

國立中山大學應用數學系

學術演講

講者：吳建福教授 (Georgia Institute of Technology)

講題：Analysis-of-Marginal-Tail-Means (ATM): A Robust Method for Discrete Black-Box Optimization

時間：2022/12/23 (Friday) 15:10 ~ 16:00

地點：理 SC4009-1 教室

茶會：16:00 ~ 17:00

Abstract

We present a new method, called analysis-of-marginal-tail-means (ATM), for effective robust optimization of discrete black-box problems. ATM has important applications in many real-world engineering problems (e.g., manufacturing optimization, product design, and molecular engineering), where the objective to optimize is black-box and expensive, and the design space is inherently discrete. One weakness of existing methods is that they are not robust: these methods perform well under certain assumptions, but yield poor results when such assumptions (which are difficult to verify in black-box problems) are violated. ATM addresses this by combining both rank- and model-based optimization, via the use of marginal tail means. The trade-off between rank- and model-based optimization is tuned by first identifying important main effects and interactions from data, then finding a good compromise which best exploits additive structure. ATM provides improved robust optimization over existing methods, particularly in problems with (i) a large number of factors, (ii) unordered factors, or (iii) experimental noise. We demonstrate the effectiveness of ATM in simulations and in two real-world engineering problems: the first on robust parameter design of a circular piston, and the second on product family design of a thermistor network. (Paper in Technometrics, 2019. Mak and Wu, Simon Mak at Duke U.)

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