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- A Dirty Model for Multiple Sparse Regression

  Authors: A. Jalali, P. Ravikumar, and S. Sanghavi

  Affiliations: The University of Texas, Austin

- Multiple regression:

$$\mathbf{y}_{n\times 1}^{(k)} = \mathbf{X}_{n\times p}^{(k)} \bar{\theta^k}_{p\times 1} + \mathbf{w}^k, k = 1, 2, \ldots, r \text{ and } p >> n$$

- Response variables share some common structure

- Each task depends on features specific to itself along with some common features

- Past work: considers ℓ_1/ℓ_q ($q > 1$), ℓ_1/ℓ_∞ norm regularization

- Can one estimate statistical models where the data may not fall cleanly into any one structural class ?

- Approach used: Superposition of

  - Block-sparse parameter matrix ($\mathbf{B}$)

  - Sparse parameter matrix ($\mathbf{S}$)

  - An estimator ($\hat{\mathbf{B}}, \hat{\mathbf{S}}$) successfully recovers the true support if

    $$\mathsf{Support}(\hat{\mathbf{B}} + \hat{\mathbf{S}}) = \mathsf{Support}(\theta)$$

- Key result:

  - Performs better than LASSO or ℓ_1/ℓ_∞

- Strong Secrecy From Channel Resolvability

  Authors: Matthieu R. Bloch and J. Nicholas Laneman

  Affiliations: Georgia Institute of Technology, Atlanta and University of Notre Dame, USA

- Physical layer security

  - Reliability

  - Secrecy

- Approach used: relate coding mechanism for serecy to channel resolvability

- Channel resolvability[1]

  - No. of random bits per input sample required to achieve arbitrarily accurate approx. of output statistics

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[1]T. Han and S. Verdu, Approximation theory of output statistics, TIT, 1993

- Coding mechanism: all messages induce same distribution for the eavesdropper's observation

- Mathematical tools

    - Information-spectrum methods[2]

    - Variational distance: useful for secrecy metrics

- Helped to establish results for generic channels and for stronger secrecy metrics

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[2]T. S. Han, Information-Spectrum Methods in Information Theory, Springer-Verlag, 2002.

- FemtoCaching: Wireless Content Delivery Through Distributed Caching Helpers

  Authors: K. Shanmugam, N. Golrezaei, A. G. Dimakis, A. F. Molisch, and G. Caire

  Affiliations: University of Texas at Austin and University of Southern California, USA

- To meet high demand of data (in particular video): heterogeneous architecture

  - Shrink the cell size and bring the content closer to the user

- Drawback: Need of high-speed backhaul

- To overcome this
  - Helpers with low rate backhaul

  - High storage capacity cache

- Problem considered: How to allocate files to helpers so that expected downloading time is minimized for given

  - Given file popularity distribution

  - Helper's storage capacity

  - Network topology

- WN is defined by a bipartite graph

- Two types of caching considered

  - Uncoded caching

  - Coded caching

- Uncoded caching: NP-hard

  - Greedy strategy is proposed

- Coded caching: convex

  - Encoding technique: Fountain codes

- Toward the Performance Versus Feedback Tradeoff for the Two-User MISO Broadcast Channel

Authors: J. Chen and P. Elia

Affiliations: Mobile Communications Department, EURECOM, France

- System model: 2-user MISO BC ($M \geq 2$)

- Performance of the system

    - Timeliness of CSI

    - Precison of CSI

- Explores the tradeoff between performance and CSIT timeliness and accuracy

- Derives the DOF region

    - Tight for large range of CSIT quality

- Proposed scheme

    - Zero-forcing

    - Superposition coding

    - Interference compressioin

    - Broadcasting

- Helps to answer question like

    - What CSIT feedback precision should be provided, and when?

    - What current-CSIT and delayed-CSIT qualities suffice to achieve a certain performance?

    - Etc.....