

CURRICULUM VITAE

Michael Elad

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PERSONAL DATA

Date of Birth: December 10th, 1963

Place of Birth: Haifa, Israel

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ACADEMIC DEGREES

1994–1997: D.Sc. in Electrical Engineering – The Technion – Haifa - Israel.

Graduated on September 1997. Final average - 96.6.

Specialization on: Signal and Image Processing, Computer Vision, Adaptive filters.

Thesis: Super resolution Reconstruction of Continuous Image Sequences.

Supervisor: Prof. Arie Feuer.

1986–1988: M.Sc. in Electrical Engineering – The Technion – Haifa - Israel.

Graduated on February 1988. Final average - 95.0.

Specialization on: Signal and Image Processing, Communication.

Thesis: Digital Coding of Image Sequences with Motion Compensation.

Supervisor: Prof. David Malah.

1982–1986: B.Sc. in Electrical Engineering–The Technion–Haifa–Israel.

Graduated on February 1986. Final average - 91.6.

Specialization on: Communication, Control, Networks and Computers.

ACADEMIC APPOINTMENTS

2010 (July) – present: The Computer Science Department – The Technion, Haifa 32000, Israel.

Work: Professor, Incumbent of the Sanford Kaplan Academic Chair.

2007 – 2010: (Started on June 2007, and till June 2010) – The Computer Science Department – The Technion, Haifa 32000, Israel.

Work: Associate Professor.

2003 – 2007: (Started on October 2003, and till May 2007) – The Computer Science Department – The Technion, Haifa 32000, Israel.

Work: Senior Lecturer (tenure-track position). Teaching and performing research in the fields of signal and image processing and computer vision, with emphasis on signal representation and numerical algorithms.

2001 – 2003: (Started on October 2001, and till September 2003) Stanford University.

Work: Research Associate with the Computer Science department, and affiliated to the Scientific-Computing & Computational Mathematic (SCCM) program, led by Prof. Gene Golub. My work concentrated on three projects, all in the area of inverse problems:

1. Collaborating with Prof. Gene Golub (CS - Stanford) and Prof. Peyman Milanfar (UCSC), working on the reconstruction of 2D shapes from their complex moments.
2. Collaborating with Prof. David Donoho (Statistics – Stanford), working on inverse problems in target detection/recognition, fast polar Fourier transform, and sparse representations.
3. Collaborating with Prof. Peyman Milanfar (UCSC) and his students, working on super-resolution reconstruction of images.

INDUSTRIAL EXPERIENCE

2022 – 2024 Heading a research team in Verily (during a Sabbatical from the Technion).

2016 – 2021 Google Research - Visiting Researcher.

2013 – 2015 Nanometrics (consultant).

2013 – 2014 CMT-Medical (consultant).

2012 – 2012 Nova, Super-resolution algorithms (consultant).

2011 – 2012 Aspect Imaging - MRI Imaging (consultant).

2011 – 2013 BetterView - Video Processing - Super-Resolution (co-founder).

2003 – 2017 Agileye Technologies Ltd. - Video Processing for Security (co-founder).

2009 – 2009 Marvell - Optimization Algorithms (consultant).

2009 – 2009 MedicVision - Enhancement of Tomographic Imaging (consultant).

2007 – 2009 Xsights - Pattern Recognition for Mobile Services (CTO).

2006 – 2007 Novafora Inc. - Video Processing for Entertainment (consultant).

2003 – 2005 V-Target - Nuclear Medical Imaging (consultant).

2000 – 2001 Jigami, Israel - Heading the research division

1997 – 2000 HP-Laboratories, Israel - Research and Development.

1993 – 1993 Advanced Technologies Limited (ATL)–Atidim - Software engineer.

1988 – 1993 Army service – Israeli Air Force - Project Officer.

RESEARCH INTERESTS

- Machine learning and deep learning algorithms
- Generative models for image (conditional) synthesis via Diffusion-Models
- Inverse problems in signal and image processing and computer vision
- Sparse modeling of signals and their deployment in signal and image processing
- Numerical analysis - optimization theory, Numerical Linear Algebra

TEACHING EXPERIENCE

- 2022 – present: Created and taught a course on diffusion models for image synthesis and high-perceptual solution of inverse problems.
- 2017 – 2022: Created a specialized Massive Open Online Course (MOOC) on sparse representation theory, given under edX.
- 2012 - present: Created and taught the course “Numerical Algorithms” (234125) for undergraduate students.
- 2003 – present: Lecturing the courses “Digital Image Processing” (236860) “Digital Signal and Image Processing by Computer” (236327), “Mathematical Methods for Computer Science” (234299), “Introduction to Computer Science” (234114/7), “Numerical Analysis 1” (234107) and “Sparse and Redundant Representations and Applications in Signal and Image Processing” (236862).
- 2011 – 2014: Supervising the course “Industrial projects” (234313) – the CS Department in the Technion.
- 1999 – 2001: Lecturing the course “Introduction to Digital Image Processing” – the EE Department in the Technion.
- 1997 – 1998: Lecturing the course “Numerical Methods in Optimization” (046197) – the EE Department in the Technion.
- 1995 – 1996: Teaching the course “Introduction to Digital Signal Processing, as a teaching assistant of Prof. Boaz Porat – the EE Department in the Technion.
- 1993 – 1995: Instructing in laboratories, and supervising under-graduate students final projects – the EE Department in the Technion.
- 1985 – 1988: Instructing in laboratories, and supervising under-graduate students final projects – the EE Department in the Technion.

PUBLIC PROFESSIONAL ACTIVITIES

Editorial Boards:

- 2016 – 2021: Editor-in-Chief, SIAM Journal on Imaging Sciences.
- 2019 – 2021: Associate Editor, IEEE Transactions on Computational Imaging.
- 2010 – 2015: Associate Editor, SIAM Journal on Imaging Sciences.
- 2012 – 2015: Associate Editor, Journal on Applied Computational Harmonic Analysis.
- 2012 – 2014: Senior Associate Editor, IEEE Signal Processing Letters.
- 2011 – 2014: Associate Editor, IEEE Transactions on Information Theory.
- 2007 – 2011: Associate Editor, IEEE Transactions on Image Processing.
- 2006 – 2007: Associate Editor, EURASIP Journal on Applied Signal Processing.
- Invited Editor, Journal on Fourier Analysis and Applications - Special Issue on Sparsity (with A. Cohen, R. DeVore, A. Gilbert), 2009.
- Invited Editor, Proceedings of IEEE - Special Issue on Applications of Sparse Repres. & Compressed Sensing, (with R.G. Baraniuk, E.J. Candes, Y. Ma), 2010.

Invited Editor, IEEE Selected Topics in Signal Processing - Special Issue on Adaptive Sparse Representation (with J.L. Starck, J.Fadili, R.Nowak, P.Tsakalide), 2011.

Invited Editor, International Journal on Computer Vision - Special Issue on Sparsity (with J. Mairal and F. Bach), 2014.

Reviews:

1. IEEE Trans. On Image Processing
2. IEEE Trans. On Pattern Analysis and Machine Intelligence (PAMI)
3. IEEE Trans. On Information Theory
4. Applied and Computational Harmonic Analysis
5. Journal of the Optical Society of America (JOSA)
6. EURASIP Journal on Applied Signal Processing
7. SIAM Review
8. International Journal of Computer Vision
9. Signal Processing: Image communication
10. SIAM Matrix Analysis
11. SIAM Imaging Science
12. ISF, NSF, ERC and BSF proposals.
13. CVPR, ICCV, NeurIPS, ICML, and ICLR conferences.

Program Committees:

Co-Chair of the SIAM Imaging Sciences 2020 Conference (Toronto).

Organizing (Program) Committee and Chair of Special Session on Deep Learning at ICSEE International Conference on the Science of Electric Engineering, Eilat, Israel, December 12-14, 2018.

Special session organizer at SIAM Conference on Imaging Science, Mini-Symposium Organizer, 2018.

Special session organizer at SIAM Conference on Imaging Science (IS16), Albuquerque, New Mexico, USA May 23-26, 2016.

