

# LUIAS Distinguished Lecture

## Theory of Deep Neural Networks

Speaker

**Professor Dingxuan ZHOU**

Professor and Head, School of Mathematics and Statistics  
University of Sydney

Senior Lingnan Scholar

Lingnan University Institute for Advanced Study

Date: 11 April 2025 Time: 5:00PM - 6:00PM

Venue: MB G01, Patrick Lee Wan Keung  
Academic Building



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Registration link:

<https://forms.office.com/r/NADYvu0G1x>

### Abstract

Deep learning has been widely applied and brought breakthroughs in dealing with big data from speech recognition, computer vision, natural language processing, and many other domains. It is based on deep neural networks, often with structures designed for various purposes. Compared with its success in practical applications, deep learning is not well understood in theory. A solid theoretical foundation is desired for understanding modelling and generalization abilities of deep learning models with network architectures and structures. This talk will start with deep convolutional neural networks (CNNs) which are induced by convolutions. The convolutional architecture gives essential differences between deep CNNs and the classical fully connected neural networks. We describe a mathematical theory for deep CNNs associated with the rectified linear unit activation. Transformers and some other related deep learning models will also be discussed.

### Biography

Dingxuan Zhou is Professor and Head of School of Mathematics and Statistics, University of Sydney. Before moving to Australia, he was a Chair Professor in the School of Data Science and Department of Mathematics, City University of Hong Kong, serving also as Director of the Liu Bie Ju Centre for Mathematical Sciences (2019-22), Associate Dean of School of Data Science (2018-22), and Head of Department of Mathematics (2006-12). His recent research interests include theory of deep learning, neural networks, statistical learning theory, wavelet analysis, approximation theory, data science and applications. He was rated in 2014-2017 by Thomson Reuters/Clarivate Analytics as a highly-cited researcher. The research grants he has received include a Fund for Distinguished Young Scholars from NSF of China in 2005, twenty-five GRF/CERG projects from Research Grants Council of Hong Kong (one for each year during his service at CityU), and two Discovery Projects from Australian Research Council. He is serving on the editorial board of more than ten international journals and is an editor-in-chief of the journals "Analysis and Application" and "Mathematical Foundations of Computing".

ALL ARE WELCOME

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