

NAME

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ADDRESS

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EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR	FIELD OF STUDY
UNIVERSITY OF WISCONSIN-MADISON	Training.	2002-04	Bioinformatics
UNIVERSITY OF WISCONSIN-MADISON	Ph.D.	2000	Mathematics
UNIVERSITY OF CALIFORNIA SAN DIEGO CA	M.S.	1985	System Science (Bioengineering)
SAN DIEGO STATE UNIVERSITY CA	B.S.	1982	Computer Science & Engineering (double major)

DISSERTATION: A complex-valued overcomplete representation of Information for visual search: a learning theoretic approach based on multi-scale symmetry.

ADVISOR: Amir Assadi

MAJOR FIELDS OF INTEREST

Synergistic integration of mathematical, computational, experimental and informatics methods to achieve rapid and robust quantification in biological investigations. Application of probabilistic and information geometric methods to Nuclear Magnetic Resonance (NMR) investigations of biomolecular structure and function. Development of methods for mass spectrometry and NMR of metabolome.

RESEARCH AND PROFESSIONAL EXPERIENCE

Scientist and PI: University of Wisconsin-Madison (UW-Madison) (2006-present). *Scientist* (2004-2006).

Postdoctoral Fellow: Computation and Informatics in Biology and Medicine (2002-2004), *Postdoctoral Researcher* (2001-2002). *Visiting Professor:* Department of Mathematics (UW-Madison) (2003-present).

Research Assistant. Department of Mathematics, UW-Madison, Madison (1996-2000).

Multifaceted experience in research, development and leadership positions held in science and engineering organizations responsible for a broad range of state-of-the-art computational solutions. *Chief technology architect* SGC corporation San Diego CA (1992-1996), *Senior system architect* SGC corporation San Diego CA (1988-1992), *System Design architect* Artecon Inc. San Diego CA (1984-1988), *System Engineer* Calma/GE San Diego CA (1982-1984), *Algorithm Designer* NOSC contract San Diego CA (1981-1982). (A descriptive list of the technical reports during this period is outlined below)

HONORS AND FELLOWSHIPS

- NIH-NLM K22 award – 2006.
- NIH-NLM Postdoctoral fellowship award
- Member of MIT consortium for development of X windows system and contributor to the advisory committee for PEX advanced visualization protocol
- Advisory panel for advanced applications in object-oriented technologies (ACM)
- Education foundation scholarship award for education abroad. Placed 99.99 percentile in the national college placement exam (Iran)

PUBLICATIONS

REPRESENTATIVE AND RECENT PUBLICATIONS

1. *Probabilistic approach to determining unbiased random-coil carbon-13 chemical shift values from the protein chemical shift database.* Wang, L., Eghbalnia, H.R., and Markley, J.L., **J Biomol NMR.** 2006 (*In press*).
2. *High Resolution Iterative Frequency Identification for NMR.* Eghbalnia, H.R., Bahrami, A., Tonelli, M., Hallenga K., & Markley, J.L., **J Am Chem Soc.** 2005 Sep 14;127(36):12528-36.
3. *Probabilistic identification of spin systems and their assignments including coil-helix inference as output (PISTACHIO),* Eghbalnia, H.R., Bahrami A., Wang, L., Assadi, A., & Markley, J.L., **J Biomol NMR.** 2005 July;32(3):219-233.
4. *Protein Energetic Conformational Analysis from NMR chemical shifts: determination of protein secondary structure from the sequence and assigned chemical shifts,* Eghbalnia, H.R., Wang, L., Bahrami, A., Assadi, A., & Markley, J.L., **J Biomol NMR.** 2005 May;32(1):71-81.
5. *Linear analysis of carbon-13 chemical shift differences and its application to the detection and correction of errors in referencing and spin system identification.* Wang, L., Eghbalnia, H.R., Bahrami, A., & Markley, J.L., **J Biomol NMR.** 2005 May;32(1):13-22.
6. *Symmetry, Features, and Information.* Eghbalnia, H., Assadi, A., Townsend, J. (Invited Book Chapter) **Handbook of Geometric Computing**, Bayro Corrochano, Eduardo (Ed.), Springer 2005, ISBN: 3-540-20595-0, pp.31-68. (*based on Eghbalnia's dissertation*)
7. *A Probabilistic Model Of Coherent Spatiotemporal Dynamics In Neuronal Data.* Eghbalnia H., Assadi A., Bahrami A. Machine Learning for Signal Processing, 2005 **IEEE International Workshop Page(s):381 - 386.**
8. Extraction of nonlinear features in MEG and fMRI data of human brain, **Neurocomputing**, Liya Wang, Boris Baryshnikov, Hamid Eghbalnia and Amir Assadi, Vols. 52-54, 2003, Pages 683-690.
9. *Dynamic PCA for network feature extraction in multi-electrode recording of neurophysiological data in cortical substrate of pain,* Dian M. Fallahati, Miroslav Backonja, Hamid Eghbalnia and Amir H. Assadi, **Neurocomputing**, Volumes 44-46, June 2002, Pages 401-405.
10. *A computational model of visual perception of surfaces,* H. Eghbalnia and A.H. Assadi, **Neural Networks**, Vol 16, July 2003, pages 2899-2904. Based on an invited lecture in IEEE special session on Geometric Neurocomputing.