Special session organizer at SIAM Conference on Imaging Science (IS14), Hong-Kong, May 12-14, 2014.

Special session organizer at SIAM Conference on Imaging Science (IS12), Philadelphia, USA, May 19-23, 2012.

Organizing (Program) Committee Member of SIAM Conference on Imaging Science (IS10), Chicago, Illinois, USA, April 12-14, 2010.

Co-organizer (jointly with Peyman Milanfar from UCSC) of special sessions on “Locally adaptive patch-based image and video restoration”, in the 2008 SIAM Imaging Science Conference, San-Diego, California, July 8, 2008.

Co-organizer (jointly with Jean-Luc Starck from CNRS-CEA, France) of special sessions on “Topics in sparse and redundant representations”, in the 2008 SIAM Imaging Science Conference, San-Diego, California, July 8, 2008.

Technical Program Committee of IEEE Computer Society Conference on Computer Vision and Pattern Recognition, CVPR 2006, New York, USA, June 17-22, 2006.

Co-organizer (jointly with Emmanuel Candes from Caltech) of three special sessions on “Sparse Representations and Their Role in Image processing”, in the 2006 SIAM Imaging Science Conference, Minneapolis, Minnesota, May 15-17, 2006.

Technical Program Committee of International Conference on Image Processing, ICIP 2005, Genova, Italy, September 11-14, 2005.

Technical Program Committee of IEEE Computer Society International Conference on Computer Vision and Pattern Recognition, CVPR 2005, San Diego, USA, June 20-25, 2005.

Technical Program Committee of International Conference on Image Processing, ICIP 2004, Singapore, October 24-27, 2004.

Technical Program Committee International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2004, Montreal, Quebec, Canada, May 17-21, 2004.

FACULTY AND TECHNION ADMINISTRATIVE JOBS

2015 – 2018: Head of the Rothschild Technion Excellence Program.

2010 – 2015: Graduate Studies Committee member, Computer Science Dept., Technion.

2009 – 2015: Development Committee member, Computer Science Dept., Technion.

2009 – 2014: Vice Dean for Public Affairs - Alumni and Industry Relations, Computer Science Dept., Technion.

2007 – 2009: Coordinator for open days for undergraduates studies.

2005 – 2009: Computing Committee member, Computer Science Dept., Technion.

2004 – 2006: Graduate Studies Committee member, Computer Science Dept., Technion.

2003 – 2006: Council Secretary, Computer Science Dept., Technion.

AWARDS AND HONORS

2024 – Elected to the *Israel Academy of Sciences and Humanities*.

2024 – Recipient of the Rothschild Award for exceptional scientific achievements in Engineering - Yad Hanadiv.

2021 – Recipient of the Weizmann Award for exact sciences - Tel-Aviv Yafo.

2018 – SPS (Signal Processing Society) Technical Achievement Award *for contributions to sparsity-based signal processing*.

2018 – IEEE SPS Sustained Impact Paper Award. Jointly with Michal Aharon and Alfred Bruckstein (CS-Technion), given to the paper “K-SVD: An Algorithm for Designing Overcomplete Dictionaries for Sparse Representation,” IEEE Transactions on Signal Processing, vol. 54, no. 11, November 2006.

2018 – IEEE Signal Processing Best Paper Award. Jointly with Tomer Peleg and Ron Rubinstein (CS-Technion), given to the paper “Analysis K-SVD: A Dictionary-Learning Algorithm for the Analysis Sparse Model,” IEEE Transactions on Signal Processing, Volume 61, No. 3, February 2013.

2018 – SIAM Fellow.

2018 – Clarivate (Thomson-Reuters) Highly Cited Researcher.

2018 – JVCIR best paper award, Jointly with Raja Giryes and Arie Rond, given to the paper “Poisson Inverse Problems by the Plug-and-Play scheme,” Journal on Visual Communication and Image Representation Vol. 41, Pages 96-108, November 2016.

2017 – Yanai Prize for excellence in teaching.

2017 – Clarivate (Thomson-Reuters) Highly Cited Researcher.

2016 – Thomson-Reuters Highly Cited Researcher.

2015 – Technion Henry Taub Prize for Academic Excellence.

2014 – SIAG/Imaging Science Best paper award. Jointly with Freddy Bruckstein (CS-Technion) and David L. Donoho (Stat.-Stanford).

2013 – Best lecturer award – The Technion – Israel Institute of Technology.

2012– IEEE Fellow: Elevated for contributions to sparsity-and-redundancy in image processing.

2010 – The Hershel-Rich Award for Innovation: A Technion award for the work on Super-Resolution (with Matan Protter).

2009 – Best lecturer award – The Technion – Israel Institute of Technology.

2008 – The Henry Taub Prize for Academic Excellence: A Technion award for research excellence.

2007 – The Solomon Simon Mani award for excellence in teaching (six awards were given) – The Technion – Israel Institute of Technology.

2006 – Best reviewer award (ten awards were given) - IEEE Trans. on Image processing journal.

2005 – Best lecturer award – The Technion – Israel Institute of Technology.

2004 – Best lecturer award – The Technion – Israel Institute of Technology.

2003 – Technion Management Career Development Chair – The Technion – Israel Institute of Technology.

2001 – Best lecturer award – The Technion – Israel Institute of Technology.

2000 – Best lecturer award – The Technion – Israel Institute of Technology.

1996 – Guthwirth - Special Excellence Scholarship – During the Ph.D. studies.

1987 – Wiener Excellence Award– During the M.Sc. studies.

1985 – ITT scholarship for excellence – During the undergraduate studies.

PLENARY OR INVITED TALKS

1. January 22nd, 2002. SCCM (Scientific Computing and Computation Mathematics Program) Seminar, Title: “Rejection Based Classifier for Face Detection”. Joint work with Yacov Hel-Or, Professor at the Interdisciplinary Center (IDC), Herzlia, Israel and Renato Keshet, Hewlett-Packard Laboratories, Israel.

2. March 18th, 2002. The Computer Vision Workshop - Stanford Computer Forum - Invited Talk, Title: "Rejection Based Classification and its Applications".
3. March 27th, 2002. SCCM - Linear Algebra Forum Seminar, Title: "Static and Dynamic Super-Resolution", Joint work with Arie Feuer, Professor at the Electrical Engineering Department, The Technion, Israel.
4. May 6th, 2002. SCCM (Scientific Computing and Computation Mathematics Program) Seminar, Title: "On the Bilateral Filter and Ways to Improve It".
5. July 12th, 2002. The SIAM 50th Anniversary Meeting - *Invited Talk*, Title: "Shape From Moments - An Estimation Perspective". Joint work with Peyman Milanfar, the Electrical Engineering department, University of California - Santa-Cruz, and Gene Golub, the Computer Science Department - Stanford University.
6. August 13th, 2002. FoCM - Image & Signal Proc. Workshop - *Invited Talk*, Title: "Fast Polar Fourier Transform". Joint work with David Donoho, Statistics - Stanford University, Amir Averbuch, Mathematics Department - Tel-Aviv University, and Ronald Coifman, Mathematics Department - Yale.
7. November 13th, 2002. IDR - Ideal Data Representation Workshop - University of South Carolina - *Invited Talk*, Title: "Sparse representations and the Basis Pursuit Algorithm. Joint work with Alfred M. Bruckstein, Computer Science department - Technion, Israel, David Donoho, Statistics- Stanford University, and Peyman Milanfar, the Electrical Engineering department, University of California - Santa-Cruz.
8. January 10th, 2004. AMS 10th meeting - special Session on Multiscale and Oscillatory Phenomena - *Invited Talk*, Title: "Image Decomposition Via the Combination of Sparse Representations and a Variational Approach", Joint work with Jean-Luc Starck from CEA, France, and David Donoho, Statistics- Stanford University.
9. September 25th, 2004. IPAM MGA Workshop - *Invited Talk*, Title: "Sparse Representations of Signals - Theory and Applications", Joint work with Jean-Luc Starck from CEA, France, David Donoho, Statistics - Stanford University, Alfred Bruckstein - CS, Technion, and V. Temlyakov, Math. - University of South Carolina.
10. January 27th, 2005. Industrial Affiliate Program, CS department, The Technion. *Invited Talk*, Title: "Recent Trends in Signal Representations and their Role in Image Processing". This talk has been also presented in the MVP seminar in Tel-Aviv University on May 25th, 2005.
11. August 2nd, 2005. SPIE meeting, San-Diego, CA. *Invited Talk*, Title: "The K-SVD: Design of Dictionaries for Sparse and Redundant Representation of Signals", Joint work with Michal Aharon and Alfred M. Bruckstein.
12. August 31st, 2005. Int. Conference on Super-Resolution, Hong-Kong - *Invited Talk*, Title: "Example-Based Priors for Inverse Problems in Image Processing", Joint work with Dima Dastenko - the Technion.
13. May 15th, 2006. SIAM Imaging Science conference, Minneapolis Minnesota, *Invited Talk*, Title: "An Iterated Shrinkage Algorithm for Basis Pursuit Minimization", Joint work with Michael Zibulevsky and Boaz Matalon - The Technion.
14. May 15th, 2006. SIAM Imaging Science conference, Minneapolis Minnesota, *Invited Talk*, Title: "Over-complete and Sparse Representations for Image Decomposition and inpainting", Joint work with Jean-Luc Starck from CEA, France, and David Donoho, Statistics- Stanford University.
15. July 11th, 2006. WavE 2006 - Wavelets and Applications conference, Lausanne, Switzerland, **Plenary Talk**, Title: "Sparse and Redundant Signal Representation, and its Role in Image Processing".

