Nationally ranked 1st in the Graduate Education Examination among approximately 750,000 college graduates (Turkey)

*WORK
HISTORY*

- **2005-present** Drexel University
Assistant Director of Bioimaging, Center for Integrated Bioinformatics
Research projects on Computational Analysis of Histology Slides in Cancer and Other Degenerative Diseases, Integration of Multiple Information Sources for Disease Understanding, Diagnosis, and Therapeutic Interventions
- **2002-2005** University of Pennsylvania
Post-doctoral research fellow
Research topics include Medical Image Analysis for Disease Diagnosis, Statistical and Machine Learning Methods for Processing High Dimensional Medical Data, Quantitative Assessment of Tissue Degeneration using Multi-Contrast Imaging, and Computational Methods for Quantitative Analysis of Cell Phenotypes using Multicolor Flow Cytometry
- **1998-2002** North Carolina State University
Part-time research assistantship
Research topics include Machine learning and Computer Vision
Part-time teaching assistantship
Lectured and graded tests and homeworks for Computer Vision, Digital Electronics, and VLSI Design classes
- **2001** KLA-Tencor Corporation, San Jose, California
Summer internship
Researched on Integrated Circuit Defect Review and Analysis for improved performance in defect classification
Performed a quantitative performance analysis of various classification techniques

such as Nearest Neighbor rule and Support Vector Machines

Developed a method to infer topology and material type information of wafer defects from Scanning Electron Microscopy images to improve defect representation

- **1997** Microwave and System Technologies Research Laboratory, ASELSAN (Military Electronics of Turkey), Izmir, Turkey
Summer internship
Performed quality assessment on automatic tolling machines within ASELSAN Highway Project
Investigated inductive loop-based vehicle sensor technologies
Established a communication network on a set of RF modems
- **1996** Microwave and System Technologies Research Laboratory, ASELSAN (Military Electronics of Turkey), Izmir, Turkey
Summer internship
Constructed the infrastructure for a fiber-optic communication network
Implemented a power-line communication network over a pair of AN-193 modules
- **1995** AEROSPATIALE S.N.I., Ankara, Turkey
Summer internship
Performed investigative analysis of telecommunication satellite technologies
Evaluated the satellite base station in Gölbaşı, Ankara

SKILLS

- **Computer skills**
UNIX, WINDOWS, MATLAB, C, C++, MS Office, FrameMaker, and LaTeX
- **Language skills**
Turkish (native), English (read and write), French (read and write)
- **Artistic skills**
Classical guitar performer

SELECTED PAPERS

- **Journal publications**
B. Karaçalı, “*Information theoretic deformable registration using local image information*,” to appear in the International Journal of Computer Vision
- B. Karaçalı**, C. Davatzikos, “*Simulation of tissue atrophy using a topology preserving transformation model*,” to appear in IEEE Transactions on Medical Imaging
- B. Karaçalı**, C. Davatzikos, “*Estimating topology preserving and smooth displacement fields*,” IEEE Transactions on Medical Imaging, vol. 23, no. 7, p. 868-880, 2004
- B. Karaçalı**, W. Snyder, “*Noise reduction in surface reconstruction from a given gradient field*,” International Journal of Computer Vision, vol. 60, no. 1., p. 25-44, 2004

Z. Lao, D. Shen, **B. Karaçalı**, S. M. Resnick, C. Davatzikos, “*Morphological classification of brains via high dimensional shape transformations and machine learning methods*,” *NeuroImage*, vol. 21, no. 1, p. 46-57, 2003

B. Karaçalı, R. Ramanath, W. Snyder, “*A comparative analysis of structural risk minimization by support vector machines and nearest neighbor rule*,” *Pattern Recognition Letters*, vol. 25, no. 1, p. 63-71, 2004

B. Karaçalı, W. Snyder, “*Reconstructing discontinuous surfaces from a given gradient field using partial integrability*,” *Computer Vision and Image Understanding*, vol. 92, no. 1, p. 78-111, October, 2003

B. Karaçalı, A. H. Krim, “*Fast minimization of structural risk by nearest neighbor method*,” *IEEE Trans. on Neural Networks*, vol. 14, no. 1, p. 127-137, 2003

- **Peer-Reviewed Conference Publications**

S. Makrogiannis, **B. Karaçalı**, C. Davatzikos, “A joint transformation and residual image descriptor for morphometric image analysis using an equivalence class formulation,” to appear in MMBIA 2006

Z. Lao, D. Shen, A. Jawad, **B. Karaçalı**, D. Liu, E. Melhem, N. Bryan, C. Davatzikos, “Automated Segmentation of White Matter Lesions in 3D Brain MR Images, using Multivariate Pattern Classification,” in *IEEE International Symposium on Biomedical Imaging: From Nano to Macro*, Apr 6 to Apr 9, 2006, Arlington, Virginia

Z. Xue, D. Shen, **B. Karaçalı**, C. Davatzikos, “*Statistical representation and simulation of high-dimensional deformations: Application to synthesizing brain deformations*,” *MICCAI 2005*, Palm Springs, California, Oct 26 to Oct 29, 2005, J. Duncan and G. Gerig (Eds.), LNCS 3750, pp. 500-508

B. Karaçalı, “*Fully elastic multi-modality image registration using mutual information*,” *Proceedings of the IEEE International Symposium on Biomedical Imaging*, p. 1455-1458, Arlington, April 2004

C. Davatzikos, D. Shen, Z. Lao, Z. Xue, **B. Karaçalı**, “*Morphological classification of medical images using nonlinear support vector machines*”, in *Proceedings of the IEEE International Symposium on Biomedical Imaging (invited paper)*, Arlington, April 2004

B. Karaçalı, C. Davatzikos, “*Topology preservation and regularity in estimated deformation fields*,” *Information Processing in Medical Imaging, Lecture Notes in Computer Science*, vol. 2732, 2003

B. Karaçalı, W. Snyder, “*Partial integrability in surface reconstruction from a given gradient field,*” Proceedings of ICIP, vol. 2, p. 525-528, 2002

- **Conference Publications**

B. Karaçalı, W. Snyder, “*Automatic target detection using multispectral imaging,*” Proceedings of AIPR, p. 55-59, 2002

B. Karaçalı, W.Snyder, “*Hyperspectral versus multispectral: A comparative study in ATR performance,*” In ATRWG, October 2002.

B. Karaçalı, W.Snyder, “*On-the-fly multispectral ATR,*” In Combat Identification Systems Conference, June 2002.

B. Karaçalı, H. Krim, I. C. Schick, “*Wavelet-based methods in Global Positioning System signal tracking,*” Proc. SPIE Vol. 4056, p. 127-136, 2000

- **Papers in Preparation**

B. Karaçalı, A. Tözeren, “*Virtual pathologist: An automated diagnostic aide on histology slides for cancer*”

B. Karaçalı, A. Tözeren, “*Markov chain modeling of cancer biomarker transients*”