Hossein Mobahi

Curriculum Vitæ

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Coordinated Science Laboratory
University of Illinois at Urbana-Champaign
1308 West Main St.
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Research Interests

- **Computer Vision** : Image Alignment, Image Segmentation, Image Compression, Image Inpainting.
- **Machine Learning** : Optimization of Smooth Functions, Pattern Recognition, Data Clustering, Manifold Learning.

Education

2012 (Exp.) Ph.D. Candidate in Computer Science
University of Illinois at Urbana Champaign
Advised by Professor **Yi Ma** (ECE Dept.) since **September 2007**

2005 M.S. in Computer Science (Area: AI and Robotics)
University of Tehran
GPA 19.29/20.00 (equivalent to 4.0/4.0)
Top graduated (**first rank**) in Faculty of Engineering
Dissertation: *Learning by Concept-Oriented Imitation*
Advisor : Professor Majid Nili Ahmadabadi Coadvisor: Babak Nadjar Araabi

2003 B.S. in Computer Engineering
Azad University, Tehran-South Campus
GPA 17.29/20.00
Top graduated (**second rank**) in Department of Computer Engineering
Final Project: *Building an Interactive Robot Face from Scratch*
Advisor : Mr. Masoud Katiraee

Awards and Honors

2011-2012 **Computational Science and Engineering (CSE) Fellowship**

2011 **UIUC Cognitive Science & Artificial Intelligence Award**
$2,000 unrestricted fund for promising research directions in Artificial Intelligence.

2011-2012 **Finalist of Qualcomm Fellowship** (Fellowship recipients among 33 finalists will be announced May 2011)

2010-2011 **Computational Science and Engineering (CSE) Fellowship**

2010-2011 **Feng Chen Memorial Best Paper Award**

2009 **Best Student Paper Award (Sang Uk Lee Award)**
for "Natural Image Segmentation with Adaptive Texture and Boundary Encoding", at *Asian Conference on Machine Vision (ACCV'09)*.

2009 **UIUC Cognitive Science & Artificial Intelligence Award**
$2,000 unrestricted fund for promising research directions in Artificial Intelligence.

2008–2009 **Mavis Memorial Fund Scholarship Award**
$5,000 unrestricted fund due to academic performance, research accomplishments, and demonstrated interest in engineering education.

2005 **Best Student Paper Award (1st Place) in 5th Symposium of Understanding Complex Systems**
University of Illinois at Urbana-Champaign
Article: *Swarm Contours: An ALife approach to image processing*.

2004 **IEEE Student Branch Award for Outstanding Extracurricular Activities**
University of Tehran
Teaching summer course on *Computer Vision and Pattern Recognition*.

2003 **Young Inventor Award in the National Khwarizmi Festival**
Receiving certificate from ministry of "science, research and technology"
Project Title: *An Interactive Emotional Robotic Face*

1993 **First Rank in Computer Programming Contest held among All Tehran High Schools.**
Received Certificate from *Minister of Education*.

Research Experience

2009–present **Image Segmentation using Minimum Coding Length.**
supervisor Prof. *Yi Ma*, University of Illinois at Urbana-Champaign.

2007–2009 **Sparse Signal Representation for Pattern Recognition.**
supervisor Prof. *Yi Ma*, University of Illinois at Urbana-Champaign.

2007 **Speech Visualization by Analysis of Phase Diagarams.**
supervisor Prof. *Karrie Karahalios*, University of Illinois at Urbana-Champaign.

2006–2007 **Video Retrieval System for studying Human Social Behavior (GroupScope Project).**
supervisor Prof. *Klara Nahrstedt*, University of Illinois at Urbana-Champaign.

2005–2006 **HCI techniques for aiding children with Autism.**
supervisor Prof. *Thomas S. Huang and Karrie Karahalios*, University of Illinois at Urbana-Champaign.

2005 **Tracking Bees in Low-Quality Gray-Scale Video.**
supervisor Prof. *David A. Forsyth*, University of Illinois at Urbana-Champaign.

2003–2004 **Learning by Imitation.**
supervisor Prof. *Majid Nili Ahmadabadi*, Institute for Studies in Theoretical Physics and Mathematics (IPM), School of Cognitive Sciences (SCS), Tehran, Iran.

2001–2002 **Tracking Activation Profiles in Functional MRI Images.**
supervisor Prof. *Sven Dickinson*, University of Toronto and Rutgers University.

2000–2001 **Persian Text To Speech (TTS) System.**
supervisor Prof. *Shahin Rouhani*, Institute for Studies in Theoretical Physics and Mathematics (IPM), School of Intelligent Systems (SIS), Tehran, Iran.

1999–2000 **Automatic Fingerprint Recognition.**
supervisor Prof. *Shahin Rouhani*, Institute for Studies in Theoretical Physics and Mathematics (IPM), School of Intelligent Systems (SIS), Tehran, Iran.

