CMAI: Interface of Math and Artificial Intelligence Seminar
The Chinese University of Hong Kong

This CMAI Interface of Math and AI Seminar is organized by Centre for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics at CUHK.

Date: July 3, 2024 (Wednesday)
Time: 15:00~16:30 (Hong Kong Time)
Zoom Meeting: 905 330 9693

Deep Ridgelet Transform: Harmonic Analysis for Deep Neural Network

Speaker: Prof. Sho Sonoda
RIKEN AIP

Abstract: The ridgelet transform has been developed to study neural network parameters, and it can describe the distribution of parameters. Mathematically, it is defined as a pseudo-inverse operator of neural networks. Namely, given a function f, and network NN[γ] with parameter γ, the ridgelet transform R[f] for the network NN satisfies the reconstruction formula NN[R[f]]=f. For depth-2 fully-connected networks on a Euclidean space, the ridgelet transform has been discovered up to the closed-form expression, thus we could describe how the parameters are distributed. However, for a variety of modern neural network architectures, the closed-form expression has not been known. In this talk, I will introduce a systematic method to induce the generalized neural networks and their corresponding ridgelet transforms from group equivariant functions, and present an application to deep neural networks.

Bio: Sho Sonoda is a Permanent Senior Scientist at Deep Learning Theory Team (PI: Prof. Taiji Suzuki), RIKEN AIP. He received the degree of Doctor of Engineering from Waseda University in 2017 under the supervision of Prof. Noboru Murata. He joined RIKEN in 2018, and he was tenured in 2021. His expertise is in theory and application of machine learning, and especially in the ridgelet transform for neural network.