Journal watch
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Performance Analysis and Optimization for Interference Alignment Over MIMO Interference Channels With Limited Feedback

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Singapore University of Technology and Design

- Performance analysis framework for IA
  - Limited CSI feedback
  - MIMO interference channels
  - Maximize average transmission rate (variables: f/b amount, transmission modes)
    - Closed form expressions for SINR (and average trans. rate) in the presence of IA leakage
    - Tools: Random vector quantization
  - Greedy allocation of feedback bits
  - Dynamic mode selection scheme
- Asymptotic analysis on average transmission rate
  - Trade-off between feedback amount and rate loss
  - Increase in antennas is useful only if the feedback budget is also increased
  - Interference limited scenarios: Single data stream is optimal

Greedy Algorithms for Joint Sparse Recovery

Authors:
Jeffrey D. Blanchard, Michael Cermak, David Hanle, and Yirong Jing

Grinnell College, IA, USA

- Extension and investigation of “well-known” greedy algorithms to MMV setup
  - IHT, NIHT, HTP, NHTP, CoSamp
- Sufficient conditions based on the Asymmetric-RIP to guarantee joint sparse recovery
  - Results in terms of lower and upper RIC
  - Smallest and largest singular values deviate in asymmetric fashion
  - Much weaker sufficient conditions
  - Sufficient conditions agree with the SMV counterparts
- Bounds on recovery error
- Simulation results
  - Good performance
  - Theoretical results are quite pessimistic, empirical average case provides much more information

Decomposition Approach for Low-Rank Matrix Completion and Its Applications

Authors:
Rick Ma, Nafise Barzigar, Aminmohammad Roozgard, and Samuel Cheng

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- Low rank matrix completion algorithm
  - Significantly reduces complexity and storage requirements
  - Does not use SVD or norm-minimization
  - Can be applied with finite field incomplete matrices also
  - Extensive numerical simulations to test the algorithm
- Overview of main algorithmic components
  - Decompose a incomplete matrix into u-diagonalizable matrices.
    - ★ Cluster all known entries into block diagonal structure
    - ★ Conditions for u-diagonalizability ?
  - Complete, each cluster using a “trimming” procedure
    - ★ Involves finding out if a particular column belongs to the column space of some matrix
    - ★ Find “basis” columns of cluster sub-matrix
    - ★ Zero out the incomplete entries in basis columns
    - ★ Complete the remaining columns using the linear combinations of basis columns
  - Complete all off-diagonal entries using completed clusters

On the Linear Convergence of the ADMM in Decentralized Consensus Optimization

Authors:
Wei Shi, Qing Ling, Kun Yuan, Gang Wu, and Wotao Yin

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UCLA

- Decentralized consensus optimization problem is considered
  - $\min_x \sum_{i=1}^{L} f_i(x)$, L n/w agents, common optimization variable x.
  - To solve the above in a decentralized fashion
- ADMM is applied to the decentralized setup
- Main contributions
  - A linear convergence rate has been established for ADMM in decentralized setup
  - Dependence of the rate on n/w topology, properties of objective functions is established
  - Algorithm parameter choices to get higher convergence rates is discussed

Smoothing and Decomposition for Analysis Sparse Recovery

Authors:
Zhao Tan, Yonina C. Eldar, Amir Beck and Arye Nehorai

Washington Univ., St Louis, USA
Technion Israel

- Algorithms and recovery guarantees for "Analysis" sparse model

$$\min_{x \in \mathbb{R}^n} \|\mathbf{D}^H x\|_1 \text{ subject to } \|\mathbf{A}x - b\| < \epsilon$$

- Main contributions
  - Extensions of FISTA to the above setting is considered
    - Fast iterative shrinkage-thresholding algorithm (First order method)
    - Unlike, ADMM and NESTA does not require **A** to have particular structure
  - General recovery guarantees for these algorithms based on D-RIP