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Anti-Bayesian Statistical Pattern Recognition

September 14, 2016, 1:30 – 3:30 P.M

Carleton University, 1125 Colonel By Dr.
Herzberg Building, Room 5345

Abstract

The gold standard for a classifier is the condition of optimality attained by the Bayesian classifier. Within a Bayesian paradigm, if we are allowed to compare the testing sample with only *a single* point in the feature space from each class, the *optimal* Bayesian strategy would be to achieve this based on the (Mahalanobis) distance from the corresponding means. The reader should observe that, in this context, the mean, in one sense, is the most *central* point in the respective distribution. In this talk, we shall show that we can obtain *optimal* results by operating in a diametrically opposite way, i.e., a so-called "anti-Bayesian" manner. Indeed, we shall show the completely counter-intuitive result that by working with a *very few* (sometimes as small as two) points *distant* from the mean, one can obtain remarkable classification accuracies.

Further, if these points are determined by the *Quantiles* of the distributions, the accuracy of our method, referred to as Classification by Quantile Statistics (CQS), attains the optimal Bayes' bound! This claim, which is totally counter-intuitive, has been proven for many uni-dimensional, and some multi-dimensional distributions within the exponential family, and the theoretical results have been verified by rigorous experimental testing. They have also been tested on real-life data sets. Apart from the fact that these results are quite fascinating and pioneering in their own right, they also give a theoretical foundation for the families of Prototype Reduction Schemes (PRSs) and Border Identification (BI) algorithms reported in the literature.

About the Speaker

Dr. John Oommen was born in Coonoor, India on September 9, 1953. He obtained his B.Tech. degree from the Indian Institute of Technology, Madras, India in 1975. He obtained his M.E. from the Indian Institute of Science in Bangalore, India in 1977. He then went on for his M.S. and Ph. D. which he obtained from Purdue University, in West Lafayettte, Indiana in 1979 and 1982 respectively. He joined the School of Computer Science at Carleton University in Ottawa, Canada, in the 1981-82 academic year. He is still at Carleton and holds the rank of a *Full Professor*.

Since July 2006, he has been awarded the honorary rank of *Chancellor's Professor*, which is a lifetime award from Carleton University. His research interests include Automata Learning, Adaptive Data Structures, Statistical and Syntactic Pattern Recognition, Stochastic Algorithms and Partitioning Algorithms. He is the author of more than 435 refereed journal and conference publications, and is a *Fellow of the IEEE* and a *Fellow of the IAPR*. Dr. Oommen has also served on the Editorial Board of the *IEEE Transactions on Systems, Man and Cybernetics*, and *Pattern Recognition*.

Visit his page at www.scs.carleton.ca/~oommen.

Spaces are limited! To register for the seminar contact cuids@carleton.ca.