



Operations Research Seminar

Statistical Inference from Distributed Binary Tests

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Thursday, May 21, 2009

15:00-16:00 in GL-115

Refreshment 14:45-15:00 in GL-239

The problem is formulated as follows: Each of n modules of a system can be in one of two states (“bad”, “good”) unknown to the Observer, with given (*a priori*) probabilities independently from each other. To gain information and later on to make a decision on state of modules Observer can apply tests from a set of (permissible) tests. Each test returns one of two results “pass” or “fail”. Outcome “fail” happens if and only if the following two conditions are true for *at least one* module: (1) module is in state “bad” (2) test detects the “bad” state of the module. The latter occurs with a given, for every test and every module probability (coverage). Otherwise test outputs “pass”. Warning! Test does not return the identity of “bad” modules if they are discovered; the only output is “fail”. After number of tests is completed and the corresponding binary string of test outcomes registered decision have to be made as for the state of modules. Mathematical and computational challenges to formulate and solve optimization problem are discussed. Results of simulation will be presented.

Dr. Valery Kanevsky is a Research Professor at Naval Postgraduate School in Monterey, CA. His research interests include statistical machine learning/statistical inference from inaccurate randomly distributed measurements (application to mobile communication), patterns and image recognition/biometrics, computational biology/algorithms for microarray data analysis, multiple dependencies of Internet traffic volumes (application to forecast of events of significance, e.g. extremes of stock market prices, terrorist attack), Kolmogorov Complexity (application to value allocation for processes without sellable output), Method Monte Carlo (branching processes, simulation of random variables with arbitrary distribution functions). Valery holds Ph.D. in Pure Math. and MS in Cybernetics/Theoretical Computer Science from Russia’s Academy of Sciences. . His work on measuring the value of intellectual capital has been featured in a Fortune cover story (October 3, 1994). MonteJade software that used the simulations to estimate rates of correct diagnosis and suggested new tests to write, called Fault Detective Test Analyzer, was named Software Innovation of the Year 2002 by Electronic Design News (EDN) magazine.