16. September 19th, 2006. Astronomical Data Analysis conference, 2006 (ADA IV), Marseille, France, *Invited Talk*, Title: “Super-Resolution reconstruction of Images - an Overview”. Joint work with Arie Feuer - The Technion, Peyman Milanfar and Sina Farisu - UC Santa Cruz, USA.
17. September 21st, 2006. Mathematics and Image Analysis conference (MIA’06), Paris, France, *Invited Talk*, Title: “Sparse and Redundant Signal Representation, and its Role in Image Processing”.
18. December 17th, 2006. Israel Computer Vision Day, 2006. Interdisciplinary center, Herzlia. *Invited Talk*, Title: “Denoising and Beyond via Learned Dictionaries and Sparse Representations”. Joint work with Michal Aharon and Matan Protter - the CS department, the Technion, Julien Mairal and Guillermo Sapiro, ECE department, University of Minnesota, Minneapolis, USA.
19. February 25th, 2007. Medical Imaging workshop - RAMBAM Hospital, Haifa. *Invited Talk*, Title: “New Results in Image Processing Based on Sparse & Redundant Representations”.
20. June 20th, 2007. The IV workshop on SIP & IT, Holon Institute of Technology, Holon. *Invited Talk*, Title: “Optimized Projection Directions for Compressed Sensing”. This talk was also given in MVP seminar in Tel-Aviv university on June 21st, and also in ICIAM, Zurich, on July 17th, 2007.
21. August 26th, 2007. SPIE, Wavelet XII, san-Diego, CA. **Plenary Talk**. Title: “A Wide-Angle View of Iterated Shrinkage Algorithms For Finding Sparse Representations”. Joint work with Boaz Matalon, Michael Zibulevsky, and Joseph Shtok.
22. March 30th, 2008. ICASSP, Las-Vegas. Title: “A Sparse and Non-Negative Solution of $Ax=b$ is Necessarily Unique”. Joint work with Michael Zibulevsky and Freddy Bruckstein.
23. June 26th, 2008. Tel-Aviv University, Approximation Seminar, the Mathematics department. Title: “Image Denoising and Beyond via Learned Dictionaries and Sparse Representations”.
24. July 8th, 2008. SIAM Imaging Science 2008, San-Diego. Special Session on Locally Adaptive Patch-based Image and Video Restoration - Part II. Title: “Super-Resolution-Reconstruction of Image Sequences Without Explicit Motion Estimation”. Joint work with Matan Protter (CS - Technion), Hiro Takeda and Peyman Milanfar (UCSC).
25. July 8th, 2008. SIAM Imaging Science 2008, San-Diego. Special Session on Topics in Sparse and Redundant Representations - Part I. Title: “A Weighted Average of Sparse Several Representations is Better than the Sparsest One Alone”. Joint work with Irad Yavneh.
26. December 11th, 2008. **Plenary Talk**. Computational Algebraic Statistics, Theory and Applications (CASTA), Kyoto, Japan. Title: “Sparse and Redundant Representation Modeling for Image Processing”. Joint work with Michal Aharon (CS - Technion, Guillermo Sapiro (UMN), Julien Mairal (Inria - France), and Matan Protter (CS - Technion).
27. April 6th, 2009. Statistics seminar, Ecole Polytechnique, France. Title: “MMSE Estimation for Sparse Representation Modeling”. Joint work with Irad Yavneh and Matan Protter (CS - Technion).
28. March 2nd, 2010. *Invited Talk* for the High-Technion distinguished lecture series, the Technion, Haifa. Title: “Atomic Decomposition of Images - Advanced Topics in Image Processing”.
29. April 14th, 2010. SIAM Imaging Science 2010 Conference, Chicago. Title: “Single Image Super-Resolution Using Sparse Representation”, Joint work with Roman Zeyde and Matan Protter (CS - Technion).
30. June 9th, 2010. Workshop on Sparsity and Computation, Bonn Germany. Title: “Topics in Minimum-Mean-Squared-Error (MMSE) Estimation in Sparse Approximation”, Joint work with Irad Yavneh, Javier Turek, and Matan Protter.
31. June 25th, 2010. **Plenary Talk** at the Curves and Surfaces conference, Grenoble, France. Title: “Sparse and redundant representation modeling of signals - theory and applications”.

32. July 12-16 2010. **Short Course** at the Park City (Utah) Graduate Summer School, organized by the Institute of Advanced Studies (IAS), Princeton. Title: “Sparse and Redundant Representation Modeling of Images”.
33. August 15-20 2010. **Short Course** at graduate summer school on Sparsity in Image and Signal Analysis, Hólar, Iceland. Title: “Sparse and Redundant Representation Modeling of Images”.
34. January 7th, 2011. *Invited Talk* in the SMALL workshop on Sparse Dictionary Learning. Title: “Exploiting Statistical Dependencies in Sparse Representations”. Joint work with Tomer Peleg and Yonina Eldar (EE - Technion).
35. June 30th, 2011. SPARS11 - Workshop on signal processing with adaptive sparse structured representations, Edinburgh, Scotland, UK. Title: “K-SVD Dictionary-Learning for Analysis Sparse Models”. Joint work with Ron Rubinstein.
36. September 1st, 2011. EUSIPCO 2011, Special Session on Processing and recovery using analysis and synthesis sparse models, Barcelona, Spain. Title: Sequential Minimal Eigenvalues - An Approach to Analysis Dictionary Learning. Joint work with Mark Plumbley (QMUL - London), Nancy Bertin (CNRS - Rennes, France), Boaz Ophir, and Ron Rubinstein (CS, Technion).
37. November 10th 2011. *Invited Talk* at Final Workshop, Haifa Israel. Title: “From SD to HD: Improving Video Sequences through Super-Resolution”.
38. January 16th, 2012. *Invited Talk* at Mathematics and Image Analysis conference (MIA’06), Paris, France. Title: “The Analysis Sparse Model - Definition, Pursuit, Dictionary Learning, and Beyond”.
39. March 15th 2012. **Keynote Talk** at LVA/ICA, Herzlia Israel. Title: “Analysis versus Synthesis Modeling of Data”.
40. May 2012. *Invited Talk* at SIAM Imaging Science Conference, Philadelphia, USA. Title: “The Analysis Sparse Model - Definition, Pursuit, Dictionary Learning, and Beyond” (Short-Version). This talk was also given in a Machine-Learning Workshop in Janelia Farm (May, 2012). Joint work with Ron Rubinstein (former PhD student), Tomer Peleg (PhD student), Remi Gribonval and Sangnam Nam (INRIA, Rennes), and Mike Davies (UEdin).
41. July 9th, 2012. **Keynote Talk** - MIIS 2012 International Workshop on Mathematical Issues in Informaion Sciences, Xi’an, China. Title: “Sparse and Redundant Representation Modeling of Images: Theory and Applications”.
42. August 2nd, 2012. The computer-vision seminar in the Hebrew University of Jerusalem (HUJI). Title: “Generalized Tree-Based Wavelet Transform and Applications to Patch-Based Image Processing”. Joint work with Idan Ram (PhD student) and Israel Cohen, both from the Electrical Engineering Department at the Technion.
43. April 2012 and May 2012. EE-Seminar in Tel-Aviv University, and also in the Weizmann Institute. Title: “Sparse & Redundant Representation Modeling of Images: Theory and Applications”.
44. November 23rd 2012. **Keynote Talk** - SIGMA’2012 (Signal-Image-Geometry-Modelling-Approximation), CIRM, Centre International de Rencontres Mathematiques, Luminy Campus Marseille. Title: “Another Take on Patch-Based Image Processing”.
45. December 7th, 2012. *Invited Talk* - NIPS 2012 workshop on the sparsity-based analysis model, Lake Tahoe, California. Title: “Recent Results on the Co-Sparse Analysis Model”.
46. December 12th 2012. *Invited Talk* - International Conference on Imaging Science 2012, Hong-Kong. Title: “Another Take on Patch-Based Image Processing”.

