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Finite Sample Size Optimality of GLR Tests

DATE: August 28, 2008

TIME: 11:00 AM – 12:00 PM

LOCATION: Executive Classroom

FEES: none

EVENT CONTACT:

Anita Race , H. Milton Stewart School of Industrial and Systems Engineering
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TITLE: Finite Sample Size Optimality of GLR Tests

SPEAKER: Dr. George **Moustakides**

ABSTRACT:

In binary hypothesis testing, when hypotheses are composite or the corresponding data pdfs contain unknown parameters, the generalized likelihood ratio test (GLRT) constitutes a popular means for deciding between the two possibilities. GLRT has the very interesting characteristic of performing simultaneous detection and estimation in the case of parameterized pdfs or combined detection and isolation in the case of composite hypotheses. Even though this test is known for years and has been the decision tool in numerous applications, existing results demonstrate only large sample size asymptotic optimality.

In our presentation we introduce a novel, finite sample size detection/estimation formulation for the problem of hypothesis testing with unknown parameters and a corresponding detection/isolation setup for the case of composite hypotheses. The optimum test that results from our performance measure optimization has a GLRT-like structure which is closely related to the criterion we employ for the parameter estimation or isolation part. When this criterion is selected in a very specific manner, we recover the classical GLRT of the literature, while we obtain interesting novel tests with alternative criteria. Our mathematical derivations are surprisingly simple considering that they solve a problem that has been open for more than half a century.