

TEL603E Advanced Topics in Telecommunications
Spring 2014 – Tentative Course Syllabus
Course Title: Sparse Signal Processing

Instructor: Assoc. Prof. Ender M. Ekşioğlu, ekşioğlu [at] itu edu tr, Office: 2401

Lecture hours: Wednesday 9:30-12:30 **Office hours:** Thursday 10-12

Prerequisite: A good background in calculus, linear algebra, probability theory, signal processing, programming in MATLAB or C.

Textbook:

“Sparse and Redundant Representations”, Michael Elad, Springer, 2010, class notes

Course Objectives:

This is an advanced graduate-level course in Electronics & Communications Engineering. It deals with the theories and applications of the recently expanding area of sparse signal representations. A search in ISI Web-Of-Science, with Topic=((dictionary or pursuit) and spars*) leads to a total of around 1500 journal papers, which affirms the popularity of the subject matter.

The aim of this course will be to provide an overview of the fundamentals and some key recent developments in sparse signal processing, compressed sensing and dictionary learning while trying to balance among the theoretical aspects, algorithmic approaches, and practical applications. The student is supposed to read numerous papers on the subject area, and prepare presentations for at least two of these papers. A list of about 100 relevant paper are given at the end.

Homework: A due date will accompany each homework assignment. The due time of the homework will be at the beginning of the class.

Academic Integrity: Homework, project and examinations are expected to be the sole effort of the student submitting the work. Students found guilty of cheating will receive a zero grade for the concerning homework, report or exam. Copying (in part or whole) another's problem solution, computer program or written work (plagiarism), and cheating on exams will not be tolerated.

Attendance: Attendance is required for at least 2/3 of the course hours, i.e. for at least 30 class hours.

Grading criteria:	Percent of final grade
Homework and presentations:	30%
Term project:	50%
Exam:	20%

Course Outline

Week	Topics
1	Introduction. Underdetermined linear systems and their regularization. Convex regularizers. ℓ_1 minimization. Conversion of regularized inverse problems to linear programming.
2	Solving sparse representation problem. Uniqueness and uncertainty of solutions for sparse representation.
3	Greedy pursuit algorithms. Orthogonal-matching-pursuit. Convex relaxation techniques.
4	Iterative-shrinkage algorithms. EM and bound-optimization approaches. An IRLS-based shrinkage algorithm.
5	Compressive sensing theory.
6	Compressive sensing applications: spectrum sensing for cognitive radio. Single-pixel camera. Sparse-mri.
7	Sparsity based adaptive filtering methods: sparse LMS and sparse RLS.
8	Choosing versus learning: dictionary learning for sparse representation.
9	Analysis versus synthesis models in sparse signal modeling.
10	From theory to practice – signal and image processing applications. Image compression and recognition.
11	Image denoising using sparse representation. Image separation via MCA.
12	Image inpainting. Image scale-up: sparsity based super-resolution.
13	Introduction to matrix rank minimization: matrix completion problem and applications.
14	Student project presentations.

Information about the Term Project

- Part of your final grade will be based on a research project based on the papers from the given list.
- You may also work on a paper of your choice from a respectable journal.
- You are required to thoroughly understand the problem posed in the paper, and implement the method proposed to tackle the problem. If you wish, you may also apply the methods of the paper to a problem of your own choosing.
- Details about the project will be given in an additional document.