47. March 18, 2013. **Keynote Talk** - GAMM (SIAM Germany), Novi-Sad, Serbia. Title: “Recent Results on the Co-Sparse Analysis Model”.
48. May 28th, 2013. *Invited Talk* - 3rd Annual International TCE Conference on Machine Learning & Big Data, Technion, Israel. Title: “Sparse Modeling of Graph-Structured Data ... and ... Images”.
49. July 9th, 2013. **Keynote Talk** - SPARS13 EPFL, Lausanne. Title: “Wavelet for Graphs and its Deployment to Image Processing”.
50. March 13 - 15, 2014. **Plenary Talk** - Workshop on Mathematical Approaches to Large-Dimensional Data Analysis, Tachikawa, Tokyo. Title: “Sparse Modeling of Graph-Structured Data ... and ... Images”.
51. April 1st, 2014. **Plenary Talk** - Israel Machine Vision Conference (IMVC), April 1st, 2014, Tel-Aviv, Israel. Title: “Image Processing via Pixel Permutation”.
52. May 12 - 14, 2014. **Plenary Talk** - SIAM Imaging Science Conference, Hong-Kong. Title: “Wavelet for Graphs and its Deployment to Image Processing”.
53. January 25 - 30, 2015. *Invited Talk* - International BASP Frontiers Workshop, Villars sur Ollon, Switzerland. Title: “SOS Boosting of Image Denoising Algorithms”.
54. April 19 - 24, 2015. *Invited Talk* - ICASSP 2015, in the “School-of-ICASSP” Session, Brisbane Australia. Title: “Sparse and Redundant Representation Modeling of Images: Theory and Applications”.
55. December 7-11, 2015. **Plenary Talk** - 2nd International Conference on Compressed Sensing and its Applications (CSA 2015), Berlin, Germany. Title: “The Dichotomy between Global Processing and Local Modeling”.
56. June 6, 2016. *Invited Talk* - the Technion course “Scientific-Discoveries”. Title: “Atomic Decomposition of Images: Advanced Methods in Image Processing”.
57. May 28, 2017. **Plenary Talk** - Workshop on Frame Theory and Sparse Representation for Complex Data, Institute for Mathematical Sciences – Singapore. Title: “Multi-Layered Convolutional Sparse Coding – Theory and Applications”.
58. September 4-8, 2017. **Plenary Talk** - IEEE-SPS Summer School on Signal Processing: Signal Processing Meets Deep Learning, Capri, Italy. Title: “From Sparse Representations to Deep Learning”.
59. September 17-20, 2017. **Plenary Talk** - ICIP 2017 - IEEE International Conference on Image Processing, Beijing, China. Title: “Sparse Modeling in Image Processing and Deep Learning”.
60. February 5-9, 2018. *Invited Talk* - IPAM 2018 - Workshop on New Deep Learning Techniques. Los Angeles, USA. Title: “Sparse Modeling in Image Processing and Deep Learning”.
61. March 6, 2018. **Plenary Talk** - Israel Machine Vision Conference (IMVC), Tel-Aviv, Israel. Title: “Sparse Modeling in Image Processing and Deep Learning”.
62. July 8-11, 2018. **Plenary Talk** - The 10th IEEE Sensor Array and Multichannel (SAM) Signal Processing Workshop, Sheffield UK. Title: “Sparse Modeling in Image Processing and Deep Learning”.
63. July 10-15, 2018. *Invited Talk* - Thirty-fifth International Conference on Machine Learning, Stockholm, Sweden. Title: “Sparse Modeling in Image Processing and Deep Learning”.
64. November 26-28, 2018. **Plenary Talk** - The 7th European Workshop on Visual Information Processing (EUVIP), Tampere, Finland. Title: “Sparse Modeling in Image Processing and Deep Learning”.
65. December 12-14, 2018. **Plenary Talk** - 2018 ICSEE International Conference on the Science of Electrical Engineering, Eilat, Israel. Title: “Sparse Modeling and Deep Learning”.

66. January 9-11, 2019. **Plenary Talk** - 2019 Quantitative BioImaging Conference (QBI), Rennes, France. Title: “Sparse Modeling of Data and Deep Learning”.
67. June 27-29, 2019. **Plenary Talk** - ETH - FIM - Institute for Mathematical Research: Series of Lectures on Waves and Imaging (III), Switzerland. Title: “Sparse Modelling of Data and its Relation to Deep Learning”.
68. November 1, 2019. *Invited Talk* - Princeton - DeepMath Conference. Title: “Sparse Modeling of Data and its Relation to Deep Learning”.
69. December 17, 2019. **Plenary Talk** - CAMSAP 2019 in Guadeloupe. Title: “Sparse Modeling of Data and its Relation to Deep Learning”.
70. February 4, 2020. **Plenary Talk** - Google Mountain-View - Computational Imaging Workshop. Title: “Design of Deep Learning Architectures”.
71. July 13, 2021. **Plenary Talk** - IEEE Statistical Signal Processing Workshop 2021 - Rio De Janeiro (Virtual). Title: “Image Denoising - Not What You Think”.
72. September 10, 2021. **Invited Talk** - Berkeley, Rice, IMVC. Weizmann Institute. Title: “Image Denoising - Not What You Think”.
73. April 18, 2022. **Plenary Talk** - The third international workshop on matrix computations, Lanzhou University, China. Title: “The New Era of Image Denoising - The Deep Learning Revolution and Beyond”.
74. September 13, 2022. **Plenary Talk** - EUVIP 2022, Lisbon. Title: “Image Denoising Not What You Think”.
75. April 20, 2023. **Invited Talk** - A Multiscale tour of Harmonic Analysis and Machine Learning, Paris. Title: “The New Era of Image Denoising”.

POST DOCTORAL FELLOWS, RESEARCH ASSOCIATES AND GRADUATE STUDENTS

Post Docs and Research Associates:

1. Dr. Michael Zibulevsky, Research Associate (October 2009 – October 2017), Expert in neural networks and optimization.
2. Dr. Galyna, Research Associate (June 2022 – present), Expert in inverse problems.
3. Dr. Amir Adler, Post Doctoral Fellow (May 2016 – February 2017), Deep learning for compressed-sensing applications.
4. Dr. Raja Giryes (February 2014 - July 2014 and February 2016 - September 2016), Advanced topics in sparse representations.
5. Dr. Dmitry Batenkov (June 2014 - March 2016), Local versus Global in Signal Modeling.
6. Dr. Esben Plenge (June 2014 - October 2015), Magnetic resonance imaging - Temporal reconstruction.
7. Dr. Wenze Shao (May 2014 - June 2015), Blind image restoration.
8. Dr. Ives Rey-Otero (January 2017 – September 2018), Graph Dictionary Learning.
9. Dr. Jeremias Sulam (January 2018 – July 2018), Topics in Sparse Modeling.

