THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

*** Amended ***

Optimization and Machine Learning Seminar

A Penalty Relaxation Method for Image Processing Using Euler's Elastica Model

Dr. Xiao Wang
Peng Cheng Laboratory, Shenzhen

Abstract

Euler's elastica model has been widely used in image processing. Since it is a challenging nonconvex and nonsmooth optimization model, most existing algorithms do not have convergence theory for it. In this talk, I will introduce a penalty relaxation algorithm with mathematical guarantee to find a stationary point of Euler's elastica model. To deal with the nonsmoothness of Euler's elastica model, we first introduce a smoothing relaxation problem, and then propose an exact penalty method to solve it.

We establish the relationships between Euler's elastica model, the smoothing relaxation problem and the penalty problem in theory regarding optimal solutions and stationary points. Moreover, we propose an efficient block coordinate descent algorithm to solve the penalty problem by taking advantages of convexity of its subproblems. We prove global convergence of the algorithm to a stationary point of the penalty problem. Finally we apply the proposed algorithm to denoise the optical coherence tomography images with real data from an optometry clinic and show the efficiency of the method for image processing using Euler's elastica model.

Date:	September 9, 2022 (Friday)
Time:	10:00 - 11:00am (Hong Kong Time)
Venue:	Room 210, Run Run Shaw Bldg., HKU and ZOOM: https://hku.zoom.us/j/ Meeting ID: 944 7790 8464 Password: 756881

All are welcome