Papers from IEEE Transactions on Information Theory

1. Title: [Signal Space CoSaMP for Sparse Recovery With Redundant Dictionaries](#)
Author(s): Davenport, Mark A.; Needell, Deanna; Wakin, Michael B.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **10** Pages: **6820-6829** DOI: **10.1109/TIT.2013.2273491** Published: **OCT 2013**
2. Title: [Oblique Pursuits for Compressed Sensing](#)
Author(s): Lee, Kiryung; Bresler, Yoram; Junge, Marius
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **9** Pages: **6111-6141** DOI: **10.1109/TIT.2013.2254172** Published: **SEP 2013**
3. Title: [The Improved Bounds of Restricted Isometry Constant for Recovery via \$l\(p\)\$ -Minimization](#)
Author(s): Wu, Rui; Chen, Di-Rong
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **9** Pages: **6142-6147** DOI: **10.1109/TIT.2013.2262495** Published: **SEP 2013**
4. Title: [Compressed Data Separation With Redundant Dictionaries](#)
Author(s): Lin, Junhong; Li, Song; Shen, Yi
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **7** Pages: **4309-4315** DOI: **10.1109/TIT.2013.2252397** Published: **JUL 2013**
5. Title: [Accurate Prediction of Phase Transitions in Compressed Sensing via a Connection to Minimax Denoising](#)
Author(s): Donoho, David L.; Johnstone, Iain; Montanari, Andrea
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **6** Pages: **3396-3433** DOI: **10.1109/TIT.2013.2239356** Published: **JUN 2013**
6. Title: [Probabilistic Recovery Guarantees for Sparsely Corrupted Signals](#)
Author(s): Pope, Graeme; Bracher, Annina; Studer, Christoph
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **5** Pages: **3104-3116** DOI: **10.1109/TIT.2013.2240436** Published: **MAY 2013**
7. Title: [Support Recovery of Sparse Signals in the Presence of Multiple Measurement Vectors](#)
Author(s): Jin, Yuzhe; Rao, Bhaskar D.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **5** Pages: **3139-3157** DOI: **10.1109/TIT.2013.2238605** Published: **MAY 2013**
8. Title: [Joint \$k\$ -Step Analysis of Orthogonal Matching Pursuit and Orthogonal Least Squares](#)
Author(s): Soussen, Charles; Gribonval, Remi; Idier, Jerome; et al.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **5** Pages: **3158-3174** DOI: **10.1109/TIT.2013.2238606** Published: **MAY 2013**
9. Title: [Robust Sparse Analysis Regularization](#)
Author(s): Vaiter, Samuel; Peyre, Gabriel; Dossal, Charles; et al.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **4** Pages: **2001-2016** DOI: **10.1109/TIT.2012.2233859** Published: **APR 2013**
10. Title: [Exact Recoverability From Dense Corrupted Observations via \$l\(1\)\$ -Minimization](#)
Author(s): Nguyen, Nam H.; Tran, Trac D.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **4** Pages: **2017-2035** DOI: **10.1109/TIT.2013.2240435** Published: **APR 2013**
11. Title: [On the Fundamental Limits of Adaptive Sensing](#)
Author(s): Arias-Castro, Ery; Candes, Emmanuel J.; Davenport, Mark A.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **59** Issue: **1** Pages: **472-481** DOI: **10.1109/TIT.2012.2215837** Published: **JAN 2013**