Graduated Ph.D.:

1. Michal Aharon (May 2004 – November 2006), Learning dictionaries for sparse representations.
2. Matan Protter (March 2006 – January 2011), The NL-Means algorithm and some extensions.
3. Ron Rubinstein (May 2004 – January 2012), Analysis versus synthesis in regularization of inverse problems.
4. Joseph Shtok (October 2007 – November 2012), Computerized tomography combined with sparse and redundant representations and learned dictionaries.
5. Idan Ram (October 2009 - December 2014), co-advisor: Israel Cohen, Processing of non-conventional structured data.
6. Raja Giryes (November 2009 - January 2014), Topics in sparse representation modeling.
7. Amir Adler (April 2010 - July 2014), co-advisor: Yacov Hel-Or, Subspace clustering via sparse representations.
8. Tomer Peleg (September 2011 - August 2014), Extensions of sparse representation modeling.
9. Javier Turek (March 2008 - July 2015), co-advisor: Irad Yavneh, Algorithms for MMSE estimator approximation for sparse modeling.
10. Boaz Ophir (November 2009 – May 2016), Multi-scale dictionary learning algorithms.
11. Vardan Papyan (September 2014 – September 2017), Global Versus Local Modeling of Signals.
12. Yaniv Romano (November 2012 – December 2017), Boosting patch-based image processing algorithms.
13. Jeremias Sulam (July 2013 - January 2018), Local versus global in patch-based image processing.
14. Yehuda Dar (October 2014 - September 2018), co-advisor: Freddy Bruckstein, Novel compression for video via sparse representations.
15. Yael Yankelevsky (October 2014 - November 2018), Signal processing on graphs.
16. Regev Cohen (August 2020) Variational Inverse Problems with Applications to Medical Ultra-Sound.
17. Dror Simon (October 2021), Generative Models: Affecting Current Practice with Traditional Methods.
18. Alona Golts (March 2022), Self-supervised methods in imaging sciences.
19. Aviad Aberdam (April 2022), The multi-layered sparsity model and its connection to deep-learning.
20. Gregory Vaksman (August 2023) - Modern Learning Technics for Image and Video Denoising Via Patch Matching.
21. Bahjat Kawar (August 2023) - Posterior Sampling via Langevin Dynamics.

Graduated M.Sc.:

1. Einat Kidron (January 2004 - July 2005), co-advisor: Yoav Schechner, Video-audio localization via sparsity.
2. Boaz Matalon (May 2004 - November 2006), co-advisor: Michael Zibulevsky. Denoising using over-complete representations.
3. Dima Datsenko (February 2005 - November 2006), Example-based priors in inverse problems.
4. Svetlana Raboi (July 2004 - May 2007), co-advisor: Arie Feuer. On the recovery of missing samples via sparsity conditions.

5. Raviv Brueller (June 2005 – October 2007), co-advisor: Yacov Hel-Or (IDC). Face detection - Extensions of the MRC algorithm.
6. Ori Bryt (November 2006 – November 2009), Compression of face images using sparse and redundant representations and the K-SVD algorithm.
7. Raja Giryes (October 2007 – October 2009), co-advisor: Yonina Eldar, Automatic parameter tuning for inverse problems.
8. Neta Shoham (April 2007 – January 2010), Generalization of the K-SVD algorithm for pattern detection purposes.
9. Tomer Peleg (February 2010 - September 2011), co-advisor: Yonina Eldar, Molecule modeling: sparse representation modeling of data with atom interconnections.
10. Dana Segev (November 2008 - April 2012), co-advisor: Yoav Schechner, Multimodal signal processing using sparse representations.
11. Alona Zadneprovski (Golts) (July 2013 - June 2016), Kernel dictionary learning and applications.
12. Grisha Vaksman (March 2014 - June 2016), Patch ordering for Poisson inverse problems.
13. Arie Rond (September 2014 - June 2016), Poisson denoising by plug-and-play priors.
14. Yi Ren (June 2015 - December 2016), Synthesis of images.
15. David Boubilil (March 2014 - January 2018), Neural Networks and auto-encoders.
16. Alon Brifman, M.Sc. (April 2015 - December 2019), Still and Video Super-Resolution.
17. Ev Zisselman, M.Sc. (October 2017 - February 2019), Convolutional Sparse Coding using Sparse Dictionaries.
18. Stav Shapiro, M.Sc. (May 2015 - February 2019), Improving Patch Similarity Measure Using Order Preserving Criterion and Learned Context Features.
19. Gary Mataev, M.Sc. (October 2017 - July 2020), Deep Image Prior Powered by RED.
20. Rajaei Khatib, M.Sc. (March 2018 - December 2020), Learned Greedy Method (LGM): A Novel Neural Architecture for Sparse Coding and Beyond.
21. Assaf Mauda, M.Sc. (March 2020 - February 2022), Poisson image denoising via deep neural networks.
22. Bahjat Kawar, M.Sc. (August 2020 - June 2022), Posterior Sampling via Langevin Dynamics.
23. Roy Ganz, M.Sc. (October 2020 - March 2023), Topics in Image Synthesis.
24. Guy Ohayon, M.Sc. (April 2021 - December 2022), Conditional GAN for Solving Inverse Problems.
25. Tsachi Blau, M.Sc. (July 2020 - February 2022), Adversarial attack and defence.
26. Sean Man, M.Sc. (December 2021 - May 2023), Posterior Sampler JPEG Decoder.
27. Theo Adrai, M.Sc (May 2021 - January 2024), Optimal Distortion for Stochastic Estimators Achieving Perfect Perceptual Quality in Image Restoration. Co-supervised by Prof. Tomer Michaeli - EE-department, Technion.

Ph.D. Theses in Progress:

1. Noam Elata, PhD Direct Track. Co-supervised by Prof. Tomer Michaeli - EE-department, Technion.
2. Roy Ganz, PhD Direct Track.
3. Guy Ohayon, PhD Direct Track. Co-supervised by Prof. Tomer Michaeli - EE-department, Technion.
4. Sean Man, PhD Direct Track.

M.Sc. Theses in Progress:

1. Roi Benita, M.Sc (November 2022 - present), Audio synthesis via diffusion models. Co-supervised by Prof. Joseph Keshet - EE-department, Technion.
2. Shely Golan, M.Sc. (March 2024 - present), Boosting consistency based synthesis methods.

RESEARCH GRANTS

- 2021 – 2025: Israel Council for Higher Education: Model-Based Geometrical Neural Networks: Construction, Applications, and Theory. With Alex Bronstein and Yaniv Romano [1,818,000 NIS]
- 2019 – 2021: Prime Minister’s office: Adversarial Attacks on Deep Neural Networks: Theory and Defense Algorithms via Sparse Modeling of Data. [133,000 NIS/year]
- 2018 – 2022: Israel Science Foundation Grant (ISF): New Frontiers in Sparse Representations for Graph Signals. [220,000 NIS/year]
- 2014 – 2018: Israel Science Foundation Grant (ISF): Advances in the Co-Sparse Analysis Model Theory and Practice. [198,000 NIS/year].
- 2013 – 2018: FP-7 ERC Advanced Grant: Next Generation Sparsity-Based Signal Modeling (SPARSE). [2,269,554 Euro].
- 2013 – 2015: MAGNETON Program, The Office of the Chief Scientist of the Ministry of Industry, Trade & Labor: Clutter reduction in Ultrasound imaging. Joint with GE -Healthcare and Irad Yavneh. [1,417,000 NIS]
- 2012 – 2013: Google Inc: The Co-Sparse Analysis Model and its Use in Image Restoration. [36,857 USD].
- 2012 – 2013: HP Inc: Large Scale Data Analysis and Processing via Subspace Clustering. With Yakov Hel-Or. [70,000 USD].
- 2012 – 2013: Technion-Cornell Innovation Institute (TCII): Smart Sampling and Reconstruction for Magnetic Resonance Imaging. With Yi Wang. [60,000 USD].
- 2012 – 2013: TASP - Technion Autonomous Systems Program: Better Sensing by Joint Audio-Visual Processing. With Yoav Schechner. [40,000 USD].
- 2012 – 2013: Intel Inc: Understanding and Utilizing Natural Image Statistics. With Anat Levin, Boaz Nadler and Yair Weiss. [100,000 USD].
- 2011 – 2014: ONR - Office of Naval Research: Generalized Tree-Based Wavelet Transform for Sparse Representation. [16,000 USD].
- 2009 – 2012: European Commission, FP7, FET program: SMALL project. [360,080 Euro].

