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- Diversity Gain for MIMO Neyman-Pearson Signal Detection

Authors: Q. He and Rick S. Blum

Affiliations: **Q. He**: Electronic Engineering Department, University of Electronic Science and Technology of China, China**Rick S. Blum**: Electrical and Computer Engineering Department, Lehigh University, USA

- For MIMO system adopting NP - criterion, diversity gain is derived for a vector signal present versus signal absent hypothesis testing problem
- Also analyzed the scenario when the target composed of Q random scatterers with possibly non-Gaussian reflection coefficients in the presence of possibly non-Gaussian clutter-plus noise

$$H_1 : \mathbf{r} = \sqrt{\gamma}\mathbf{B}\eta + \mathbf{W}$$
$$H_0 : \mathbf{r} = \mathbf{W}$$

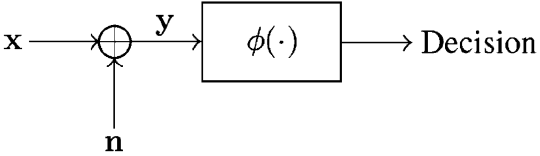
- Optimum detector is developed for Gaussian case
- Diversity gain in case of both Gaussian and non-Gaussian signal vector is derived

- Noise Enhanced M-ary Composite Hypothesis-Testing in the Presence of Partial Prior Information

Authors: S. Bayram and S. Gezici

Affiliations: Department of Electrical and Electronics Engineering, Bilkent University, Bilkent, Ankara, Turkey

- Noise enhanced detection is studied for *M*-ary composite hypothesis-testing problems in the presence of partial prior information



- Optimal additive noise is obtained according to two criterion:
  1. uniform distribution
  2. least-favorable distribution

- It is shown that optimal noise can be represented by a constant signal level or by a randomization of a finite number of signal levels according to Criterion 1 and 2.
- Cases of unknown parameter distribution under some composite hypotheses are considered

- Optimal Wideband Spectrum Sensing Framework for Cognitive Radio Systems

Authors:P. Paysarvi-Hoseini and N. C. Beaulieu

Affiliations: iCORE Wireless Communications Laboratory, Department of Electrical and Computer Engineering, University of Alberta, Canada

- An optimal framework for wideband Spectrum Sensing (SS) termed as Multiband Sensing-time-adaptive Joint Detection (MSJD)
- Wideband channel is divided in to N non-overlapping narrowband subchannels and J numbers of primary share this spectrum
- Goal is to jointly identifying the underutilized subbands
- There are two important aspects:
  1. Secondary capacity throughput for CR users
  2. Interference protection for primary networks

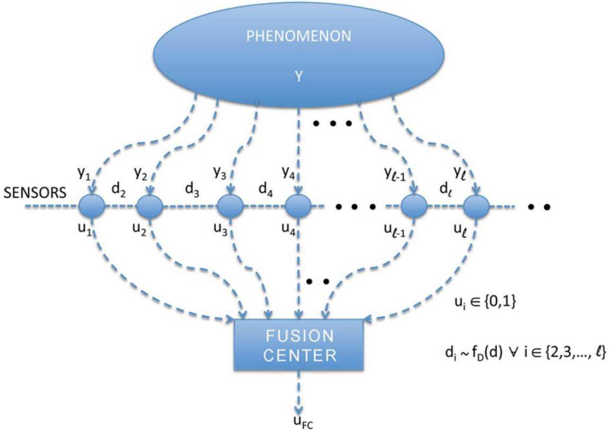
- Objective is to find the detection thresholds $\{\in_k\}_{k=1}^{N}$ and sensing time τ to optimize the performance of the secondary network while protecting the primary intrest
- The proposed scheme makes efficient use of the spectrum by establishing a suitable tradeoff between secondary user access and primary network protection

- Closed-Form Error Exponent for the NeymanâPearson Fusion of Dependent Local Decisions in a One-Dimensional Sensor Network

Authors: Jorge Plata-Chaves and Marcelino Lázaro

Affiliations: Signal Theory and Communications Department, Universidad Carlos III de Madrid, Spain

- A distributed detection system is considered where a large number of sensors perform a local detection and the FC performs a NP - fusion of the binary sensor observations



- The correlation structure of the local decesion is modeled with a $1 - D$ MRF
- A closed form expression for error exponent for NP - fusion of the local decesions is derived
- A phisical model for the conditional probability of MRF is developed
- Using this model, the error exponent is charcterized for the following sensor spacing model
  1. equispaced sensors with failures
  2. exponentially spaced sensors with failures

- Linear Precoders for the Detection of a Gaussian Process in Wireless Sensors Networks

Authors:P. Bianchi, Member, J. Jakubowicz,and F. Roueff

Affiliations:Institut Telecom/Telecom ParisTech/CNRS LTCI, France

- Performance of NeymanâPearson detection of a stationary Gaussian process in noise is analyzed, using a large WSN
- Each sensor compresses its observations using a linear precoder and final decesion is taken by FC
- Two family of precoders are studied:
    1. i.i.d. precoders
    2. orthogonal precoders
- Performance is analyzed under a regime where $k, n \to \infty$ s.t $\frac{k}{n} \to c \in [0, 1]$

- For the considered precoders, it is shown that the miss prob. of NP detector converges exponentially to zero
- Closed form expression of the corresponding error exponents are derived
- Proposed a practical orthogonal precoding strategy which achives best error exponent among all orthogonal strategy