12. Title: [Compressible Distributions for High-Dimensional Statistics](#)
Author(s): Gribonval, Remi; Cevher, Volkan; Davies, Mike E.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **8** Pages: **5016-5034** DOI: **10.1109/TIT.2012.2197174** Published: **AUG 2012**
13. Title: [Compressed Sensing With General Frames via Optimal-Dual-Based \$l\(1\)\$ -Analysis](#)
Author(s): Liu, Yulong; Mi, Tiebin; Li, Shidong
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **7** Pages: **4201-4214** DOI: **10.1109/TIT.2012.2191612** Published: **JUL 2012**
14. Title: [Subspace Methods for Joint Sparse Recovery](#)
Author(s): Lee, Kiryung; Bresler, Yoram; Junge, Marius
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **6** Pages: **3613-3641** DOI: **10.1109/TIT.2012.2189196** Published: **JUN 2012**
15. Title: [A Remark on the Restricted Isometry Property in Orthogonal Matching Pursuit](#)
Author(s): Mo, Qun; Shen, Yi
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **6** Pages: **3654-3656** DOI: **10.1109/TIT.2012.2185923** Published: **JUN 2012**
16. Title: [Recovery of Sparsely Corrupted Signals](#)
Author(s): Studer, Christoph; Kuppinger, Patrick; Pope, Graeme; et al.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **5** Pages: **3115-3130** DOI: **10.1109/TIT.2011.2179701** Published: **MAY 2012**
17. Title: [Sparse Solution of Underdetermined Systems of Linear Equations by Stagewise Orthogonal Matching Pursuit](#)
Author(s): Donoho, David L.; Tsaig, Yaakov; Drori, Iddo; et al.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **2** Pages: **1094-1121** DOI: **10.1109/TIT.2011.2173241** Published: **FEB 2012**
18. Title: [Uncertainty Relations and Sparse Signal Recovery for Pairs of General Signal Sets](#)
Author(s): Kuppinger, Patrick; Durisi, Giuseppe; Boelcskei, Helmut
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **58** Issue: **1** Pages: **263-277** DOI: **10.1109/TIT.2011.2167215** Published: **JAN 2012**
19. Title: [Accuracy Guarantees for \$l\(1\)\$ -Recovery](#)
Author(s): Juditsky, Anatoli; Nemirovski, Arkadi
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **57** Issue: **12** Pages: **7818-7839** DOI: **10.1109/TIT.2011.2162569** Published: **DEC 2011**
20. Title: [On the Error of Estimating the Sparsest Solution of Underdetermined Linear Systems](#)
Author(s): Babaie-Zadeh, Massoud; Jutten, Christian; Mohimani, Hosein
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **57** Issue: **12** Pages: **7840-7855** DOI: **10.1109/TIT.2011.2170129** Published: **DEC 2011**
21. Title: [A Probabilistic and RIPless Theory of Compressed Sensing](#)
Author(s): Candes, Emmanuel J.; Plan, Yaniv
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **57** Issue: **11** Pages: **7235-7254** DOI: **10.1109/TIT.2011.2161794** Published: **NOV 2011**
22. Title: [On the Performance of Sparse Recovery Via \$l\(p\)\$ -Minimization \(\$0 \leq p \leq 1\$ \)](#)
Author(s): Wang, Meng; Xu, Weiyu; Tang, Ao
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **57** Issue: **11** Pages: **7255-7278** DOI: **10.1109/TIT.2011.2159959** Published: **NOV 2011**
23. Title: [Precise Stability Phase Transitions for \$l\(1\)\$ Minimization: A Unified Geometric Framework](#)
Author(s): Xu, Weiyu; Hassibi, Babak
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **57** Issue: **10** Pages: **6894-6919** DOI: **10.1109/TIT.2011.2165825** Published: **OCT 2011**
24. Title: [Sparse Recovery With Orthogonal Matching Pursuit Under RIP](#)
Author(s): Zhang, Tong

Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 57 Issue: 9 Pages: 6215-6221 DOI: 10.1109/TIT.2011.2162263 Published: SEP 2011

25. Title: [Orthogonal Matching Pursuit for Sparse Signal Recovery With Noise](#)
Author(s): Cai, T. Tony; Wang, Lie
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 57 Issue: 7 Pages: 4680-4688 DOI: 10.1109/TIT.2011.2146090 Published: JUL 2011
26. Title: [Adaptive Forward-Backward Greedy Algorithm for Learning Sparse Representations](#)
Author(s): Zhang, Tong
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 57 Issue: 7 Pages: 4689-4708 DOI: 10.1109/TIT.2011.2146690 Published: JUL 2011
27. Title: [New Bounds for Restricted Isometry Constants](#)
Author(s): Cai, T. Tony; Wang, Lie; Xu, Guangwu
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 56 Issue: 9 Pages: 4388-4394 DOI: 10.1109/TIT.2010.2054730 Published: SEP 2010
28. Title: [Analysis of Orthogonal Matching Pursuit Using the Restricted Isometry Property](#)
Author(s): Davenport, Mark A.; Wakin, Michael B.
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 56 Issue: 9 Pages: 4395-4401 DOI: 10.1109/TIT.2010.2054653 Published: SEP 2010
29. Title: [Stable Recovery of Sparse Signals and an Oracle Inequality](#)
Author(s): Cai, Tony Tony; Wang, Lie; Xu, Guangwu
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 56 Issue: 7 Pages: 3516-3522 DOI: 10.1109/TIT.2010.2048506 Published: JUL 2010
30. Title: [Performance Analysis for Sparse Support Recovery](#)
Author(s): Tang, Gongguo; Nehorai, Arye
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: 56 Issue: 3 Pages: 1383-1399 DOI: 10.1109/TIT.2009.2039039 Published: MAR 2010

