

Journal Watch: IEEE Transactions on Information Theory, Vol. 58, No. 7, July 2012

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- Joint Detection and Estimation: Optimum Tests and Applications

Authors: George V. Moustakides, Guido H. Jajamovich, Ali Tajer, and Xiaodong Wang

Affiliations: Department of Electrical and Computer Engineering, University of Patras, Greece; Department of Electrical Engineering, Columbia University, New York and Department of Electrical Engineering, Princeton University

- Considers joint detection and estimation problem:

$$H_0 : X \sim f_0(X)$$

$$H_1 : X \sim f_1(X|\theta), \theta \sim \pi(\theta)$$

- Required to define suitable performance measure:
 - Combine the two performance measures
 - Focus on one subproblem and attempt to optimize its efficiency while assuring satisfactory performance for the second subproblem through suitable constraints

- Proposes following approaches:
 - One-Step Tests
 - Two-Step Tests
- Applied to:
 - problems of retrospective changepoint detection
 - multiple input multiple output (MIMO) radar

- A Factor Graph Approach to Clock Offset Estimation in Wireless Sensor Networks

Authors: Aitzaz Ahmad, Davide Zennaro, Erchin Serpedin, and Lorenzo Vangelista

Affiliations: Department of Electrical and Computer Engineering, Texas, USA;
Department of Information Engineering, University of Padova, Italy

- The problem of clock offset estimation in a two-way timing message exchange regime is considered
- The likelihood function of the observation time stamps is Gaussian, exponential, or log-normally distributed
- A unified framework for maximum likelihood (ML) estimation of clock offset is obtained
- To capture the imperfections in node oscillators, Bayesian approach is proposed by using a factor graph representation of the posterior density

- Completely Stale Transmitter Channel State Information is Still Very Useful

Authors: Mohammad Ali Maddah-Ali and David Tse

Affiliations: Department of Electrical Engineering and Computer Sciences,
University of California, USA

- Feedback process leads to two sources of inaccuracies:
 - Quantization Error
 - Delay
- Coherence time $<$ feedback delay: delayed feedback information reveals no information about the current state
- Is there way to use the delayed feedback information to achieve nontrivial multiplexing gains ?

- System model: MIMO broadcast channel with M antennas at transmitter and K users with single antenna
- Main result: for $M \geq K$, one can achieve a total of

$$\frac{K}{1 + \frac{1}{2} + \dots + \frac{1}{K}}$$

degrees of freedom per second per Hz

- The transmitter uses the fed back CSI to learn the side information that the receivers receive from previous transmissions

- On the Optimum Diversity-Multiplexing Tradeoff of the Two-User Gaussian Interference Channel With Rayleigh Fading

Authors: Hamid Ebrahimzad and Amir K. Khandani

Affiliations: Coding and Signal Transmission Laboratory, Department of Electrical and Computer Engineering, University of Waterloo, Canada

- Optimum tradeoff between diversity and multiplexing gains in a 2-user quasi-static Rayleigh fading IC is studied
- Coding scheme for Gaussian IC with interference level $\alpha = \frac{\log INR}{\log SNR} \geq 1$ is developed
- For this coding scheme, the achievable DMT is characterized
- In the low and high rate regions: the proposed coding scheme is a one-level Gaussian code, independent of the CSI
- In the middle rate region: the proposed coding scheme, depending on the partial CSI, can be a one-level or a two-level Gaussian code

Other interesting paper

- Y. Liu, T. Mi, and S. Li, Compressed Sensing With General Frames via Optimal-Dual-Based l_1 -Analysis
- C. S. Vaze and M. K. Varanasi, The Degrees of Freedom Region and Interference Alignment for the MIMO Interference Channel With Delayed CSIT
- Y. Li and A. Nosratinia, Capacity Limits of Multiuser Multiantenna Cognitive Networks
- K. V. Srinivas, A. W. Eckford, and R. S. Adve, Molecular Communication in Fluid Media: The Additive Inverse Gaussian Noise Channel