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Adaptive Learning in a World of Projections

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Abstract: The task of parameter/function estimation has been at the center of scientific attention for a long time and it comes under different names such as filtering, prediction, beamforming, classification, regression. Conventionally, the task has been treated as an optimization task of an appropriately adopted loss function. However, in most of the cases, the choice of the loss function is mainly dictated by its mathematically tractability and not by a physical reasoning related to the specific problem at hand. The task is further complicated when a-priori information, in the form of constraints, becomes available. The presence of constraints in estimation tasks is recently gaining in importance, due to the revival of interest in robust learning schemes. In this talk, the estimation task is treated in the context of set theoretic estimation arguments. Instead of a single optimal point, we are searching for a set of solutions that are in agreement with the available information, which is provided to us in the form of a set of training points and a set of constraints. The goal of this talk is to present a general tool for parameter/function estimation, both for classification as well as regression tasks, in a time adaptive setting in (infinite dimensional) Reproducing Kernel Hilbert spaces (RKHS). The general framework is that of convex set theory via the powerful and elegant tool of projections.

Short Bio: Sergios Theodoridis is currently Professor of Signal Processing and Communications in the Department of Informatics and Telecommunications of the University of Athens. His research interests lie in the areas of Adaptive Algorithms and Communications, Machine Learning and Pattern Recognition, Signal Processing for Audio Processing and Retrieval. He is the co-editor of the book "Efficient Algorithms for Signal Processing and System Identification", Prentice Hall 1993, the co-author of the best selling book "Pattern Recognition", Academic Press, 4th ed. 2008, the co-author of the book "Introduction to Pattern Recognition: A MATLAB Approach", Academic Press, 2009, and the co-author of three books in Greek, two of them for the Greek Open University. He is the co-author of six papers that have received best paper awards including the 2009 IEEE Computational Intelligence Society Transactions on Neural Networks Outstanding paper Award. He has served as an IEEE Signal Processing Society Distinguished Lecturer. He was the general chairman of EUSIPCO-98, the Technical Program co-chair for ISCAS-2006 and co-chairman and co-founder of CIP-2008 and co-chairman of CIP-2010. He has served as President of the European Association for Signal Processing (EURASIP) and as member of the Board of Governors for the IEEE CAS Society. He currently serves as member of the Board of Governors (Member-at-Large) of the IEEE SP Society. He has served as a member of the Greek National Council for Research and Technology and he was Chairman of the SP advisory committee for the Edinburgh Research Partnership (ERP). He has served as vice chairman of the Greek Pedagogical Institute and he was for four years member of the Board of Directors of COSMOTE (the Greek mobile phone operating company). He is Fellow of IET, a Corresponding Fellow of RSE, a Fellow of EURASIP and a Fellow of IEEE.

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