Papers from IEEE Transactions on Image Processing

31. Title: [Learning Doubly Sparse Transforms for Images](#)
Author(s): Ravishankar, Saiprasad; Bresler, Yoram
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **12** Pages: **4598-4612** DOI: **10.1109/TIP.2013.2274384** Published: **DEC 2013**
32. Title: [Adaptive Dictionary Learning in Sparse Gradient Domain for Image Recovery](#)
Author(s): Liu, Qiegen; Wang, Shanshan; Ying, Leslie; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **12** Pages: **4652-4663** DOI: **10.1109/TIP.2013.2277798** Published: **DEC 2013**
33. Title: [Nonlocal Hierarchical Dictionary Learning Using Wavelets for Image Denoising](#)
Author(s): Yan, Ruomei; Shao, Ling; Liu, Yan
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **12** Pages: **4689-4698** DOI: **10.1109/TIP.2013.2277813** Published: **DEC 2013**
34. Title: [Bayesian Learning of Sparse Multiscale Image Representations](#)
Author(s): Hughes, James Michael; Rockmore, Daniel N.; Wang, Yang
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **12** Pages: **4972-4983** DOI: **10.1109/TIP.2013.2280188** Published: **DEC 2013**
35. Title: [Design of Non-Linear Kernel Dictionaries for Object Recognition](#)
Author(s): Hien Van Nguyen; Patel, Vishal M.; Nasrabadi, Nasser M.; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **12** Pages: **5123-5135** DOI: **10.1109/TIP.2013.2282078** Published: **DEC 2013**
36. Title: [An Iterative Linear Expansion of Thresholds for \$l\(1\)\$ -Based Image Restoration](#)
Author(s): Pan, Hanjie; Blu, Thierry
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **9** Pages: **3715-3728** DOI: **10.1109/TIP.2013.2270109** Published: **SEP 2013**
37. Title: [Analysis Operator Learning and its Application to Image Reconstruction](#)
Author(s): Hawe, Simon; Kleinstueber, Martin; Diepold, Klaus
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **6** Pages: **2138-2150** DOI: **10.1109/TIP.2013.2246175** Published: **JUN 2013**
38. Title: [Multi-Wiener SURE-LET Deconvolution](#)
Author(s): Xue, Feng; Luisier, Florian; Blu, Thierry
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **5** Pages: **1954-1968** DOI: **10.1109/TIP.2013.2240004** Published: **MAY 2013**
39. Title: [Sparse Representation Based Image Interpolation With Nonlocal Autoregressive Modeling](#)
Author(s): Dong, Weisheng; Zhang, Lei; Lukac, Rastislav; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **4** Pages: **1382-1394** DOI: **10.1109/TIP.2012.2231086** Published: **APR 2013**
40. Title: [Context-Aware Sparse Decomposition for Image Denoising and Super-Resolution](#)
Author(s): Ren, Jie; Liu, Jiaying; Guo, Zongming
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **4** Pages: **1454-1467** DOI: **10.1109/TIP.2012.2231690** Published: **APR 2013**
41. Title: [How to SAIF-ly Boost Denoising Performance](#)
Author(s): Talebi, Hossein; Zhu, Xiang; Milanfar, Peyman
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **4** Pages: **1468-1483** DOI: **10.1109/TIP.2012.2231691** Published: **APR 2013**

