

特邀哈尔滨工业大学数学学院边伟教授作学术报告

报告人：边伟教授

报告题目：Smoothing fast iterative hard thresholding algorithm for l_0 penalized nonsmooth convex regression problem

主持人：徐玮玮 教授

报告时间：2022年3月23日10:00-11:00

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报告摘要：

In this talk, we investigate a class of constrained sparse regression problem with cardinality penalty, where the feasible set is defined by box constraint, and the loss function is convex, but not necessarily smooth. First, we put forward a smoothing fast iterative hard thresholding (SFIHT) algorithm for solving such optimization problems, which combines smoothing approximations, extrapolation techniques and iterative hard thresholding methods. The extrapolation coefficients can be chosen to satisfy $\sup_k \beta_k = 1$ in the proposed algorithm. We discuss the convergence behavior of the algorithm with different extrapolation coefficients, and give sufficient conditions to ensure that any accumulation point of the iterates is a local minimizer of the original cardinality penalized problem. In particular, for a class of fixed extrapolation coefficients, we discuss several different update rules of the smoothing parameter and obtain the convergence rate of $O(\ln k / k)$ on the loss and objective function values. Second, we consider the case in which the loss function is Lipschitz continuously differentiable, and develop a fast iterative hard thresholding (FIHT) algorithm to solve it. We prove that the iterates of FIHT converge to a local minimizer of the problem that satisfies a desirable lower bound property. Moreover, we show that the convergence rate of loss and objective function values are $o(k^{-2})$. Finally, some numerical examples are presented to illustrate the theoretical results.

报告人简介：

边伟，女，哈尔滨工业大学数学学院，教授、博士生导师。2004年和2009年于哈尔滨工业大学分别获得学士和博士学位，导师为薛小平教授，随后留校工作至今。期间，2010-2012年访问香港理工大学跟随陈小君教授，从事博士后工作。2013年12月被聘为副教授，2016年12月通过“哈工大青拔计划”晋升为教授。主要从事的研究领域为：最优化理论与算法、神经网络。先后在MP, SIOPT, SIIMS, SINUA, SISC, MOR和三个IEEE系列汇刊发表多篇学术论文。先后获得2018年度“龙江青年学者”和2019年度教育部青年学者称号。主持国家自然科学基金面上项目2项和青年基金项目1项。获得黑龙江省自然科学二等奖（排

第二) 一项。任中国运筹学会理事, 中国运筹学会数学规划分会理事, 黑龙江数学会常务理事, 任 SCI 期刊 JOTA 编委。

数学与统计学院

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