

Department of Mathematics
City University of Hong Kong

Colloquium

Organised by Prof. F. Cucker and Prof. M. Ismail

Optimal Adaptive Sampling Recovery

by

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Abstract: We propose a new approach to study optimal adaptive sampling algorithms for recovery of functions defined on the unit d -cube $[0,1]^d$. Let $W \subset L_q, 0 < q \leq \infty$, be a class of functions on $[0,1]^d$. For B a subset in L_q , we define a sampling recovery method with the free choice of sample points and recovering functions from B as follows. For each $f \in W$ we choose n sample points. This choice defines n sampled values. We then choose a function from B for recovering f . The choice of n sample points and a recovering function from B for each $f \in W$ defines a sampling algorithm $S_n^B(f)$ for recovery by functions in B . We consider optimal adaptive sampling algorithms for recovery of functions in W by sets B of cardinality at most 2^n in terms of the quantity

$$e_n(W)_q := \inf_{S_n^B: |B| \leq 2^n} \sup_{f \in W} \|f - S_n^B(f)\|_q,$$

and by the set $B = \sum_n(\mathbf{M})$ in terms of the quantity

$$s_n(W, \mathbf{M})_q := \inf_{S_n^B: B = \sum_n(\mathbf{M})} \sup_{f \in W} \|f - S_n^B(f)\|_q,$$

where \mathbf{M} is the set of tensor products of integer translated dilations of the centered cardinal B-spline of order $2r$ which do not vanish identically in $[0,1]^d$, and $\sum_n(\mathbf{M})$ the non-linear set of linear combinations of n free terms from \mathbf{M} .

$$e_n(SB_{p,\theta}^\alpha)_q \approx s_n(SB_{p,\theta}^\alpha, \mathbf{M})_q \approx n^{-\alpha/d}.$$

In comparing with the optimal non-adaptive sampling recovery, the asymptotic order of $e_n(SB_{p,\theta}^\alpha)_q$ and $s_n(SB_{p,\theta}^\alpha, \mathbf{M})_q$ is better in some cases. We also construct asymptotically optimal adaptive sampling algorithms.

Date : 1 March 2011 (Tuesday)
Time : 4:30pm – 5:30pm
Venue : Room B6605 (College Conference Room)
Blue Zone, Level 6
Academic Building
City University of Hong Kong

(Tea, coffee and cookies will be provided at the College Conference Room in B6605 before the colloquium from 4:00 to 4:30pm. Please come and join us.)

**** All interested are welcome ****
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