42. Title: [Nonlocally Centralized Sparse Representation for Image Restoration](#)
Author(s): Dong, Weisheng; Zhang, Lei; Shi, Guangming; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **4** Pages: **1618-1628** DOI: **10.1109/TIP.2012.2235847** Published: **APR 2013**
43. Title: [Nonnegative Local Coordinate Factorization for Image Representation](#)
Author(s): Chen, Yan; Zhang, Jiemi; Cai, Deng; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **3** Pages: **969-979** DOI: **10.1109/TIP.2012.2224357** Published: **MAR 2013**
44. Title: [A Weighted Dictionary Learning Model for Denoising Images Corrupted by Mixed Noise](#)
Author(s): Liu, Jun; Tai, Xue-Cheng; Huang, Haiyang; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **3** Pages: **1108-1120** DOI: **10.1109/TIP.2012.2227766** Published: **MAR 2013**
45. Title: [Sparse Representation With Kernels](#)
Author(s): Gao, Shenghua; Tsang, Ivor Wai-Hung; Chia, Liang-Tien
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **2** Pages: **423-434** DOI: **10.1109/TIP.2012.2215620** Published: **FEB 2013**
46. Title: [Two-Direction Nonlocal Model for Image Denoising](#)
Author(s): Zhang, Xuande; Feng, Xiangchu; Wang, Weiwei
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **22** Issue: **1** Pages: **408-412** DOI: **10.1109/TIP.2012.2214043** Published: **JAN 2013**
47. Title: [Universal Regularizers for Robust Sparse Coding and Modeling](#)
Author(s): Ramirez, Ignacio; Sapiro, Guillermo
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **21** Issue: **9** Pages: **3850-3864** DOI: **10.1109/TIP.2012.2197006** Published: **SEP 2012**
48. Title: [Coupled Dictionary Training for Image Super-Resolution](#)
Author(s): Yang, Jianchao; Wang, Zhaowen; Lin, Zhe; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **21** Issue: **8** Pages: **3467-3478** DOI: **10.1109/TIP.2012.2192127** Published: **AUG 2012**
49. Title: [Image Super-Resolution With Sparse Neighbor Embedding](#)
Author(s): Gao, Xinbo; Zhang, Kaibing; Tao, Dacheng; et al.
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **21** Issue: **7** Pages: **3194-3205** DOI: **10.1109/TIP.2012.2190080** Published: **JUL 2012**
50. Title: [Blind Separation of Image Sources via Adaptive Dictionary Learning](#)
Author(s): Abolghasemi, Vahid; Ferdowsi, Saideh; Sanei, Saeid
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **21** Issue: **6** Pages: **2921-2930** DOI: **10.1109/TIP.2012.2187530** Published: **JUN 2012**
51. Title: [Solving Inverse Problems With Piecewise Linear Estimators: From Gaussian Mixture Models to Structured Sparsity](#)
Author(s): Yu, Guoshen; Sapiro, Guillermo; Mallat, Stephane
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **21** Issue: **5** Pages: **2481-2499** DOI: **10.1109/TIP.2011.2176743** Published: **MAY 2012**
52. Title: [Image Inpainting by Patch Propagation Using Patch Sparsity](#)
Author(s): Xu, Zongben; Sun, Jian
Source: IEEE TRANSACTIONS ON IMAGE PROCESSING Volume: **19** Issue: **5** Pages: **1153-1165** DOI: **10.1109/TIP.2010.2042098** Published: **MAY 2010**

Papers from IEEE Transactions on Signal Processing

53. Title: [Direct Optimization of the Dictionary Learning Problem](#)
Author(s): Rakotomamonjy, Alain
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 22 Pages: 5495-5506 DOI: 10.1109/TSP.2013.2278158 Published: NOV 2013
54. Title: [RSP-Based Analysis for Sparsest and Least \$l\(1\)\$ -Norm Solutions to Underdetermined Linear Systems](#)
Author(s): Zhao, Yun-Bin
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 22 Pages: 5777-5788 DOI: 10.1109/TSP.2013.2281030 Published: NOV 2013
55. Title: [Kernelized Supervised Dictionary Learning](#)
Author(s): Gangeh, Mehrdad J.; Ghodsi, Ali; Kamel, Mohamed S.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 19 Pages: 4753-4767 DOI: 10.1109/TSP.2013.2274276 Published: OCT 2013
56. Title: [Constrained Overcomplete Analysis Operator Learning for Cospase Signal Modelling](#)
Author(s): Yaghoobi, Mehrdad; Nam, Sangnam; Gribonval, Remi; et al.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 9 Pages: 2341-2355 DOI: 10.1109/TSP.2013.2250968 Published: MAY 2013
57. Title: [Learning Sparsifying Transforms](#)
Author(s): Ravishankar, Saiprasad; Bresler, Yoram
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 5 Pages: 1072-1086 DOI: 10.1109/TSP.2012.2226449 Published: MAR 2013
58. Title: [Perturbation Analysis of Orthogonal Matching Pursuit](#)
Author(s): Ding, Jie; Chen, Laming; Gu, Yuantao
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 2 Pages: 398-410 DOI: 10.1109/TSP.2012.2222377 Published: JAN 2013
59. Title: [Stable Signal Reconstruction via \$l\(1\)\$ -Minimization in Redundant, Non-Tight Frames](#)
Author(s): Haltmeier, Markus
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 61 Issue: 2 Pages: 420-426 DOI: 10.1109/TSP.2012.2222396 Published: JAN 2013
60. Title: [A Multilevel Iterated-Shrinkage Approach to \$l\(1\)\$ Penalized Least-Squares Minimization](#)
Author(s): Treister, Eran; Yavneh, Irad
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 60 Issue: 12 Pages: 6319-6329 DOI: 10.1109/TSP.2012.2218807 Published: DEC 2012
61. Title: [On the Recovery Limit of Sparse Signals Using Orthogonal Matching Pursuit](#)
Author(s): Wang, Jian; Shim, Byonghyo
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 60 Issue: 9 Pages: 4973-4976 DOI: 10.1109/TSP.2012.2203124 Published: SEP 2012
62. Title: [An MDL Framework for Sparse Coding and Dictionary Learning](#)
Author(s): Ramirez, Ignacio; Sapiro, Guillermo
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 60 Issue: 6 Pages: 2913-2927 DOI: 10.1109/TSP.2012.2187203 Published: JUN 2012
63. Title: [Kernel Sparse Representation-Based Classifier](#)
Author(s): Zhang, Li; Zhou, Wei-Da; Chang, Pei-Chann; et al.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: 60 Issue: 4 Pages: 1684-1695 DOI: 10.1109/TSP.2011.2179539 Published: APR 2012