- 2008 – 2012: Israel Science Foundation Grant (ISF): Novel Super-Resolution Reconstruction Algorithms with no Explicit Motion-Estimation. [588,000 NIS].
- 2008 – 2012: Israel Science Foundation Grant (ISF): Auditory Computer-Vision. With Y. Schechner. [736,000 NIS].
- 2007 – 2009: Ministry of Industry, Trade and Labor. MAGNET program, (BMP consortium): Development and solutions of photonics technologies for spectroscopy diagnostics and treatment. With R. Kimmel. [app. 230,000 NIS (per year)].
- 2007 – 2008: Center for The Security Science and Technology, Technion. Jointly with R. Kimmel [29,000 USD].
- 2005 – 2009: USA-Israel Binational Science Foundation Grant: Analysis versus synthesis approaches in signal-priors for the solution of inverse problems. With D.L. Donoho and P. Milanfar. [21,375 USD per year].
- 2005 – 2008: Israel Science Foundation Grant (ISF): Sparsity and redundancy in signal representation - design of optimal transforms. With A.M. Bruckstein. [17,000 USD equipment (for the first year) and 152,000 NIS per year].
- 2005: ISF New Faculty Equipment Support Grant: for equipping a signal/image processing lab. [42,000 USD].
- 2004 – 2007: Ministry of Industry, Trade and Labor. MAGNET program, (AVNET 37 consortium): 3D face recognition algorithms. With R. Kimmel. [app. 280,000 NIS (per year)].

LIST OF PUBLICATIONS

THESES

1. M.Sc. thesis: “Digital Coding of Image Sequences with Motion Compensation”, 1988, the Technion, Israel Institute of Technology.
2. D.Sc. thesis: “Super resolution Reconstruction of Continuous Image”, 1997, the Technion, Israel Institute of Technology.

BOOKS

1. Michael Elad, “Sparse and Redundant Representation – From Theory to Applications in Signal and Image Processing”, Springer, New-York, 2010.

JOURNAL PAPERS

1. M. Elad and A. Feuer, “Restoration of Single Super-Resolution Image From Several Blurred, Noisy and Down-Sampled Measured Images”, IEEE Trans. on Image Processing, Vol. 6, no. 12, pp. 1646-58, December 1997.
2. M. Elad and A. Feuer, “Recursive optical Flow Estimation - Adaptive Filtering approach”, Journal of Visual Comm. and Image Representation, Vol. 9, pp. 119-138, June 1998.
3. M. Elad and A. Feuer, “Super-Resolution Restoration of Continuous Image Sequence - Adaptive Filtering Approach”, IEEE Trans. on Image Processing, Vol. 8, no. 3, pp. 387-395, March 1999.
4. M. Elad and A. Feuer, “Super-Resolution Reconstruction of Continuous Image Sequence”, IEEE Trans. On Pattern Analysis and Machine Intelligence (PAMI), Vol. 21, no. 9, pp. 817-834, September 1999.

5. M. Elad and Y. Hel-Or, "A Fast Super-Resolution Reconstruction Algorithm for Pure Translational Motion and Common Space Invariant Blur", the IEEE Trans. on Image Processing, Vol.10, no.8, pp.1187-93, August 2001.
6. M. Elad and A.M. Bruckstein, "A Generalized Uncertainty Principle and Sparse Representation in Pairs of \mathbb{R}^N Bases", IEEE Trans. On Information Theory, Vol. 48, pp. 2558-2567, September 2002.
7. M. Elad, "On the Origin of the Bilateral Filter and Ways to Improve It", IEEE Transactions On Image Processing, Vol. 11, Number 10, pp. 1141-1151, October 2002.
8. M. Elad, Y. Hel-Or, and R. Keshet, "Rejection based classifier for face detection", Pattern Recognition Letters, Vol. 23, Issue 12, pp. 1459-1471, October 2002.
9. D. Donoho and M. Elad, "Maximal Sparsity Representation via l_1 Minimization", the Proc. Nat. Aca. Sci., Vol. 100, no. 5, pp. 2197-2202, March 2003.
10. R. Kimmel, M. Elad, D. Shaked, R. Keshet, and I. Sobel, "A Variational Framework to Retinex", International Journal of Computer Vision, Vol. 52, No. 1, pp. 7-23, April 2003.
11. A. Bruckstein, M. Elad, and R. Kimmel, "Down Scaling for Better Transform Compression", IEEE Trans. on Image Processing, Vol. 12, No. 9, pp. 1132-44, Sept. 2003.
12. M. Elad, R. Kimmel, D. Shaked, and R. Keshet, "Reduced Complexity Retinex Algorithm Via the Variational Approach", Journal on Visual Communication and Image Representation, Vol.14, No. 4, pp. 369-388, December 2003.
13. S. Farsiu, D. Robinson, M. Elad, and P. Milanfar, "Advances and Challenges in Super-Resolution", the International Journal of Imaging Systems and Technology, Vol. 14, pp. 47-57, April 2004.
14. M. Elad, P. Milanfar, and Gene Golub, "Shape from Moments - An Estimation Theory Perspective", IEEE Trans. on Signal Processing, Vol. 52, No. 7, pp. 1814-1829, July 2004.
15. S. Farsiu, D. Robinson, M. Elad, and P. Milanfar, "Fast and Robust Multi-Frame Super-resolution", IEEE Transactions on Image Processing, vol. 13, no. 10, pp. 1327-1344, October 2004.
16. J.-L. Starck, M. Elad, and D.L. Donoho, "Redundant Multiscale Transforms and their Application for Morphological Component Analysis", the Journal of Advances in Imaging and Electron Physics, Vol. 132, pp. 287-348, 2004.
17. J. Tsai, M. Elad, P. Milanfar, and G. Golub, "Variable projection for near-optimal filtering in low bit-rate block coders", IEEE Trans. on Circuits and Systems for Video Technology, Vol. 15, No. 1, pp. 154-160, January 2005.
18. R. Kimmel, D. Shaked, M. Elad, and I. Sobel, "Space Dependent Color Gamut Mapping: A Variational Approach", IEEE Transactions on Image Processing, Vol. 14, pp. 796-803, June 2005.
19. J.L. Starck, M. Elad, and D.L. Donoho, "Image decomposition via the combination of sparse representations and a variational approach", the IEEE Trans. On Image Processing, Vol. 14, pp. 1570-1582, October 2005.
20. M. Elad, P. Teo, and Y. Hel-Or, "On the Design of Filters for Gradient-Based Motion Estimation", Journal of Mathematical Imaging and Vision, Vol. 23, pp. 345-365, November 2005.
21. G. Boutry, M. Elad, G. Golub, and P. Milanfar, "The Generalized Eigenvalue Problem for Non-Square Pencils Using A Minimal Perturbation Approach", SIAM Journal on Matrix Analysis and Applications, Vol. 27, pp. 582-601, November 2005.
22. M. Elad, J-L. Starck, P. Querre, and D.L. Donoho, "Simultaneous Cartoon and Texture Image Inpainting Using Morphological Component Analysis (MCA)", the Journal on Applied and Computational Harmonic Analysis, Vol. 19, pp. 340-358, November 2005.
23. D.L. Donoho, M. Elad, and V. Temlyakov, "Stable Recovery of Sparse Overcomplete Representations in the Presence of Noise", the IEEE Trans. On Information Theory, Vol. 52, pp. 6-18, January 2006.
24. S. Farsiu, M. Elad, and P. Milanfar, "Multi-Frame Demosaicing and Super-Resolution of Color Images", the IEEE Trans. On Image Processing, Vol. 15, pp. 141-159, January 2006.