A SAMPLE OF OTHER PUBLICATIONS, RECENT ABSTRACTS, AND TECHNICAL REPORTS (FROM A TOTAL OF 40)

11. *Information processing of motion in facial expression and the geometry of dynamical systems.* Assadi A. MacMenamin, B., Eghbalnia H., **Electronic Imaging.** 2005 15(2):6.
12. Recurrent probabilistic dynamics: Applications to pattern recognition, Amir Assadi and Hamid Eghbalnia, **Neurocomputing**, Volumes 38-40, June 2001, Pages 1067-1075.
13. *A learning theoretic approach to perceptual geometry in natural scenes,* Amir Assadi, Hamid Eghbalnia and Stephen Palmer, **Neurocomputing**, Volumes 38-40, June 2001, Pages 1077-1085.
14. *An application of support vector machines and symmetry to computational modeling of perception through visual attention,* Hamid Eghbalnia and Amir Assadi, **Neurocomputing**, Volumes 38-40, June 2001, Pages 1193-1201.
15. *Learning optimal wavelets from overcomplete representations.* Eghbalnia-H; Assadi-A, *Proceedings of the International Society for Optical Engineering. Wavelet Applications in Signal and Image Processing VIII*, Aldroubi, Akram; Laine, Andrew F.; Unser, Michael A. (editors), vol.4119, pt.1-2; 2000; p.286-93.
16. *Resting-state functional connectivity study using independent component analysis,* Cordes D., J. Carew, H. Eghbalnia, M.E. Meyerand, M. Quigley, K. Arfanakis, A. Assadi, P.A. Turski and V. Haughton (1999) . *Int. Soc. for Magn. Reson. in Med. (ISMRM) Philadelphia, PA, p. 1706.*

17. *Nonlinear methods for clustering and reduction of dimensionality*. Eghbalnia-H; Assadi-A; Carew-J, **IJCNN'99. International Joint Conference on Neural Networks. Proceedings. IEEE, Piscataway, NJ, USA; 1999; 6 vol. lxii+4439 pp. p.1004-9 vol.2**

SAMPLE OF RECENT ABSTRACTS

18. Direct prediction of chemical shift distributions from amino acid sequence, H. Eghbalnia, J. Markley, A. Bahrami (2006), Keystone Symposia; Structural Genomics.
19. Getting more information out of the statistical distribution of chemical shifts, H. Eghbalnia, L. Wang, A. Bahrami, John L. Markley (2006), 47th ENC.
20. Automation in NMR investigations of protein structure and interactions, Markley J., Bahrami A., Cornilescu G., Eghbalnia H., Hallenga K., Kainosho M., Newman C. S., Tonelli M., Tyler R. C., Ulrich E. L., Vinarov D. A., Volkman B. F., Wang L., Westler W. M., Zolnai Z. (2005), FEBS Journal 272 (s1), [C6-004].