64. Title: [From Bernoulli-Gaussian Deconvolution to Sparse Signal Restoration](#)
Author(s): Soussen, Charles; Idier, Jerome; Brie, David; et al.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **59** Issue: **10** Pages: **4572-4584** DOI: **10.1109/TSP.2011.2160633** Published: **OCT 2011**
65. Title: [The In-Crowd Algorithm for Fast Basis Pursuit Denoising](#)
Author(s): Gill, Patrick R.; Wang, Albert; Molnar, Alyosha
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **59** Issue: **10** Pages: **4595-4605** DOI: **10.1109/TSP.2011.2161292** Published: **OCT 2011**
66. Title: [On the Stable Recovery of the Sparsest Overcomplete Representations in Presence of Noise](#)
Author(s): Babaie-Zadeh, Massoud; Jutten, Christian
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **58** Issue: **10** Pages: **5396-5400** DOI: **10.1109/TSP.2010.2052357** Published: **OCT 2010**
67. Title: [Minimizing Nonconvex Functions for Sparse Vector Reconstruction](#)
Author(s): Mourad, Nasser; Reilly, James P.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **58** Issue: **7** Pages: **3485-3496** DOI: **10.1109/TSP.2010.2046900** Published: **JUL 2010**
68. Title: [Best Basis Compressed Sensing](#)
Author(s): Peyre, Gabriel
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **58** Issue: **5** Pages: **2613-2622** DOI: **10.1109/TSP.2010.2042490** Published: **MAY 2010**
69. Title: [Recursive Least Squares Dictionary Learning Algorithm](#)
Author(s): Skretting, Karl; Engan, Kjersti
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **58** Issue: **4** Pages: **2121-2130** DOI: **10.1109/TSP.2010.2040671** Published: **APR 2010**
70. Title: [An Improved Smoothed \$l\(0\)\$ Approximation Algorithm for Sparse Representation](#)
Author(s): Hyder, Md Mashud; Mahata, Kaushik
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **58** Issue: **4** Pages: **2194-2205** DOI: **10.1109/TSP.2009.2040018** Published: **APR 2010**
71. Title: [Sparse Reconstruction by Separable Approximation](#)
Author(s): Wright, Stephen J.; Nowak, Robert D.; Figueiredo, Mario A. T.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **57** Issue: **7** Pages: **2479-2493** DOI: **10.1109/TSP.2009.2016892** Published: **JUL 2009**
72. Title: [Dictionary Learning for Sparse Approximations With the Majorization Method](#)
Author(s): Yaghoobi, Mehrdad; Blumensath, Thomas; Davies, Mike E.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **57** Issue: **6** Pages: **2178-2191** DOI: **10.1109/TSP.2009.2016257** Published: **JUN 2009**
73. Title: [A Fast Approach for Overcomplete Sparse Decomposition Based on Smoothed \$l\(0\)\$ Norm](#)
Author(s): Mohimani, Hosein; Babaie-Zadeh, Massoud; Jutten, Christian
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **57** Issue: **1** Pages: **289-301** DOI: **10.1109/TSP.2008.2007606** Published: **JAN 2009**
74. Title: [Reduce and boost: Recovering arbitrary sets of jointly sparse vectors](#)
Author(s): Mishali, Moshe; Eldar, Yonina C.
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **56** Issue: **10** Pages: **4692-4702** DOI: **10.1109/TSP.2008.927802** Part: **1** Published: **OCT 2008**
75. Title: [Dictionary preconditioning for greedy algorithms](#)
Author(s): Schnass, Karin; Vandergheynst, Pierre
Source: IEEE TRANSACTIONS ON SIGNAL PROCESSING Volume: **56** Issue: **5** Pages: **1994-2002** DOI: **10.1109/TSP.2007.911494** Published: **MAY 2008**