Teaching and Mentoring

Undergraduates Mentored

Fall 2011 Andrew J. Beugelsdijk, *Supervising an Undergraduate Research Assistant (RA)*, **Image Coding using Gaussian Radial Basis Functions**, UIUC.

2010–2011 Walter R. Sorto, *Illinois Scholars Undergraduate Research Program (ISUR) (Funded by Intel)*, **Perspective Invariant Object Representation**, UIUC.

2009 Jason Cho, *CS498LA "Undergrad Research Lab,"*, **Learning Contour Shapes to Represent Objects**, UIUC.

2009 Sanchit Mathur, *CS498LA "Undergrad Research Lab,"*, **Image Inpainting using Contour Recognition and Completion**, UIUC.

Teaching

2005 **Volunteer Teaching for Lecture Series on "Introduction to Pattern Recognition".**
ACM Student Chapter, University of Illinois at Urbana-Champaign.

2005 **Teaching Assistant for "Introduction to Artificial Intelligence" (CS440-ECE448).**
Taught by Prof. *Jean Ponce*, University of Illinois at Urbana-Champaign.

2003 **Workshop Lecturer, "Stereo Vision and Object Tracking".**
2nd National Robotic Workshop, ACM Student Chapter, University of Tehran.

2003 **Teaching Summer Course, "Applied Machine Vision".**
IEEE Student Branch, University of Tehran.

Internships

Summer 2008 **NEC Laboratories of America**, Princeton, NewJersey.
Project: Exploiting temporal coherence in video for learning.
Supervisor: Dr. Jason Weston

Summer 2012 **Microsoft Research**, Redmond, Washington.
Project: Free Energy Models for Flexible Template Matching
Supervisor: Dr. Nebojsa Jojic

Invited Talks

Apr 2012 **UW Optimization Seminar**, University of Washington. Hosts: *Prof. Rekha Thomas & Prof. James Burke*.
Gaussian Smoothing and Asymptotic Convexity.

Apr 2012 **UIUC Digital Signal Processing (DSP) Seminar**, University of Illinois at Urbana Champaign. Host: *Prof. Minh Do*.
Seeing through the Blur.

Mar 2012 **GRaphics And Imaging Lab (GRAIL)**, CS Department, University of Washington. Host: *Dr. Bryan Russell*.
Seeing through the Blur.

Feb 2012 **Microsoft Research (MSR) Talk Series**, Redmond, Washington. Host: *Dr. Larry Zitnick*.
Nonconvex optimization by Gaussian smoothing and continuation with applications to image alignment.

Apr 2011 **Qualcomm Research, Innovation Fellowship Final Presentation**, Bridgewater, New Jersey.
A Holistic Approach to 3D Reconstruction & Recognition.

Apr 2011 **NEC Labs, Machine Learning Group**, Princeton, New Jersey. Host: *Dr. Hans Peter Graf.*
Segmentation of Natural Images & Urban Scenes via Compression.

Jul 2010 **Microsoft Corp., Bing Map Research Group**, Bellevue, Washington. Host: *Dr. Eyal Ofek*.
Segmentation of Natural Images by Texture and Boundary Compression.

Aug 2010 **Microsoft Research**, Redmond, Washington. Host: *Dr. Larry Zitnick*.
Segmentation of Natural Images by Texture and Boundary Compression.

Dec 2004 **Institute for studies in theoretical Physics and Mathematics (IPM)**, Tehran, Iran. Host: *Prof. Majid Nili-Ahmadabadi*.
Image Processing with self organized contours.

Feb 2004 **Institute for studies in theoretical Physics and Mathematics (IPM)**, Tehran, Iran. Host: *Prof. Majid Nili-Ahmadabadi*.
The Role of Imitation in Learning.

Publications

Journal Papers

[1] **Segmentation of Natural Images by Texture and Boundary Compression.**
Mobahi, H., Rao, S., Yang, A., Sastry, S., Ma, Y.
International Journal of Computer Vision (IJCV), 95 (1), pg. 86-98, Oct. 2011.

[2] **Towards a Practical Face Recognition System:**
Robust Alignment and Illumination by Sparse Representation.
Wagner, A., Wright, J., Ganesh, A., Zhou, Z., **Mobahi, H.**, Ma, Y.
IEEE Transactions on Pattern Analysis & Machine Intelligence (PAMI) 34(2): 372-386, 2012.

[3] **A Biologically Inspired Method for Conceptual Imitation using Reinforcement Learning.**
Mobahi, H., Nili Ahmadabadi, M., Nadjar Araabi, B.
Journal of Applied Artificial Intelligence Vol. 21, No. 3, pp. 155-183, Taylor & Francis Group, Mar. 2007.

[4] **Swarm Contours: A fast self-organization approach for snake initialization.**
Mobahi, H., Nili Ahmadabadi, M., Nadjar Araabi, B.
Complexity, Vol 12, Issue 1, pp. 41-52, John Wiley & Sons Inc, Oct. 2006.

