北京理工大學

2025 TALKS IN COMBINATORICS

Farid Aliniaeifard is a Mathematician at the Research Center for Mathematics and Interdisciplinary Sciences of Shandong University. He was previously a Postdoctoral Fellow in the Department of Mathematics at the University of British Columbia (UBC). He earned his Ph.D. in Algebraic Combinatorics from York University, where his outstanding work was recognized as he was nominated as one of the university's top five Ph.D. students for the prestigious Vanier Scholarship. Recently, he has been working on how AI can help research in combinatorics. Farid Aliniaeifard has over 21 publications, including articles in top journals such as *Advances in Mathematics*, *International Mathematics Research Notices*, and the *Journal of Combinatorial Theory, Series A*. He is also a dedicated educator, recognized at UBC with the Department Award for Outstanding Teaching by a Postdoctoral Fellow.

Can AI Show Creativity in Mathematics — Or Is It Just a Tool?

As AI becomes increasingly capable of generating mathematical results, we, mathematicians, are confronted with a fundamental question: Can AI exhibit genuine creativity in mathematics? We begin by discussing this question, and then we explore the role of AI as a tool in mathematical research. First, we explain how reinforcement learning can be systematically used to search for counterexamples in combinatorial problems. Second, we present how deep learning can detect patterns and assist mathematicians in formulating plausible conjectures. Third, we describe how to use deep learning to identify sufficient conditions for a given statement. As an illustration, we apply this process to Stanley's e-positivity problem for graphs—a central problem in algebraic combinatorics for the past three decades.

2025.12.12 (Fri) 9.50–10.50 am (Beijing time, GMT+8)

@Tencent Meeting 833-168-329

Invited by David Wang (glw@bit.edu.cn)