EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

THE DINEGENTROPY OF DIAGNOSTIC AND DETECTION TESTS

ABSTRACT – Diagnostic testing is relevant to a variety of scenarios in medicine, threat detection, and signal processing. In this paper we set up a mathematical architecture for diagnostics, and articulate its probabilistic underpinnings. Doing so enables us to develop a metrics for assessing the efficacy of diagnostic tests, and for resolving a long standing problem in diagnostics, namely the comparison of tests when their receiver operating characteristic (ROC) curves cross. The former is done via the notion of the Gini Coefficient (which is not the Gini Index), and the latter via an information theoretic notion, namely, dinegentropy. Introduction of dinegentropy in the context of diagnostics' is new, and is the key a contribution of this paper.

The workings of dinegentropy is illustrated via a synthetic example as proof of principle.

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SPEAKER BIO – Dr. Nozer D. Singpurwalla is an Emeritus Professor of Statistics and Distinguished Research Professor at the George Washington University in Washington, D.C. He has been Visiting Professor at Carnegie-Mellon University, Stanford University, the University of Florida at Tallahassee, the University of California at Berkeley, the Santa Fe Institute and Oxford University (UK). During Fall 1991, he was the first C. C. Garvin Visiting Endowed Professor in the Mathematical Sciences at the Virginia Polytechnic Institute and State University. He is Fellow of the Institute of Mathematical Statistics, the American Statistical Association, and the American Association for the Advancement of Science, and he is an elected member of the International Statistical Institute. He is the 1984 recipient of the U.S. Army's S. S. Wilks Award for Contributions to Statistical Methodologies in Army Research, Development and Testing, and the first recipient of The George Washington University's Oscar and Shoshana Trachtenberg Prize for Faculty Scholarship. In 1993 he was selected by the National Science Foundation, the American Statistical Association and the National Institute of Standards and Technology as the ASA/NIST/NSF Senior Research Fellow. In 1993 he was awarded a Rockefeller Foundation Grant as a Scholar in Residence at the Bellagio, Italy Center.

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