

## *Multilinear extension of $k$ -submodular functions*

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**Abstract:** A  $k$ -submodular function is a pairwise monotone function that given  $k$  disjoint subsets outputs a value that is submodular in every orthant. In this paper, we provide a new framework for  $k$ -submodular maximization problems, by relaxing the optimization to the continuous space with the multilinear extension of  $k$ -submodular functions and a variant of pipage rounding that recovers the discrete solution. When the function is monotone, we propose a simple algorithm that achieves almost  $\frac{1}{2}$ -approximation for unconstrained maximization and maximization under total size and knapsack constraints. This result is asymptotically optimal. The multilinear extension introduces new insights to analyze and optimize  $k$ -submodular functions. Based on joint work with Huanjian Zhou.

**Speaker Bio:** 王昀翔现为香港中文大学（深圳）数据科学学院助理教授。王昀翔于2014年在上海交通大学获信息安全专业工程学士学位；其后于2020年在香港中文大学计算机科学与工程系获博士学位。就读博士期间，他曾在阿尔伯塔大学和加拿大皇家银行长期访问。王昀翔的研究方向包括强化学习，在线学习，和学习理论等。他的研究成果发表在ITCS, NeurIPS, ICML, ICLR等会议。他关于The Gambler's problem的研究解决了强化学习教科书中的开放问题，并证明了强化学习中的混沌现象。

Chengdu Algorithms and Logic Seminar is a series of online seminars organized by School of Computer Science and Engineering, University of Electronic Science and Technology of China, and School of Computer Science, University of Auckland that aims to promote collaborations in a broad range of topics in algorithms and logic.

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