



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

**SEMINAR ON DATA SCIENCE
AND APPLIED MATH**

**Explore the Compressible Gradients in
High-Dimensional Zeroth-Order Optimization**

By

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Abstract

We consider the problem of minimizing an objective function without any derivative information. Such optimization is called zeroth-order, derivative-free, or black-box optimization. When the problem dimension is large-scale, the existing zeroth-order state-of-the-arts often suffer the curse of dimensionality. In this talk, we explore a novel compressible gradients assumption and propose two new methods, namely ZORO and SCOBO, for high-dimensional zeroth-order optimization. In particular, ZORO uses evaluations of the objective function and SCOBO uses only comparison information between points. Furthermore, we propose a block coordinate descent algorithm, coined ZO-BCD, for ultra-high-dimensional settings. We show the query complexities of ZORO, SCOBO, and ZO-BCD are only logarithmically dependent on the problem dimension. Numerical experiments show that the proposed methods outperform the state-of-the-arts on both synthetic and real datasets.

Biography: *HanQin Cai is an Assistant Adjunct Professor in the Department of Math at UCLA. He earned his Ph.D. degree from the University of Iowa in 2018, under the guidance of Professor Jian-Feng Cai and Prof. Weiyu Xu. His research interests lie in developing fast and provable algorithms for the fields of signal/image processing, data analysis, optimization, and machine learning. Currently, he is focusing on the projects of zeroth-order optimization and low-rank matrix/tensor problems.*

Date : 22 April 2021 (Thursday)

Time : 10:30am - 12:00noon

Zoom Meeting : <https://hkust.zoom.us/j/99988827320> (Passcode: hkust)

All are Welcome!