[5] **Fuzzy Behaviors for an Emotional Interactive and Emotional Robot Face.**
Mobahi, H., Lucas, C.
WSEAS Transactions on Systems (M. Mladenov, Ed.), Issue 4, Volume 2, pp. 1111-1117, October 2003.

Refereed Conference Papers

[6] **Seeing through the Blur.**
Mobahi, H., Ma, Y., Zitnick, L.
Int. Conf. on Computer Vision and Pattern Recognition (CVPR), Rhode Island, June 2012.

[7] **Holistic 3D Reconstruction of Urban Structures from Low-rank Textures.**
Mobahi, H., Zhou, Z., Yang, A., Ma, Y.
Workshop on 3D Reconstruction and Recognition, International Conference on Computer Vision (ICCV), pp. 593-600, 2011.

[8] **Learning Topology of Curves with Application to Clustering.**
Mobahi, H., Rao, S.R., Ma, Y.
AAAI Fall Symposium on Manifold Learning, pp. 34-41, Virginia, November 2009.

[9] **Natural Image Segmentation with Adaptive Texture and Boundary Encoding.**
Rao, S.R., **Mobahi, H.**, Yang, A., Ma, Y.
H. Zha, R.-i. Taniguchi, and S. Maybank (Eds.): ACCV 2009, Part I, LNCS 5994, pp. 135–146. Springer, Heidelberg (2010).
✹ WINNER OF THE BEST STUDENT PAPER AWARD (SANG UK LEE AWARD) ✹

[10] **Face Recognition With Contiguous Occlusion Using Markov Random Fields.**
Zhou, Z., Wagner, A., **Mobahi, H.**, Wright, J., Ma, Y.
ICCV'09, pp. 1050-1057, Kyoto, Japan, September 2009.

[11] **Data-Driven Image Completion by Image Patch Subspaces.**
Mobahi, H., Rao, S.R., Ma, Y.
27th Picture Coding Symposium, Chicago, May 2009.

[12] **Deep Learning from Temporal Coherence in Video.**
Mobahi, H., Collobert, R., Weston, J.
ICML'09, pp. 737-744, Montreal, Canada, June 2009.

[13] **Deep Learning Via Semi-Supervised Embedding.**
Weston, J., Collobert, R., Ratle, F., **Mobahi, H.**, Kuksa, P., Kavukcuoglu, K.
ICML'09, Workshop on Learning Feature Hierarchies, Montreal, Canada, June 2009.

[14] **Swarm Contours: An ALife approach to image processing.**
Mobahi, H., Nili Ahmadabadi, M., Nadjar Araabi, B.
5th Symposium of Understanding Complex Systems, University of Illinois at Urbana-Champaign, May (2005).

[15] **Concept Oriented Imitation.**
Mobahi, H., Nili Ahmadabadi, M., Nadjar Araabi, B.
Proceedings of IEEE International Conference on Robotics and Automation (ICRA05), pp. 1495-1500, Spain, April 2005.

[16] **Fast initialization of active contours: towards practical visual interfaces for human-robot interaction.**
Mobahi, H., Ahmadabadi, M.N.; Araabi, B.N.
Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2004), pp. 546-551, Japan, October 2004.

[17] **Temporal Resolution in Coevolutionary Optimization.**
Mobahi, H., Lucas, C.
Workshop on Applied Optimization (WAO 2004), Institute for Numerical Mathematics Technische Universitat Dresden, Germany, October 2004.

[18] **Peak Stick RBF Network for Online System Identification.**
Mobahi, H., Sharifi-Janabi, F.
Proceedings of the International Joint Conference on Neural Networks (IJCNN04), pp. 2105-2111, Budapest, Hungary, July 2004.

[19] **Fuzzy Perception, Emotion and Expression for Interactive Robots.**
Mobahi, H., Ansari, S.
Proceedings of IEEE International Conference on Systems, Man and Cybernetic (SMCC03), Volume 4, pp. 3918-3923,Washington, D.C., USA, Oct. 2003.

[20] **Shape Representation.**
Mobahi, H.
1st International Seminar on Graphs, Combinatorics and Computational Algorithms, Amir Kabir University, Tehran, Iran, Feb. 2001.

Magazines

[21] **HCI Applications for Aiding Children with Mental Disorders.**
Mobahi, H., Karahalios, K. G.
ACM Crossroads, Special Issue on Human-Computer Interaction, Issue 12.2, Winter 2005, pp. 8-12.

Media Coverage

- **Channel 3 of Iran's TV**: Talangor Program, Successful Youth Part, an *exclusive interview* with me demonstrating my interactive robot face (Aryan) in action, aired February 2003.

Computer Skills

- **Programming Languages**: C.
- **Mathematical Tools**: Matlab, Mathematica, Maple.