Papers from SIAM Journal on Imaging Sciences

76. Title: [Augmented Lagrangian-Based Sparse Representation Method with Dictionary Updating for Image Deblurring](#)
Author(s): Liu, Qiegen; Liang, Dong; Song, Ying; et al.
Source: SIAM Journal on Imaging Sciences Volume: 6 Issue: 3 Pages: 1689-1718 DOI: 10.1137/110857349 Published: 2013
77. Title: [A Symbol-Based Algorithm for Decoding Bar Codes](#)
Author(s): Iwen, Mark A.; Santosa, Fadil; Ward, Rachel
Source: SIAM Journal on Imaging Sciences Volume: 6 Issue: 1 Pages: 56-77 DOI: 10.1137/110834378 Published: 2013
78. Title: [Clustered Sparsity and Separation of Cartoon and Texture](#)
Author(s): Kutyniok, Gitta
Source: SIAM Journal on Imaging Sciences Volume: 6 Issue: 2 Pages: 848-874 DOI: 10.1137/120874990 Published: 2013
79. Title: [Sparse Signal Reconstruction via Iterative Support Detection](#)
Author(s): Wang, Yilun; Yin, Wotao
Source: SIAM JOURNAL ON IMAGING SCIENCES Volume: 3 Issue: 3 Pages: 462-491 DOI: 10.1137/090772447 Published: 2010
80. Title: [Learning the Morphological Diversity](#)
Author(s): Peyre, Gabriel; Fadili, Jalal; Starck, Jean-Luc
Source: SIAM Journal on Imaging Sciences Volume: 3 Issue: 3 Pages: 646-669 DOI: 10.1137/090770783 Published: 2010
81. Title: [Analysis and Generalizations of the Linearized Bregman Method](#)
Author(s): Yin, Wotao
Source: SIAM Journal on Imaging Sciences Volume: 3 Issue: 4 Pages: 856-877 DOI: 10.1137/090760350 Published: 2010

