Journal watch
Journal Watch - IEEE Transactions on Signal Processing, Oct(2)/Nov(1) 2013

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November 9, 2013

Dynamic Dictionary Algorithms for Model Order and Parameter Estimation

Authors:
Christian D. Austin, Joshua N. Ash, and Randolph L. Moses

Ohio State University

- Low-order parametric model estimation from noisy models
- Dictionary based model estimation
  - Parameter space is discretized into K parameter samples
  - Evaluate a parametric function at a parameter sample for all measurements
  - Static dictionary
    - ★ Estimates quantized to the sample spacing
    - ★ Finer spacing leads to large dictionaries and higher inter-column correlations
    - ★ Dynamic dictionary sizes try to avoid the above issues
- Training free dynamic dictionary algorithms
  - Penalty based algorithm: repulsion penalty function that controls the parameter spacing
    - ★ LASSO type objective function along with an extra penalty term, $\mu g(\theta_{\mathbf{k}} - \theta_{\mathbf{j}})$, where $g()$ can be $1/\|z\|_2$ for example
  - Constraint based algorithm: Directly constrain the parameter distance
- Analysis shows that dynamic algorithms overcomes parameter estimation bias induced by quantization

Improving Physical Layer Secrecy Using Full-Duplex Jamming Receivers

Authors:
Gan Zheng, Ioannis Krikidis, Jiangyuan Li, Athina P. Petropulu and Bjorn Ottersten

Univ. of Luxemburg, Univ. of Cyprus, State Univ of NJ - Rutgers

- Using Full-Duplex MIMO concepts in implementing PHY layer secrecy
- Practical approaches to PHY layer secrecy - degrade the decoding capability of ED
  - Multiple Antenna at Transmitter - Artificial noise (AN)
  - External help to jam the ED - Cooperative Jamming (CJ)
  - No external sources - Multiple transmissions from source (iJAM)
- Full-Duplex transmissions to jam the ED
  - Considered practical models of self-interference (LI model)
  - One Tx ant, one Rx ant and single ant ED
    - ★ Closed form expressions for power allocation for the receiver
    - ★ Full power not utilized (Saturation due to LI)
  - Destination with multiple antennas
    - ★ System is no longer interference limited
    - ★ Shown that optimal jamming covariance matrix is rank-1 and proposed algorithms to find it

Convergence and Applications of a Gossip-Based Gauss-Newton Algorithm

Authors:
Xiao Li and Anna Scaglione

Univ. of California, Davis

- Distributed optimization via diffusion
  - Combination of descent step with network diffusion steps
  - Distributed Gauss-Newton Algorithm for NLLS optimization
- Setup
  - Let $g(\underline{x}) : \mathbb{R}^N \rightarrow \mathbb{R}^M$
  - Objective function is $g^T(\underline{x})g(\underline{x})$
  - Multiple agents in the system. Each agent has access to partial information about $g(\underline{x})$
  - Compute $\underline{x}$ that minimized above objective function in a distributed fashion
- Each agent solves the problem "locally"
- Information required for computing descent direction is exchanged using *gossiping*
  - Time varying network graph considered
  - Each agent combines information from neighbors in weighted fashion and the weight matrix depends upon the topology during the exchange epoch
  - Static exchange model and Randomized exchange model considered
- The proposed GGN algorithm is applied for PSSE applications

Enhanced Sparse Bayesian Learning via Statistical Thresholding for Signals in Structured Noise

Authors:
Martin Hurtado, Carlos H. Muravchik and Arye Nehorai

National Univ. of La Plata, Argentina; Washington Univ at St Louis

- Sparse reconstruction with multiple measurements (MMV) using Bayesian framework
- Apart from additive noise, a structured noise component is considered
  - Interference from other users (Clutter in radar, reverberation in active sonar etc.)
  - Modeled as $\sum_{k=1}^{K} Z_k \mathbf{u}_k$, where Z_k are (known) regression matrices and $\mathbf{u}_k \sim \mathcal{N}(0, \Sigma_u)$
  - Σ_u is unknown and treated as nuisance parameters and estimated from data
- Standard SBL framework
  - Component variances (hyper-parameters) are used to control which dictionary items are active
  - EM-algorithm is used to numerically compute these hyper-parameters
  - “Pruning” to reduce the parameter space progressively
- A new statistical decision based pruning procedure is proposed
  - Test has CFAR like properties
  - Does not depend upon power of the signal, interference nor the noise

Nearest-Neighbor Distributed Learning by Ordered Transmissions

Stefano Marano, Vincenzo Matta, and Peter Willett
Univ. of Salerno, Italy; Univ. of CT

Dynamic Compressive Sensing of Time-Varying Signals Via Approximate Message Passing

J. Ziniel, Phil Schniter
Ohio State Univ.

Efficient Parametric Signal Estimation From Samples With Location Errors

Sumeet Kumar, Vivek K Goyal and Sanjay E. Sarma
MIT

Semi-Blind Receivers for Joint Symbol and Channel Estimation in Space-Time-Frequency MIMO-OFDM Systems

Kefei Liu, Joao Paulo C. L. da Costa, H. C. So, and Andr L. F. de Almeida
Univ. of Hong Kong; Univ. of Brasilia; Federal Univ. of Ceara, Brazil

Decentralized Sparsity-Regularized Rank Minimization: Algorithms and Applications

M. Mardani, C. Mateos, G. B. Giannakis
Univ. of Minnesota