25. D.L. Donoho and M. Elad, "On the Stability of the Basis Pursuit in the Presence of Noise", *EURASIP Signal Processing Journal*, Vol. 86, No. 3, pp. 511-532, March 2006.
26. M. Aharon, M. Elad, and A.M. Bruckstein, "On the Uniqueness of Overcomplete Dictionaries, and a Practical Way to Retrieve Them", *the Journal of Linear Algebra and Applications*, Vol. 416, pp. 48-67, July 2006.
27. J. Bobin, Y. Moudden, J.-L. Starck, and M. Elad, "Morphological Diversity and Source Separation", *the IEEE Signal Processing Letters*, Vol. 13(7), pp. 409-412, July 2006.
28. M. Elad, "Sparse Representations are Most Likely to be the Sparsest Possible", *EURASIP Journal on Applied Signal Processing*, Vol. 2006 (2006), Article ID 96247, 12 pages.
29. S. Farsiu, M. Elad, and P. Milanfar, "Video-to-Video Dynamic Super-Resolution for Grayscale and Color Sequences", *EURASIP Journal on Applied Signal Processing*, Vol. 2006 (2006), Article ID 61859, 15 pages.
30. A. Averbuch, R. Coifman, D.L. Donoho, M. Elad, and M. Israeli, "Fast and Accurate Polar Fourier Transform", *the Applied and Computational Harmonic Analysis journal*, Vol. 21(2), pp. 145-167, September 2006.
31. M. Aharon, M. Elad, and A.M. Bruckstein, "The K-SVD: An Algorithm for Designing of Overcomplete Dictionaries for Sparse Representation", *IEEE Trans. On Signal Processing*, Vol. 54, No. 11, pp. 4311-4322, November 2006.
32. M. Elad and M. Aharon, "Image Denoising Via Sparse and Redundant representations over Learned Dictionaries", *IEEE Trans. on Image Processing*, Vol. 15, No. 12, pp. 3736-3745, December 2006.
33. M. Elad, "Why Simple Shrinkage is Still Relevant for Redundant Representations?", *IEEE Trans. On Information Theory*, Vol. 52, No. 12, pp. 5559-5569, December 2006.
34. E. Kidron, Y.Y. Schechner, and M. Elad, "Cross-Modality Localization via Sparsity", *IEEE Trans. on Signal Processing*, Vol. 55, No. 4, pp. 1390-1404, April 2007.
35. M. Elad and D. Datsenko, "Example Based regularization Deployed to Super-Resolution Reconstruction of a Single Image", *The Computer (a special issue on super resolution methods)*, Vol. 50, No. 4, pp. 1-16, April 2007.
36. M. Elad, P. Milanfar, and R. Rubinstein, "Analysis Versus Synthesis in Signal Priors", *Inverse Problems*. Vol. 23, No. 3, pp. 947-968, June 2007.
37. D.L. Donoho, M. Elad, and V.N. Temlyakov, "On Lebesgue-Type Inequalities for Greedy Approximation", *Journal of Approximation Theory*, Vol. 147, No. 2, pages 185-195, August 2007.
38. D. Datsenko and M. Elad, "Example-Based Single Image Super-Resolution: A Global MAP Approach with Outlier Rejection", *Journal of Multidimensional System and Signal Processing*, Vol. 18, No. 2-3, pp. 103-121, September 2007.
39. M. Elad, R. Goldenberg, and R. Kimmel, "Low Bit-Rate Compression of Facial Images", *IEEE Trans. on Image Processing*, Vol. 16, No. 9, pp. 2379-2383, September 2007.
40. M. Elad, B. Matalon, and M. Zibulevsky, "Coordinate and Subspace Optimization Methods for Linear Least Squares with Non-Quadratic Regularization", *Applied and Computational Harmonic Analysis*, Vol. 23, pp. 346-367, November 2007.
41. C. Staelin, M. Elad, D. Graig, O. Shmueli, and M. Vans, "Biblio Automatic Meta-data Extraction", *International journal on Document Analysis and Recognition*, Vol. 10, No. 2, Pages 113-126, November 2007.
42. M. Elad, "Optimized Projections for Compressed-Sensing", *IEEE Trans. on Signal Processing*, Vol. 55, No. 12, pp. 5695-5702, December 2007.
43. J. Mairal, M. Elad, and G. Sapiro, "Sparse Representation for Color Image Restoration", *IEEE Trans. on Image Processing*, Vol. 17, No. 1, pp. 53-69, January 2008.

44. J. Mairal, G. Sapiro, and M. Elad, "Learning Multiscale Sparse Representations for Image and Video Restoration", *SIAM Multiscale Modeling and Simulation*, Vol. 7, No. 1, pp. 214–241, April 2008.
45. O. Bryt and M. Elad, "Compression of Facial Images Using the K-SVD Algorithm", *Journal of Visual Communication and Image Representation*, Vol. 19, No. 4, pp. 270–283, May 2008.
46. M. Aharon and M. Elad, "Sparse and Redundant Modeling of Image Content Using an Image-Signature-Dictionary", *SIAM Journal on Imaging Sciences*, Vol. 1, No. 3, pp. 228–247, July 2008.
47. A.M. Bruckstein, M. Elad, and M. Zibulevsky, "On the Uniqueness of Nonnegative Sparse Solutions to Underdetermined Systems of Equations", *IEEE Transactions on Information Theory*, Vol. 54, No. 11, pp. 4813–4820, October 2008.
48. J. Shtok and M. Elad, "Analysis of the Basis Pursuit Via the Capacity Sets", *The Journal of Fourier Analysis and Applications*, Vol. 14, No. 5-6, pp. 688–711, December 2008.
49. M. Protter, M. Elad, H. Takeda, and P. Milanfar, "Generalizing the Non-Local-Means to Super-Resolution Reconstruction", *IEEE Transactions on Image Processing*, Vol. 18, No. 1, pp. 36–51, January 2009.
50. M. Protter and M. Elad, "Image Sequence Denoising Via Sparse and Redundant Representations", *IEEE Trans. on Image Processing*, Vol. 18, No. 1, pp. 27–36, January 2009.
51. A.M. Bruckstein, D.L. Donoho, and M. Elad, "From Sparse Solutions of Systems of Equations to Sparse Modeling of Signals and Images", *SIAM Review*, Vol. 51, No. 1, pp. 34–81, February 2009.
52. M. Protter and M. Elad, "Super-Resolution with Probabilistic Motion Estimation", *IEEE Transactions on Image Processing*, Vol. 18, No. 8, pp. 1899–1904, August 2009.
53. H. Takeda, P. Milanfar, M. Protter, and M. Elad, "Super-resolution Without Explicit Subpixel Motion Estimation", *IEEE Transactions on Image Processing*, Vol. 18, No. 9, pp. 1958–1975, September 2009.
54. M. Elad and I. Yavneh, "A Plurality of Sparse Representations is Better than the Sparsest One Alone", *IEEE Transactions on Information Theory*, Vol. 55, No. 10, pp. 4701–4714, October 2009.
55. J.M. Fadili, J.-L. Starck, M. Elad and D.L. Donoho "Reproducible Research in Signal and Image Decomposition and inpainting", *Computing in Science and Engineering*, Vol. 12 No. 1, pp. 44–62, January 2010.
56. R. Rubinstein, M. Zibulevsky, and M. Elad, "Double Sparsity: Learning sparse dictionaries for sparse signal approximation", *IEEE Transactions on Signal Processing*, Vol. 58 No. 3, pp. 1553–1564, March 2010.
57. R. Rubinstein, A.M. Bruckstein, and M. Elad, "Dictionaries for Sparse Representation Modeling", *IEEE Proceedings - Special Issue on Applications of Sparse Representation and Compressive Sensing*, Vol. 98, No. 6, pp. 1045-1057, April 2010.
58. M. Elad, M.A.T. Figueiredo, and Y. Ma, "On the Role of Sparse and Redundant Representations in Image Processing", *IEEE Proceedings - Special Issue on Applications of Compressive Sensing and Sparse Representation*, Vol. 98, No. 6, pp. 972-982, April 2010.
59. M. Elad and M. Zibulevsky, "L1-L2 Optimization in Signal and Image Processing", *IEEE Signal Processing Magazine*, Vol. 27, No. 3, pp. 76–88, May 2010.
60. M. Protter, I. Yavneh, and M. Elad, "Closed-Form MMSE Estimation for Signal Denoising Under Sparse Representation Modelling Over a Unitary Dictionary", *IEEE Transactions on Signal Processing*, Vol. 58, No. 7, pp. 3471-3484, July 2010.
61. Z. Ben-Haim, Y.C. Eldar, and M. Elad, "Coherence-Based Performance Guarantees for Estimating a Sparse Vector Under Random Noise", *IEEE Transactions on Signal Processing*, Vol. 58, No. 10, pp. 5030-5043, October 2010.
62. R. Giryes, M. Elad, and Y.C. Eldar, "The projected GSURE for automatic parameter tuning in iterative shrinkage methods", *Applied and Computational Harmonic Analysis*, Vol. 30, No. 3, pp. 407-422, May 2011.

