THE UNIVERSITY  OF HONG KONG

Department of Mathematics

C O L L O Q U I U M

Regularized Weighted Least Squares by Orthogonal Polynomials

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Abstract

We consider polynomial approximation over the interval $[-1, 1]$ by a class of regularized weighted discrete least squares methods with ℓ_2-regularization and ℓ_1-regularization terms, respectively. It is merited to choose classical orthogonal polynomials as basis sets of polynomial space with degree at most L. As node sets we use zeros of orthogonal polynomials such as Chebyshev points of the first kind, Legendre points. The number of nodes, say $N + 1$, is chosen to ensure $L \leq 2N + 1$. With the aid of Gauss quadrature, we obtain approximation polynomials of degree L in closed form without solving linear algebra or optimization problem. It can be shown that there is an extention of Wang-Xiang formula for classical polynomial interpolation.

We then study the approximation quality of ℓ_2-regularization approximation polynomial, especially on the Lebesgue constant. Moreover, the sparsity of ℓ_1-regularization approximation polynomial, respectively. Finally, we give numerical examples to illustrate these theoretical results and show that well-chosen regularization parameter can provide good performance approximation, with or without contaminated data.

Date:	**November 20, 2018 (Tuesday)**
Time:	**4:10 – 5:10pm**
Venue:	**Room 210, Run Run Shaw Bldg., HKU**

All are welcome