SAMPLE OF TECHNICAL REPORTS

21. Fast, automatic finite element mesh generation. Calma/GE technical report (1982)
22. Numerically stable methods of finding intersections of Non-uniform Rational B-spline Surfaces (NURBS). Artecon Tech. Rep. – Project IAE (1984)
23. Adaptive mesh generation for shading NURBS. SGC technical report (1987)
24. Proposal for building a distributed, object-based, global collaborative system. SGC technical report (1989)
25. Architecture for TMX/TMS – incremental foundations for building a distributed, object-based, global collaborative system. SGC technical report (1990)
26. An algorithm for switching between coarse and fine finite difference meshes for the Navier-Stokes equation applied to near transonic flow. Report under a NOSC study grant (1982).

TEACHING AND MENTORING

RECENTLY MENTORED STUDENTS

Research Topic: Geometric & statistical methods for NMR structure determination from sparse data

Arash Bahrami. Biophysics Program – Biochemistry Dept., UW - Madison (2003-current).

Member of Arash's dissertation committee.

Research Topic: Geometric and statistical methods for refinement of protein super-secondary structure

Liya Wang. Biophysics Program – Biochemistry Dept., UW – Madison (2003-current).

Member of Liya's dissertation committee.

Research Topic: Methods for statistical shape analysis and statistical signal analysis

Usman Khan. Graduate student in engineering and Statistics (2003-2005). Moved to CMU.

Several other graduate students and undergraduate students were mentored, or trained, for periods ranging from two to twelve months on a variety of topics (A list is available).

TEACHING

Experience in teaching and lecturing to a variety of audiences in conventional as well as short course settings. Examples include lectures in Biochemistry 801 (2004-2006), lectures in Math 801(2003-2004), CS 576 (2002-2005), and lectures in Math 491 (1998-1999).

Instructor for Beginning algebra, UW-Madison (1998-1999) – rated exceptional in teaching.

Lectures in object oriented programming (1990-1992). UCSD Extension – S.D., CA. Short course on geometric modeling and design, and professional development course (DDR inc.) 1989.

SOME PRESENT AND PAST COLLABORATIONS

Mark Cook – Department of Animal Sciences, University of Wisconsin-Madison
Warren Porter – Department of Zoology, University of Wisconsin-Madison
Amir Assadi – Department of Mathematics, University of Wisconsin-Madison
Amos Ron – Department of computer science, University of Wisconsin-Madison
Leah D. Whigham - Department of Obstetrics and Gynecology, University of Wisconsin-Madison
Milo Westler – Department of Biochemistry, University of Wisconsin-Madison
Eldon Ulrich – Department of Biochemistry, University of Wisconsin-Madison
Fariba Assadi-Porter – Department of Biochemistry, University of Wisconsin-Madison
Michael Shortreed – Department of Chemistry, University of Wisconsin-Madison
Dan Butz – Department of Zoology, University of Wisconsin-Madison
Miroslav Backonja – Department of Neurology University of Wisconsin-Madison
James Townsend – Department of Psychology (Indiana University)
Stephen Palmer – Department of Psychology (University of California Berkeley)

RECENT RESEARCH SUPPORT AND PENDING GRANTS

Role	Grant	Project	Status
PI	1K22 LM899201	Informatics and modeling to extend the reach of NMR structure determination	Awarded
Scientist. Made major contributions to research sections of the grant	5P41 RR02301	National Magnetic Resonance Facility at Madison	Funded/ Ongoing
Collaborator. Wrote sections dealing with approaches to NMR signal processing	1R01GM072000	New Mathematical Methodology for NMR Spectroscopy	Funded/ Ongoing
Collaborator. Mathematical methods for metabolomics processing	R21 DK070297	Isotope-assisted differential metabolomics.	Funded/ Ongoing
Fellowship.	5T15LM005359	CIBM Postdoctoral Fellow	Complete

SERVICE

Co-organizer of the upcoming (2006) NMR Data collection and analysis workshop in Madison.
Co-organizer of the annual NIPS workshop on Geometric Methods in Learning Theory (2000-2001).
Organizer of CIBM post-doc seminars (2002-2003).
Collaborated on organizing First CNS Mini-Symposium on oscillations and networks (CNS 2005).
Organizer of Biochemistry NMR learning seminars (2003-2004).
Co-Organizer of Object-oriented programming, systems and languages (1983-1984).

PATENTS – IN PROCESS

Noninvasive measurement & identification of biomarkers in disease state using NMR spectroscopy. P05420US 5/06
A method for quantitatively computing a specific ligand/receptor binding interaction. *WARF disclosure 4/06*