

國立中央大學數學系

專題演講

主 講 人：胡全榮博士 (新加坡南洋理工大學)

演講題目：Geometry and Topology in Mathematical AI

演講茶會：2024年02月29日(星期四) 3:30 p.m. ~ 4:00 p.m.

茶會地點：中央大學鴻經館M306

演講時間：2024年02月29日(星期四) 4:00 p.m. ~ 5:00 p.m.

演講地點：中央大學鴻經館M107

Abstract：

Nowadays, artificial intelligence (AI) has evolved into an indispensable tool driving advancements in modern sciences and technology. Its applications span various domains, including bioinformatics, molecular design, computer science, image analysis and processing, and multimedia applications. Notably, foundational mathematical techniques such as probability theory, statistics, differential equations, convex optimization, and optimal transport form the cornerstone of AI and machine learning (ML) models. Recently, besides these mathematical tools, geometry and topology have revealed their prowess in analyzing intricate structures within data and ML architectures, leading to a notable enhancement in the performance of ML models. Specifically, tools derived from topological data analysis (TDA) and geometric deep learning, such as persistent homology and graph neural networks, have captured the attention of the AI community. These tools exhibit promising results, particularly in molecular design and social network analysis. This presentation offers a comprehensive introduction to the developmental roadmap showcasing the contribution of geometry and topology in modern AI. Additionally, it includes an overview of our current studies on the applications of TDA in material designs, introducing the power of topological and geometric methods in analyzing solar cell materials by showing our promising results in predicting their physical properties.

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