Bilge Karaçalı, PhD

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Work History

- **2008- İzmir Institute of Technology, İzmir**

  Associate professor, Electrical and Electronics Engineering Department

- **2005-2007 Drexel University, Philadelphia, Pennsylvania**

  Research assistant professor, School of Biomedical Engineering, Science and Health Systems

  Assistant director of bioimaging, Center for Integrated Bioinformatics

- **2002-2005 University of Pennsylvania, Philadelphia, Pennsylvania**

  Postdoctoral research fellow, Department of Radiology, Section of Biomedical Image Analysis

Education

- **North Carolina State University, Raleigh, North Carolina**

  PhD in electrical engineering with a minor in mathematics, December 2002

  MS in electrical engineering, December 1999

- **Bilkent University, Ankara**

  BS in electrical and electronics engineering, June 1997

Teaching

- **İzmir Institute of Technology, İzmir**

  EE101 Introduction to Electrical Engineering (freshman), Fall, 2008-09, 2009-10

  EE430 Introduction to Systems Biology (senior), Fall, 2008-09, 2009-10

  EE550 Computational Biology (graduate), Fall, 2008-09, 2009-10

  EE434 Biomedical Signal Processing (senior), Spring, 2007-08, 2008-09, 2009-10

  EE436 Mathematical Foundations of Signal Processing and Control (senior), Spring, 2008-09, 2009-10

  EE549 Biomedical Image Analysis (graduate), Spring, 2007-08, 2008-09

- **Drexel University, Philadelphia, Pennsylvania**

  Medical Image Analysis, GPBA Summer Institute, 2006

- **University of Pennsylvania, Philadelphia, Pennsylvania**

  Medical Image Analysis, guest lecturer in Nuclear Medicine, 2004 and 2005

Research

- **Biomedical Information Processing**

  Automatic protein classification

Computational analysis of genetic sequences

Molecular phylogeny algorithms

Biomedical image analysis

Quantitative methods in biomedical data analysis

- **Statistical Learning**

  Statistical learning theory

  Quasi-supervised learning

  Approximation, classification, and detection

  Automatic target recognition and tracking

- **Computer Vision**

  Surface reconstruction, shape-from-shading, photometric stereo

  Multispectral and hyperspectral vision

  Remote sensing

- **Mathematical Methods**

  Vector space methods

  Independent component analysis

  Multivariate ranks

  Wavelets and multiscale analysis

  Extreme value theory

Projects

- *Modeling/Estimating Tissue Deformations in Tumor Patients*, NIH Project, R01-NS042645-04, **postdoctoral fellow**, 2002-2005

- *2+2+2 Workforce Education in Biotechnology and Bioinformatics*, PA DCED Project, **project coordinator**, 2005

- *Elastic Alignment of Multimodality Medical Images using Information Theoretic Point Similarity Measures*, TÜBİTAK, 108E249, **project investigator**, 2009 (ongoing)

- *Hierarchical Motif Vectors for Protein Alignment and Functional Classification*, European Research Counsel FP7, PIRG-GA-2008-230903, **project coordinator**, 2009 (ongoing)

Awards

- **1992** Ranked 40th nationwide in University Entrance Examination

- **1997** Ranked 1st nationwide in Graduate Education Examination

- **2007** 2nd prize, GPBA Spring Retreat Poster Competition, general category

Publications

- **Journal articles**

  Karaçalı, B., "Quasi-supervised learning for biomedical data analysis," Pattern Recognition, 43(10), 3674-3682 (2010).

Gormley, M., Dampier, W., Ertel, A., Karaçalı, B., Tözeren, A., "Prediction potential of candidate biomarker sets identified and validated on gene expression data from multiple datasets," BMC Bioinformatics, 8(415) (2007).

Karaçalı, B., Vamvakidou, A.P., Tözeren, A., "Automated recognition of cell phenotypes in histology images based on membrane- and nuclei-targeting biomarkers," BMC Medical Imaging, 7(7) (2007).

Karaçalı, B., Tözeren, A., "Automated detection of regions of interest for tissue microarray experiments: an image texture analysis," BMC Medical Imaging, 7(2) (2007).

Karaçalı, B., "Information theoretic deformable registration using local image information," International Journal of Computer Vision, (72)3, 219-237 (2007).

Xue, Z., Shen, D., Karaçalı, B., Stern, J., Rottenberg D., Davatzikos, C., "Simulating Deformations of MR Brain Images for Validation of Atlas-based Segmentation and Registration Algorithms", NeuroImage, 33, 855-866 (2006).