63. J.S. Turek, I. Yavneh, and M. Elad, "On MMSE and MAP Denoising Under Sparse Representation Modeling Over a Unitary Dictionary", *IEEE Transactions on Signal Processing*, Vol. 59, No. 8, pp. 3526-3535, August 2011.
64. I. Ram, M. Elad, and I. Cohen, "Generalized Tree-Based Wavelet Transform", *IEEE Transactions on Signal Processing*, Vol. 59, No. 9, pp. 4199-4209, September 2011.
65. B. Ophir, M. Lustig, and M. Elad, "Multi-Scale Dictionary Learning using Wavelets", *IEEE Selected Topics in Signal Processing*, Vol. 5, No. 5, pp. 1014-1024, September 2011.
66. R. Giryes and M. Elad, "RIP-Based Near-Oracle Performance Guarantees for Subspace-Pursuit", CoSaMP, and Iterative Hard-Thresholding, *IEEE Trans. on Signal Processing*, Vol. 60, No. 3, Pages 1465 - 1468, March 2012.
67. A. Adler, V. Emiya, M.G. Jafari, M. Elad, R. Gribonval and M.D. Plumbley, "Audio inpainting", *IEEE Trans. on Audio, Speech and Language Processing*, Vol. 20, No. 3, Pages. 922-932, March 2012.
68. I. Ram, M. Elad, and I. Cohen, "Redundant Wavelets on Graphs and High Dimensional Data Clouds", *IEEE Signal Processing Letters*, Vol. 19, No. 5, Pages 291-294, May 2012.
69. T. Peleg, Y.C. Eldar, and M. Elad, "Exploiting Statistical Dependencies in Sparse Representations for Signal Recovery", *IEEE Trans. on Signal Processing*, Vol. 60, No. 5, Pages 2286-2303, May 2012.
70. M. Elad, "Sparse and Redundant Representation Modeling - What Next?", *IEEE Signal Processing Letters*, Vol. 19, No. 12, Pages 922-928, December 2012.
71. L.N. Smith and M. Elad, "Improving Dictionary Learning: Multiple Dictionary Updates and Coefficient Reuse", *IEEE Signal Processing Letters*, Vol. 20, No. 1, Pages 79-82, January 2013.
72. A. Adler, M. Elad, and Y. Hel-Or, "Probabilistic Subspace Clustering via Sparse Representations", *IEEE Signal Processing Letters*, Vol. 20, No. 1, Pages 63-66, January 2013.
73. S. Nam, M.E. Davies, M. Elad, and R. Gribonval, "The Cospase Analysis Model and Algorithms, Applied and Computational Harmonic Analysis", Vol. 34, No. 1, Pages 30-56, January 2013.
74. R. Rubinstein, T. Peleg and M. Elad, "Analysis K-SVD: A Dictionary-Learning Algorithm for the Analysis Sparse Model", *IEEE Trans. on Signal Processing*, Vol. 61, No. 3, Pages 661-677, March 2013.
75. T. Peleg and M. Elad, "Performance Guarantees of the Thresholding Algorithm for the Co-Sparse Analysis Model", *IEEE Trans. on Information Theory*, Vol. 59, No. 3, Pages 1832-1845, March 2013.
76. J. Shtok, M. Elad, and M. Zibulevsky, "Learned Shrinkage Approach For Low-Dose Reconstruction in Computed Tomography", *International Journal of Biomedical Imaging*, Volume 2013, Article ID 609274, 20 pages, 2013.
77. P.J. Shin, P.E. Z. Larson, M.A. Ohliger, M. Elad, J.M. Pauly, D.B. Vigneron and M. Lustig, "Calibrationless Parallel Imaging Reconstruction Based on Structured Low-Rank Matrix Completion", *Journal of Magnetic Resonance Imaging*, Vol. 38, No. 11, Pages 1-12, November 2013.
78. I. Ram, M. Elad and I. Cohen, "Image Processing using Smooth Ordering of its Patches", *IEEE Trans. on Image Processing*, Vol. 22, No. 7 Pages: 2764-2774, July 2013.
79. R. Giryes, S. Nam, M. Elad, R.Gribonval, and M.E. Davies, "Greedy-Like Algorithms for the Cospase Analysis Model", *Linear Algebra and Applications*, Vol. 441, Pages 22-60, January 2014.
80. M. Uecker, P. Lai, M.J. Murphy, P. Virtue, M. Elad, J.M. Pauly, S.S. Vasanawala, and M. Lustig, "ESPIRiT-An Eigenvalue Approach to Autocalibrating Parallel MRI: Where SENSE Meets GRAPPA", *Journal of Magnetic Resonance in Medicine*, Vol. 71, No. 3, Pages 990-1001, March 2014.
81. J.S. Turek, I. Yavneh, and M. Elad, "On MAP and MMSE Estimators for the Co-sparse Analysis Model", *Elsevier Digital Signal Processing*, Vol. 28, Pages 57-74, May 2014.

82. T. Peleg and M. Elad, "A Statistical Prediction Model Based on Sparse Representations for Single Image Super-Resolution", *IEEE Transactions on Image Processing*, Vol. 23, No. 6, Pages 2569-2582, June 2014.
83. Y. Romano, M. Protter, and M. Elad, "Single Image Interpolation via Adaptive Non-Local Sparsity-Based Modeling", *IEEE Transactions on Image Processing*, Vol. 23 No. 7, Pages 3085-3098, July 2014.
84. I. Ram, M. Elad, and I. Cohen, "Patch-Ordering-Based Wavelet Frame and its Use in Inverse Problems", *IEEE Transactions on Image Processing*, Vol. 23 No. 7, Pages 2779-2792, July 2014.
85. I. Ram, M. Elad, and I. Cohen, "Facial Image Compression using Patch-Ordering-Based Adaptive Wavelet Transform", *IEEE Signal Processing Letters*, Vol. 21 No. 10, Pages 1270-1274, October 2014.
86. R. Rubinstein and M. Elad, "Dictionary Learning for Analysis-Synthesis Thresholding", *IEEE Transactions on Signal Processing*, Vol. 62, No. 22, November 2014.
87. R. Giryes and M. Elad, "Sparsity Based Poisson Denoising with Dictionary Learning", *IEEE Transactions on Image Processing*, Vol. 23, No. 12, Pages 5057-5069, December 2014.
88. A. Adler, M. Elad, Y. Hel-Or, and E. Rivlin, "Sparse coding with Anomaly Detection, *Springer Journal on Signal Processing Systems*", Vol. 79, No. 2, Pages 179-188, May 2015.
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