

Abdolreza Abdolhosseini Moghadam

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<http://egr.msu.edu/waves/people/nima.htm>

Qualifications

4+ years of experience in high-tech industries and more than 8+ years of experience in research labs as researcher/developer/system designer with extensive knowledge and specialty in sparse coding (compressed sensing), data modeling, algorithm development and design, statistics (including probability theory, deviation analysis), mathematics (combinatorics and designs, algebra, linear algebra, tensors, graph theory and algebraic graph theory), digital signal processing, video processing, image processing, machine learning, optimization, information theory, channel coding, frame theory, computer vision and designing embedded systems.

Honors, Awards, Achievements and Grants

- By modeling video contents into Common and Innovative components, we achieved results in certain video processing problems (such as scene change detection, object localization and removal) which are comparable with the results from state of the art algorithms developed solely for those problems. A draft is available at <http://www.egr.msu.edu/waves/people/nima/civ.pdf>
- By modeling the (non-linear) behavior of color correlation in the frequency domain, we achieved quantitative and qualitative records in “image demosaicing” (in the image processing context). A draft is available at <http://www.egr.msu.edu/waves/people/nima/cd.pdf>
- Served as journal reviewer for journals of IEEE transactions on Image Processing , Springer journal on Circuits, Systems and Signal Processing and Conference reviewer for IEEE ICASSP.
- Had significant contribution on NSF award No. 1117709 in 2011 (\$408,536 granted).
- Top 10% paper award in IEEE Multi-Media Signal Processing (MMSP) for the paper with the title “Compressive Demosaicing”.

Patents

- Video representations using a sparsity-based model (K000877US01/KES), Eastman Kodak.
- Scene boundary detection using a sparsity model (K000878US01/KES), Eastman Kodak.
- Motion Matrix for video compression (PU 100198/IU 100197), Technicolor.

Employment and Professional Experience

Research Assistant

East Lansing, MI

Waves-Lab, Michigan State University

2007 - Present

- Studied the properties of a class of sparse (i.e. mostly zero) random matrices called Sparse-Expander Like Projections (SERP), which are rectangular matrices where the number of rows is less than the number of columns and their non-zero entries follow Normal distribution.
- Designed a combinatorial algorithm for solving under-determined systems of linear equations when SERP matrices govern such system and the solution is known to be sparse. Please see <http://www.egr.msu.edu/waves/people/nima/SERP/serp.pdf>
- On the application side, I work on image demosaicing and video modeling, scene change detection, object tracking and video editing.

Research intern

Rochester, NY

Eastman Kodak

Summer 2011

- The objective was to propose a unifying framework for modeling video contents (by effectively utilizing the spatio-temporal correlations in video contents), such that a wide range of common video processing tasks (such as object removal, inpainting, object tracking and scene change detection) could be performed efficiently.

Research intern

Princeton, NJ

Technicolor (Thomson)

Summer 2010

- Utilizing certain recent results on Affine Constraint Rank Minimization (e.g. matrix completion) and theory of compressed sensing in order to compress video contents.

Team lead, system designer

Tehran, Iran

Tehran Municipality

Spring 2004 Winter 2007

- Leading “Kiosk project”: Designing a low cost (embedded) kiosk system to be installed in some bus stops, allowing people to browse news while waiting for the bus.
- Customizing a Linux based OS for a low cost (less than 100\$) set-top-box.

Publications

- A. A. Moghadam, M. Aghagolzadeh, M. Kumar and H. Radha, “A compressive framework for demosaicing of natural images”, IEEE transactions on Image Processing, Vol. 22, Issue 6, pp 2356-2371.
- A. A. Moghadam, M. Kumar and H. Radha, “Common and Innovative Visuals (CIV): a sparsity modeling framework for video”, under review in IEEE transactions on Image Processing, 2013.
- A. A. Moghadam and H. Radha, “Sparse Expander-like Real-valued Projection (SERP) matrices for compressed sensing”, IEEE global conference on signal and information processing (Global-SIP), 2013.
- A. A. Moghadam and H. Radha, “Sparse Expander-like Real-valued Projection (SERP) matrices for compressed sensing”, under review in IEEE transactions on Signal Processing, 2013.
- M. Aghagolzadeh, A. A. Moghadam, M. Kumar and H. Radha, “Compressive demosaicing for periodic color filter arrays”, IEEE International Conference on Image Processing (ICIP’11), September 2011.
- M. Aghagolzadeh, A. A. Moghadam, M. Kumar and H. Radha, “Bayer and panchromatic color filter array demosaicing by sparse recovery”, SPIE, Digital Photography, 2011.
- A. A. Moghadam, M. Aghagolzadeh, M. Kumar and H. Radha, “Incoherent Color Frames for Compressive Demosaicing”, IEEE ICASSP 2011.
- A. A. Moghadam, M. Aghagolzadeh, M. Kumar and H. Radha, “Compressive Demosaicing”, IEEE MMSP 2010 (top 10 paper award).
- Abdolreza Abdolhosseini Moghadam and Haydar Radha, “Hybrid Compressed Sensing”, IEEE MMSP 2010.
- Abdolreza Abdolhosseini Moghadam and Haydar Radha, “Complex Sparse Projections for Compressed Sensing”, IEEE Conference on Information Sciences and Systems (CISS10), Johns Hopkins University, Baltimore, MD, USA.
- Abdolreza Abdolhosseini Moghadam and Haydar Radha, “Complex Randomness-in-Structured Projections for Compressed Sensing”, in Proceedings of IEEE International Conference on Image Processing (ICIP09), Egypt.
- Abdolreza Abdolhosseini Moghadam and Haydar Radha, “Practical Compressed Sensing with Log-of-Prime Projections”, in Proceedings of Conference on Information Sciences and Systems (CISS09), Johns Hopkins University, Baltimore, MD, USA, March 18-20,2009.
- Abdolreza Abdolhosseini Moghadam, H. R. Rabiee, M. Ghanbari, “E-Nice: an enhanced NICE”, The 2006 International Symposium on Frontiers in Networking with Applications in conjunction with The IEEE 20th International Conference on Advanced Information Networking and Applications, Vienna, 18-20 April 2006.
- Abdolreza Abdolhosseini Moghadam, S. Barghi, H. R. Rabiee, M. Ghanbari, “A new scheme on recovery from failure in NICE overlay protocol”, IEEE P2P Information Management 2006, Hong Kong, 29 May 2006.

Skills

- Solid understanding of advanced digital and statistical signal processing techniques and theories.
- Solid understanding of advanced image and video processing techniques.
- Solid knowledge in simulations and modeling with MATLAB and Mathematica (6+ years).
- Proficient in C, debugging and simulation for both embedded as well as desktop platforms.
- Knowledge of OS (Windows, UNIX), shell programming and developing device drivers.
- Experience with working on large data sets.
- Solid knowledge of digital hardware design and embedded systems (3+ years).

Education

<i>PhD in Electrical Eng.</i>	Michigan State University	MI, USA
<i>MSc in Computer Eng.</i>	Sharif University of Tech.	Iran
<i>BSc in Computer Eng.</i>	Sharif University of Tech.	Iran
