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Cooperative Sensing With Imperfect Reporting Channels: Hard Decisions or Soft Decisions?

Authors:
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Princeton

- Setup: Distributed detection, i.e., sensors and FC
  - Errors present in the reporting channels
  - Different average SNRs on listening channels
  - Hard decision and soft decision strategies are compared
    - HD: Each sensor transmits a 0/1 decision
    - SD: Each sensor transmits a D-bit soft information
- Main Conclusions
  - There is a considerable performance gain in using SD based cooperative sensing even in the presence of reporting errors
  - Established that there is a BEP wall effect even for SD schemes but nothing to worry about as wall is quite high !!
- Other contributions:
  - Detection prob. for K-out-of-N fusion rule for HD in the presence of channel errors
  - Optimal fusion rule for SD based CS, etc.

Optimal Topology Control and Power Allocation for Minimum Energy Consumption in Consensus Networks

Authors:
Stefania Sardellitti, Sergio Barbarossa and Ananthram Swami

Sapienza University of Rome

ARL

- Setup: Achievement of consensus in a WSN
  - Convergence rates of average consensus algo. is well understood
    - Lower bounded by algebraic connectivity, i.e., 2nd largest eig. of graph Laplacian
  - Topologies maximizing algebraic connectivity is also well understood
  - But for a WSN, the cost of establishing/maintaining topology needs to be accounted
- Main Contributions
  - Optimization problem is setup to minimize a performance metric that depends upon number of iterations required to reach consensus and total network power consumption required to maintain links in WSN
    - Topology, i.e. the active links, and the power per link is the output of above optimization problem
    - For a given node, p_{ij} and a_{ij} are not independent
    - Original opt. problem is hard to solve. So lot of relaxations and approximations are considered to make the problem tractable.
  - Both Deterministic and random graphs are considered

Distributed Covariance Estimation in Gaussian Graphical Models

Authors:
Ami Wiesel and Alfred O. Hero, III

The Hebrew University of Jerusalem

Univ of Michigan, Ann Arbor

- Setup: Graphical Gaussian model
  - Nodes represent the joint Gaussian RVs.
  - Conditional independence structure is represented via graph topology.
  - Given the topology and multiple observations (at each node), how to compute the inverse of covariance matrix in distributed fashion.
- Estimation of required entries in the inverse using neighbor node information is well understood
- Collating information from different nodes makes the inverse matrix asymmetric
  - Two algorithms proposed to remove this asymmetry by exchanging information amongst neighbor nodes (message passing)

Sensor-Centric Data Reduction for Estimation With WSNs via Censoring and Quantization

Authors:
Eric J. Msechu and Georgios B. Giannakis

University of Minnesota

- WSN with FC setup used to estimate some signal parameters
  - Data-reduction algorithms considered with no inter-sensor communication
  - Limited feedback from FC to nodes is assumed (to send CSI back to nodes)
- Data Censoring: Per node decision if the data is to be transmitted
  - Censoring rule arrived at by setting up an optimization problem that minimizes the least square fit error with a constraint on number of un-censored nodes.
    - Relaxations considered to reach at tractable censoring rule (thresholding)
    - General intuition is to retain measurements that have large values of "regression functions" ($h_k^T \theta$).
  - MLE with censored data
    - Need to find and maximize the joint pdf of received censored-data at FC
- Further data-reduction by quantizing un-censored data

Reconciling Compressive Sampling Systems for Spectrally Sparse Continuous-Time Signals

Michael A. Lexa, Mike E. Davies and John S. Thompson
The University of Edinburgh

Bit Allocation Laws for Multiantenna Channel Feedback Quantization: Multiuser Case

Authors: Behrouz Khoshnevis and Wei Yu
Univ. of Toronto

Regularized Modified BPDN for Noisy Sparse Reconstruction With Partial Erroneous Support and Signal Value Knowledge

Authors: Wei Lu and Namrata Vaswani
Iowa State University, Ames

On the Achievability of CramerRao Bound in Noisy Compressed Sensing

Authors: Rad Niazadeh, Massoud Babaie-Zadeh, and Christian Jutten

Entropy Minimization for Solving Sudoku

Authors: Jake Gunther and Todd Moon