Other Sources

82. Title: [On verifiable sufficient conditions for sparse signal recovery via \$l\(1\)\$ minimization](#)
Author(s): Juditsky, Anatoli; Nemirovski, Arkadi
Source: MATHEMATICAL PROGRAMMING Volume: **127** Issue: **1** Special Issue: **SI** Pages: **57-88** DOI: **10.1007/s10107-010-0417-z** Published: **MAR 2011**
83. Title: [CoSaMP: Iterative signal recovery from incomplete and inaccurate samples](#)
Author(s): Needell, D.; Tropp, J. A.
Source: APPLIED AND COMPUTATIONAL HARMONIC ANALYSIS Volume: **26** Issue: **3** Pages: **301-321** DOI: **10.1016/j.acha.2008.07.002** Published: **MAY 2009**
84. Title: [Subspace Pursuit for Compressive Sensing Signal Reconstruction](#)
Author(s): Dai, Wei; Milenkovic, Olgica
Source: IEEE TRANSACTIONS ON INFORMATION THEORY Volume: **55** Issue: **5** Pages: **2230-2249** DOI: **10.1109/TIT.2009.2016006** Published: **MAY 2009**
85. Title: [PROBING THE PARETO FRONTIER FOR BASIS PURSUIT SOLUTIONS](#)
Author(s): van den Berg, Ewout; Friedlander, Michael P.
Source: SIAM JOURNAL ON SCIENTIFIC COMPUTING Volume: **31** Issue: **2** Pages: **890-912** DOI: **10.1137/080714488** Published: **2008**
86. Title: [Iterative hard thresholding for compressed sensing](#)
Author(s): Blumensath, Thomas; Davies, Mike E.
Source: APPLIED AND COMPUTATIONAL HARMONIC ANALYSIS Volume: **27** Issue: **3** Pages: **265-274** DOI: **10.1016/j.acha.2009.04.002** Published: **NOV 2009**
87. Title: [Online Learning for Matrix Factorization and Sparse Coding](#)
Author(s): Mairal, Julien; Bach, Francis; Ponce, Jean; et al.
Source: JOURNAL OF MACHINE LEARNING RESEARCH Volume: **11** Pages: **19-60** Published: **JAN 2010**
88. Title: [The Dantzig selector: Statistical estimation when \$p\$ is much larger than \$n\$](#)
Author(s): Candes Emmanuel ; Tao, Terence
Source: ANNALS OF STATISTICS Volume: **35** Issue: **6** Pages: **2313-2351** DOI: **10.1214/009053606000001523** Published: **DEC 2007**
89. Title: [Enhancing Sparsity by Reweighted \$l\(1\)\$ Minimization](#)
Author(s): Candes Emmanuel J.; Wakin, Michael B.; Boyd, Stephen P.
Source: JOURNAL OF FOURIER ANALYSIS AND APPLICATIONS Volume: **14** Issue: **5-6** Pages: **877-905** DOI: **10.1007/s00041-008-9045-x** Published: **DEC 2008**
90. Title: [NEAR-IDEAL MODEL SELECTION BY \$l\(1\)\$ MINIMIZATION](#)
Author(s): Candes Emmanuel J.; Plan, Yaniv
Source: ANNALS OF STATISTICS Volume: **37** Issue: **5A** Pages: **2145-2177** DOI: **10.1214/08-AOS653** Published: **OCT 2009**
91. Title: [How well can we estimate a sparse vector?](#)
Author(s): Candes Emmanuel J.; Davenport, Mark A.
Source: APPLIED AND COMPUTATIONAL HARMONIC ANALYSIS Volume: **34** Issue: **2** Pages: **317-323** DOI: **10.1016/j.acha.2012.08.010** Published: **MAR 2013**
92. Title: [SPLIT BREGMAN METHODS AND FRAME BASED IMAGE RESTORATION](#)
Author(s): Cai, Jian-Feng; Osher, Stanley; Shen, Zuowei
Source: MULTISCALE MODELING & SIMULATION Volume: **8** Issue: **2** Pages: **337-369** DOI: **10.1137/090753504** Published: **2009**

93. Title: [Linearized Bregman Iterations for Frame-Based Image Deblurring](#)
Author(s): Cai, Jian-Feng; Osher, Stanley; Shen, Zuowei
Source: SIAM JOURNAL ON IMAGING SCIENCES Volume: 2 Issue: 1 Pages: 226-252 DOI: 10.1137/080733371 Published: 2009
94. [arXiv:1301.3375](#) [pdf]
On the Identifiability of Overcomplete Dictionaries via the Minimisation Principle Underlying K-SVD
Karin Schnass
Comments: 45 pages, 3 figures, this version includes non-asymptotic results
95. [arXiv:1206.0338](#) [pdf]
Poisson noise reduction with non-local PCA
Joseph Salmon, Zachary Harmany, Charles-Alban Deledalle, Rebecca Willett
96. [arXiv:1305.6663](#) [pdf]
Generalized Denoising Auto-Encoders as Generative Models
Yoshua Bengio, Li Yao, Guillaume Alain, Pascal Vincent
97. [arXiv:1301.3468](#) [pdf]
Boltzmann Machines and Denoising Autoencoders for Image Denoising
Kyunghyun Cho
98. E. J. Candès and C. Fernandez-Granda. Towards a mathematical theory of super-resolution.
To appear in Communications on Pure and Applied Mathematics.
99. E. J. Candès and C. Fernandez-Granda. Super-resolution from noisy data.
To appear in J. of Fourier Analysis and its Applications.