

USC Department of Mathematics
PROBABILITY & STATISTICS SEMINAR

3:30 PM, Friday 16.Jan.09
249 Kaprielian Hall
(Refreshments served at 3 PM)

George Moustakides
Department of Electrical & Computer Engineering
University of Patras, Greece

Optimum GLR tests

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 parameter 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 they solve a problem which is open for more than half a century.