Journal watch
IEEE Transactions on Signal Processing, May 2011 issue
and
ICASSP 2011 - Some CS papers

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The value of redundant measurement in compressed sensing

Authors:
Victoria Kostina, Marco F. Duarte, Sina Jafarpour, Robert Calderbank
Duke University
Princeton

- Considered quantization of CS measurements
- Main contribution is to prove better results on a previous paper
  - Democracy of measurement matrices: All measurements carry same weight
  - Proven using RIP
  - Uniform sampling with rejection of measurements above a certain threshold
- Main Contributions
  - Bit budget to specify the rejected measurements
  - Vector quantization for the non-rejected measurements
- It is better to make more measurements and reject in terms of performance under quantization
  - Leads to a finer mesh for non-rejected measurements

Statistical Compressive Sensing of Gaussian Mixture Models

Authors:
Gushen Yu and Guillerm Sapiro
University of Minnesota, Minneapolis

- Considered sampling of signals that follow a prior distribution
  - $y = Ax, A \in \mathcal{R}^{M \times N}, M << N, x \sim \mathcal{N}(0, S)$
- Goal is accurate reconstruction *on average*
  - Expected MSE
- Conditions on measurement matrix
  - RIP in expectation, Expected NSP etc.
- Linear filtering decoders for gaussian signal models
  - Average mean squared error bounded by best-k term approx. error
- KEY Result
  - O(k) measurements required as compared to O(klog(N/k)) for CS

Estimation and Dynamic updating of Time varying signals with sparse variations
Authors: M. Salman Asif, A Charles, J Romberg, and C Rozell
Georgia Tech

ESTIMATING SPARSE MIMO CHANNELS HAVING COMMON SUPPORT
Authors: Yann Barbotin, A Hormati, S Rangan, M Vetterli
EPFL and Polytechnic Institute of New York

Weighted Compressed Sensing and Rank Minimization
Authors: Samet Oymak, M. Amin Khajehnejad, Babak Hassibi
CalTech

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Consensus-based distributed Total Least Squares Estimation in Ad Hoc Wireless Sensor Networks

Authors:
Alexander Bertrand and Marc Moonen
KU Leuven, Belgium

- Distributed algorithm to find TLS estimates in WSN
  - One-hop connectivity
  - Each node is observing the same underlying vector
  - Each node knows only a part of measurement matrix
- Main issues
  - Due to consensus constraints (connectivity) the problem is not separable
  - TLS is not convex: Equivalent to finding the eigenvector corresponding to minimum eigenvalue
- Solve for the dual problem
  - That turns out to be separable
  - Can be solved using sub-gradient methods
- Convex relaxations
  - Not equivalent to the original problem but can be proved to solve the problem of interest

Should Penalized Least Squares Regression be Interpreted as Maximum A Posteriori Estimation?

Authors:
Remi Gribonval
INRIA, Rennes, France Princeton

- Denoising problem: $y = x + n$. Estimate of x given y?
- MAP estimator: $arg\ max\ p(x|y)$ and MMSE: $E[X|Y = y]$, minimization of expected cost
- MAP estimator with a known prior can be expressed as a penalized/regularized LS
  - Regularization term: $[-logP_X(x)]$ OR
  - Penalty term, $\phi(x)$ can be interpreted as a prior with density $C_0 exp(-\phi(x))$
- What about MMSE ? Can it be expressed as regularized least squares
- YES
  - For a given $p_X(x)$ a penalty term can be found such that MMSE estimator is the regularized LS estimator
  - Then, MMSE can also be interpreted as MAP estimator with prior $\hat{p_X}(x)$ and this prior can differ from original prior
- Applications: computation of MMSE, others ??

Sensitivity to Basis Mismatch in Compressed Sensing
Yuejie Chi, Louis L. Scharf, Ali Pezeshki A. Robert Calderbank
Princeton, Colorado State Univ, Duke

Sparsity-Cognizant Total Least-Squares for Perturbed Compressive Sampling
Authors: Hao Zhu, Geert Leus and Georgios B. Giannakis
Univ of Minnesota; Delft, Netherlands

Hidden Relationships: Bayesian Estimation With Partial Knowledge
Authors: Tomer Michaeli and Yonina C. Eldar
Technion