Karaçalı, B., Davatzikos, C., "Simulation of tissue atrophy using a topology preserving transformation model," IEEE Transactions on Medical Imaging, 25(5), 649-652 (2006).

Karaçalı, B., Davatzikos, C., "Estimating topology preserving and smooth displacement fields," IEEE Transactions on Medical Imaging, 23(7), 868-880 (2004).

Karaçalı, B., Snyder, W., "Noise reduction in surface reconstruction from a given gradient field," International Journal of Computer Vision, 60(1), 25-44 (2004).

Lao, Z., Shen, D., Karaçalı, B., Resnick, S. M., Davatzikos, C., "Morphological classification of brains via high dimensional shape transformations and machine learning methods," NeuroImage, 21(1), 46-57 (2003).

Karaçalı, B., Ramanath, R., Snyder, W., "A comparative analysis of structural risk minimization by support vector machines and nearest neighbor rule," Pattern Recognition Letters, 25(1), 63-71 (2004).

Karaçalı, B., Snyder, W., "Reconstructing discontinuous surfaces from a given gradient field using partial integrability," Computer Vision and Image Understanding, 92(1), 78-111 (2003).

Karaçalı, B., Krim, H., "Fast minimization of structural risk by nearest neighbor method," IEEE Trans. on Neural Networks, 14(1), 127-137 (2003).

- **Conference proceedings**

Karaçalı, B., "Deformation Field Interpolation Using Rotational Landmarks," BİYOMUT 2010

Önder, D., Karaçalı, B., "Automated Classification of Cancerous Textures in Histology Images Using Quasi-supervised Learning Algorithm," BİYOMUT 2010

Doğan, T., Karaçalı, B., "Evolutionary Relationships Between Gene Sequences via Nonlinear Embedding," BİYOMUT 2010

Önder, D., Karaçalı, B., "Automated clustering of histology slide texture using co-occurrence based grayscale image features and manifold learning," BİYOMUT 2009

Makrogiannis, S., Verma, R., Karaçalı, B., Davatzikos, C., "A joint transformation and residual image descriptor for morphometric image analysis using an equivalence class formulation," Proceedings of the 2006 Conference on Computer Vision and Pattern Recognition Workshop (CVPRW'06), New York, 74-81, IEEE Publications, Piscataway 2006.

Lao, Z., Shen, D., Jawad, A., Karaçalı, B., Liu, D., Melhem, E., Bryan, N., Davatzikos, C., "Automated Segmentation of White Matter Lesions in 3D Brain MRImages, using Multivariate

Pattern Classification," Proc. 3rd IEEE International Symposium on Biomedical Imaging: From Nano to Macro, Arlington, 307-310, IEEE Publications, Piscataway 2006.

Xue, Z., Shen, D., Karaçalı, B., Davatzikos, C., "Statistical representation and simulation of high-dimensional deformations: Application to synthesizing brain deformations," Proc. MICCAI 2005, Palm Springs, J. Duncan and G. Gerig (Eds.), LNCS, Vol. 3750, 500-508, Springer, Berlin, 2005.

Karaçalı, B., "Fully elastic multi-modality image registration using mutual information," Proc. 2nd IEEE International Symposium on Biomedical Imaging, Arlington, 1455-1458, IEEE Publications, Piscataway, 2004.

Davatzikos, C., Shen, D., Lao, Z., Xue, Z., Karaçalı, B., "Morphological classification of medical images using nonlinear support vector machines", Proc. 2nd IEEE International Symposium on Biomedical Imaging (invited paper), Arlington, 587-590, IEEE Publications, Piscataway, 2004.

Karaçalı, B., Davatzikos, C., "Topology preservation and regularity in estimated deformation fields," Proc. 18th Information Processing in Medical Imaging, Lecture Notes in Computer Science, Vol. 2732, Ambleside, 426,437, Springer, Berlin, 2003.

Karaçalı, B., Snyder, W., "Partial integrability in surface reconstruction from a given gradient field," Proc. 9th International Conference on Image Processing, Rochester, Vol. 2, 525-528, IEEE Publications, Piscataway, 2002.

Karaçalı, B., Snyder, W., "Automatic target detection using multispectral imaging," Proc. 31st Applied Image Pattern Recognition Workshop, Washington D.C., 55-59, IEEE Publications, Piscataway, 2002.

Karaçalı, B., Krim, H.,, Schick, I. C., "Wavelet-based methods in Global Positioning System signal tracking," Proc. SPIE, Orlando, Vol. 4056, 127-136, SPIE Publications, Bellingham, 2000.